Determinants of Demand for and Repayment of Farm Credit in Economies with Market Coordination Failures: A Tanzanian context

Deus D. Ngaruko[28]

Abstract

This study examines the determinants of farmers' participation in farm credit market in Tanzania. Both neoclassical economics and new institutional economics perspectives were applied in the current study to analyze determinants of demand for- and repayment of farm credit for Tanzania respectively. Data were collected from a survey of 75 agrocredit contracts in Western Tanzania. The demand analysis of farm credit has shown that demand for farm credit is determined by incentive and capacity to acquire the credit. It is argued that in economies with market coordination failures the demand for farm credit can only be justified if farmers are capable and willing to repay the credit they acquired in the past. It was also found out that the agrocredit repayment rate by borrower farmers in the study area increased with increase in implied cost of forms of coercion used to enforce repayment, quality of borrower farmer's characteristics, utility cost of borrower's degree of guiltiness or shame, value of multilateral relationships with market actors and value/volume of borrowed agrocredit. The paper concludes that under market coordination failures, the investment in social network and personalised relationships is inevitable in promoting supply and hence effective demand for farm credit

Key words: farm credit demand, farm credit repayment, market coordination failures

[28] Centre for Economics and Community Economic Development, Open University of Tanzania, Box 23409 Dar es Salaam, Email: deus.ngaruko@out.ac.tz; ngarukoddp@yahoo.co.uk

1.0 Introduction

In rural Sub-Saharan Africa the decline in supply from government agencies following structural adjustment reforms, has not been adequately compensated for by an increase in private supply, a situation exacerbated by the growing underlying demand for credit as farmers intensify production to respond to new market opportunities, as well as land scarcity and soil exhaustion. Even where the services are extended to rural clients, small agricultural producers are only rarely able to access (Dorward et al 1998). The elimination by the government of credit, inputs and output subsidies and the privatization of agricultural marketing organizations (which has de-linked credit, input and output markets) have led to high market coordination failures. Market coordination failure is narrowly defined here as the situation where one or some of the complementary markets or activities are missing in an economy thereby affecting performance of other markets. In this case credit, inputs and output markets are complementary to each other thus absence of one affects the other. Thus credit suppliers incur transaction costs to overcome transaction risks characterised by the absence of efficient complementary markets especially in poor rural areas. This poses a major policy challenge to developing financial institutions that are effective in targeting low-income small farm households while at the same time pursuing commercial viability. To some extent, structural adjustment programmes have been successful in generating a more favourable macroeconomic environment in some developing countries. However, ongoing market reforms and privatisation have not yet produced appreciable improvements in the provision of agricultural support services, nor have they increased farm profitability. Ngaruko (2008) argues that if anything, small farmers often have less access to rural banking and to other institutional agricultural lending facilities than before.

The banking sector progress in Tanzania has been relevant only to the mainstream banking system and its urban clients. The latter make up less than 10% of the Tanzanian population. For the low-income population concentrated in the rural areas, it is obvious that the closure of rural branches of the country's largest and state-owned commercial bank, the Cooperative and Rural Development Bank (CRDB); privatisation of the National Bank of Commerce (NBC); and the discontinuation of the Central Bank's directed agricultural credit have had an adverse impact on the delivery of financial services to the rural areas. As a consequence, the principal providers of financial services to the rural poor have been the Savings and Credit Co-operative Societies (SACCOS), foreign donor-assisted Non Governmental Organisations (NGOs) and informal financial institutions (e.g. moneylenders, relatives, interlinked/interlocking contracts etc).

Various types of interlinked credit arrangements such as nucleus estate outgrower schemes, sharecropping and contract farming have emerged as significant mechanisms to finance seasonal farm production. Interlinking of supply of agricultural inputs with credit and output marketing works well in a single-channel marketing system. It also works for tradable agricultural commodities as well as those which require highly specialised marketing, storage and processing facilities. Where alternative marketing outlets exist loan repayment may not be guaranteed because borrowers can opt to sell crops to other buyers (Dorward et al, 1998; Klein et al 1999).

There is growing evidence (See for example Poulton, 1998 and Mwakaje, 1999) that some categories of smallholder cash crop farmers in Tanzania are now relying on semi formal and informal arrangements for financing seasonal farm production. Poulton observed that some cashew producers in Mtwara Region obtained seasonal credit from private traders through a transaction that is interlocked with input (sulphur) or with blowing services. Dorward et al, (1998) distinguish interlinked from interlocking contracts in that the former extends beyond seasonal input-output market contracts whereas the latter is confined only to input-output contracts. Unlike in interlinked contracts, interlocking does not carry the restriction that prices in the different markets be jointly determined. They argue that interlocking seeks to enforce repayment of a pre-harvest loan through tying its recovery to activities in the output market. Mwakaje (1999) on the other hand explores the relative efficiency of various interlinked contractual arrangements between private traders and smallholder coffee farmers in Rungwe district. She observed an impressive performance for interlinked contractual arrangements between private traders and primary co-operative societies.

1.2 Research Problem

The emergence and evolution of semi formal and informal institutional arrangements in Tanzania has occurred outside the banking regulatory framework. Without a banking licence, deposits usually cannot be mobilised, debt instruments cannot be used and capital markets remain inaccessible. It is thus obvious that the range of funding sources for semi formal and informal financial intermediaries is narrower than that of formal financial institutions (Giehler, 1999). Connected to this weakness, Gallardo *et al*, (2003) point out that there is no readily available organized information on the operations of the emerging credit suppliers such as private traders providing microfinance services in Tanzania particularly in rural areas. Kydd et al (2001) in their work on the international perspective on rural and farmer finance, point out that there seems to exist a knowledge gap about transaction arrangements adapted to supplying financial services to meet seasonal demand in rural areas following the defunct state initiatives.

The reasons commonly put forward in the literature for the inability (lack of willingness) by formal private financial institutions to get involved in rural finance are varied, and sometimes contradictory. In general most studies associate the low effective supply of financial services to low private profits due to risks that are unique in rural areas and in agriculture (Kydd et al 2001, Dorward and Kydd, 2002; Elhiraika *et al*, 1998; Shreiner, 1997). Contrary to this, there is evidence of some successful stories illustrating the possibility for private financial organisations to make profits by engaging in rural and agriculture financing (See for example Temu, 1999; Yaron et al, 1998). However, Giehler (1999) argues that most of the widely discussed microfinance success stories and technologies do not address the specific constraints of lending to smallholder agriculture. This suggests that there are unexplored core reasons beyond risks involved in financing agriculture that may be responsible for the supply lags of formal financial institutions in the farm credit market. Thus the objectives of this paper are two fold: first, to apply explain determinants of farm credit in rural Tanzania; and second, to determine core factors affecting borrower’s compliance to loan repayment in rural Tanzania.

2.0 Conceptualising demand for farm input credit by smallholder farmers

2.1 Neoclassical Economics perspective

The neoclassical economic theory presumes that the intersection between demand and supply functions of farm input credit determines the profit maximising level of the input credit. As noted previously, the demand function for farm input credit is referred to as a derived demand because it is determined to the larger extent, by the final demand for crops to be produced. Apart from the input credit borrowing interest rate, the demand for farm input credit depends on the price of the crop(s), prices of other inputs that substitute for or complement the input that is demanded and also the technical transformation of the input(s) into output (i.e. production function parameters). Thus economists would argue that a profit maximising decision process will shape the demand curve. Figure 8.1 shows a hypothetical example of a production process with a single input credit. A farmer will maximise profit at the point where the value of marginal product (VMP) equals the marginal factor cost (MFC)[29] as illustrated in Figure 8.1. When the MFC declines (all else equal) the profit maximising quantity of input credit demanded increases. If certain key factors such as output price or agronomic technologies change to make the input credit more productive, then the VMP curve shifts to the right from VMP1 to VMP2.

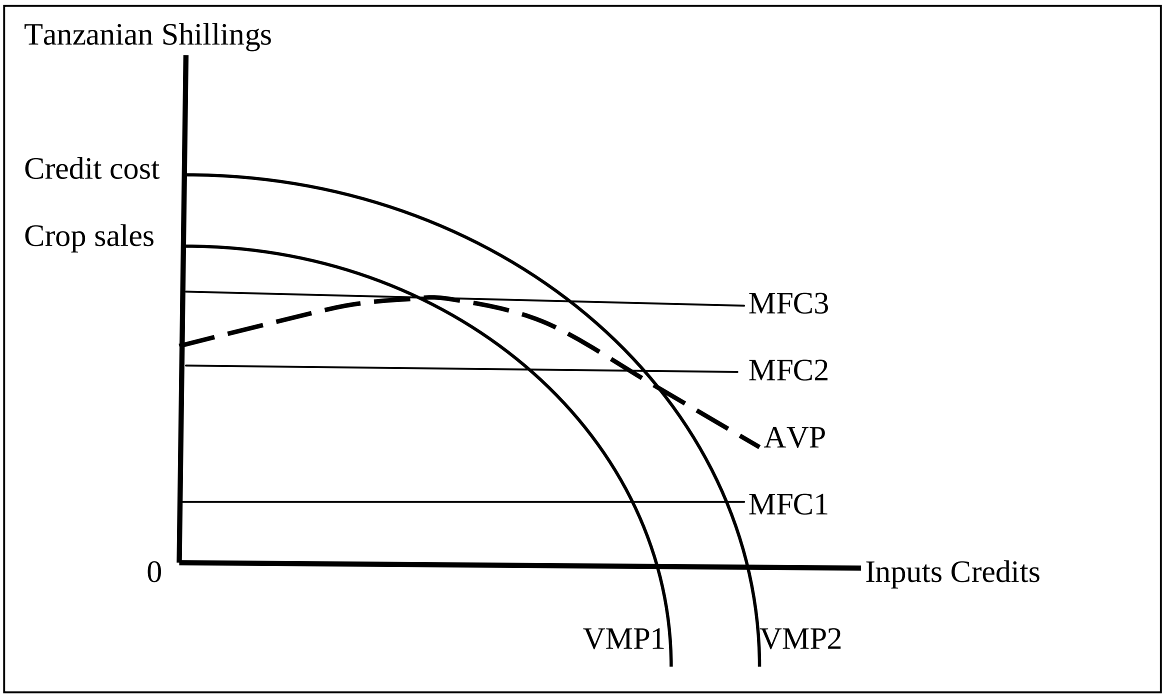

Figure 1: Demand for input credit to the crop production process

The rightward shift in demand curve increases the level of demand at any level of MFC. The concept of profit maximisation remains a theoretical concept that seldom matches with real

[29] VMP = marginal physical product × output price. MFC = cost of adding the last unit of input.

smallholder decision making process. Kelly (2005) outlines four assumptions that underlie the functionality of profit maximisation concept i.e.

(i) the farmer seeks to maximise profit from the input credit use
(ii) the farmer knows the physical response curve
(iii) the farmer is able to estimate output prices for the next marketing season and
(iv) the farmer faces no risks or constraints related to access to credit sources and input purchases, production or output marketing

Therefore, it is unlikely that farmers make profit maximising input credit demand decisions because none of the above assumptions are realistic particularly in Sub Sahara Africa. In addition, most farmers in poor countries face serious economic constraints such as high price risk and low income which limit their effective demand for farm input credit. Many smallholder farmers have difficulties in adopting recommended technical crop management practices because of low education. There are also institutional problems that limit the development of human capital and performance of the input credit and output markets. In diagnosing causes of weak effective demand for fertiliser for example, Kelly (*op.cit*) suggests that it is important to use analytical framework that goes beyond the simple arithmetic of profit maximisation.

2.2 Modelling determinants of demand for farm credit

The demand for farm input credit (Q (D)) which is measured as the value of input credit acquired can be viewed as the function of two broad factors: incentives to borrow (I) and capacity to access and use the input (C). Put in mathematical form this statement can be expressed as follows (holding other factors constant)

$$Q(D) = f(I, C) \tag{1}$$

Incentives include factors that directly influence the profitability of the input credit such as input credit yield potential (Y), price for the input credit (P_i) and output price (P_y). The capacity to acquire and use the input credit depends on human and financial capital. Human capital can be measured in terms of farm labour availability (L), educational and skills level (S) and experience in borrowing (E) whereas financial capital can be expressed in terms of farmer's wealth (W) indicated by value of food stocks, livestock and farm assets/equipment and access to credit sources (A) measured in terms of number of available sources of credit from which a farmer is eligible and willing to borrow. Therefore equation 1 can be rewritten as:

$$Q(D) = \alpha_0 Y^{\alpha_1} P_i^{\alpha_2} P_y^{\alpha_3} L^{\alpha_4} S^{\alpha_5} E^{\alpha_6} W^{\alpha_7} A^{\alpha_8} \varepsilon^{\mu} \tag{2}$$

Where α_{0-8} are randomly assigned parameters that vary from one farmer to another. For econometrical specification purposes, a natural logarithmic transformation functional form is applied on Equation 2 to give a log-linear demand equation of the form represented on Equation 3

$$\ln Q(D) = \alpha_0 + \alpha_1 \ln Y + \alpha_2 \ln P_i + \alpha_3 \ln P_y + \alpha_4 \ln L + \alpha_5 \ln S + \alpha_6 \ln E + \alpha_7 \ln W + \alpha_8 \ln A \quad (3)$$

Where $\alpha_0 \geq 0; \alpha_1, \alpha_3, \alpha_4, \alpha_5 > 0; \alpha_2, \alpha_6, \alpha_7, \alpha_8 < 0$

The expected signs of elasticities indicated in equation 3 are postulated from hypotheses that are linked to Figure 1. For example, the overall improvement in capacity to access and use input credit by farmers as well as improvement in human capital are likely to shift the demand curve outwards by positively inspiring farmers' perceptions of the economic potential of investing in agriculture hence increased effective demand for input credit. Improvements in financial capital on the other hand will shift the demand curve leftwards where farmers tend to demand less input credit but maintaining same net crop sales. This is so especially where farmers can avoid creditors' stringent contract enforcement mechanisms by purchasing farm inputs using own sources. Decrease in cost of borrowing (interest plus transaction costs) will move a farmer along the same demand curve to a higher quantity of input credit. However, it should be noted that both incentives and capacity are affected by broader factors such as technologies and general institutional environment as well as the local degree of market coordination.

2.3 Determinants of farm credit repayment by farmers: A New Institutional Economics perspective

2.3.1 Credit Market Participation Model

For a credit transaction contract to occur, and hence market participation, parties must believe that a given set of mutual obligations governing the transaction is respected. Fafchamps (2004) summarises the various mechanisms economic agents are to comply with transaction contracts into categories such as guilt or shame, legitimate or illegitimate coercion, threat of bilateral retaliation, and retaliation inflicted by third party group of people that are not part of the contract. Guilt and shame are internal emotions that may be harnessed to enforce the individual's behaviour. Whereas one feels guilt for an action even if no one knows about it, shame on the other hand comes from disapproval from others. Fafchamps (2004) argues that although guilt and shame are not tractable in economic modelling, they can be powerful motivations for human behaviour particularly in rural areas where social interaction is highly integrated. The legitimate coercion involves the legal enforcement of contract through courts, which ultimately relies on the state's monopoly over legitimate force. Illegitimate force can be used to enforce contractual obligations in which parties may resort to insults and violence directly, hire thugs, or bribe policemen to intervene. Fafchamps points out that whether legitimate or illegitimate, use of coercion to enforce contracts is costly.

A threat of retaliation is another mechanism that induces compliance with contractual obligations. For such a mechanism to work, parties must interact with each other repeatedly over time. Retaliation can be in form of refusal to further transaction (bilateral punishment strategy) or inflicted by a group of people not part to the contract (multilateral punishment strategy). For the bilateral punishment strategy to be effective in deterring breach of contract the relationship between parties must be worth preserving. A group punishment requires a co-ordination mechanism and circulation of information about contract compliance within the group.

Let us apply Fafchamps market model and consider a farm credit market contract that involves two prime parties: a farmer and a credit supplier. The farmer agrees to repay *f* amount of money (cash or in kind) at a future time period, t_1 to the credit supplier in exchange for *k* amount of money (cash or in kind) at present time t_0. Let us further assume that parties must value *f* and *k* differently so that gains from the exchange to occur i.e. the farmer likes to receive *k* more than paying *f* and vice versa for a credit supplier. Adapting Fafchamps model, two scenarios for a farmer and credit supplier to effectively participate in the market are conceptualised respectively in the subsequent sections.

2.3.2 Farmer's Compliance to Contract Model

At time t_1 a farmer may decide whether or not to comply with the contract i.e. repayment of f . The cost of complying with the contract varies with farmer's characteristics e and unanticipated shocks w. A farmer with other sources of income such as wage from non-farm employment will find it easier to repay the loan than a subsistence farm-based low income farmer during the drought period. Thus the cost of the farmer of repaying *f* amount can be presented as $\pi(f,e,w)$. In case of breach of contract, the farmer will receive a payoff of 0 but is subjected to incur some forms of punishment previously discussed. A rational farmer fulfils the contract if the cost of complying is smaller than all penalties combined. This statement can be presented in equation form as:

$$\pi(f,e,w) \le G(e,w) + P(e,w,c) + V(e,w) + R(e,w) \qquad (4)$$

Where:

(i) *G(e,w)* is the utility cost to the farmer due to guilt or shame

(ii) *P(e,w,c)* is the cost to the farmer due to various forms of coercive action e.g. harassment, threat, court action etc. These forms of coercive actions are determined by the form of contract/governance structure

(iii) *V (e,w)* is the value of the relationship i.e. the expected discounted value of future transactions with the credit supplier

(iv) *R (e,w)* is the value of the lost reputation i.e. the expected discounted value of future transactions with all those who will refuse to transact with the farmer after a breach has occurred.

If $\pi(f,e,w) = \infty$, the borrower farmer will be unable to comply with the contract and the farmer will unlikely accept *k* value credit, if any, only a smaller amount of *k* is sought. Equation 4 assumes that a borrower farmer makes decisions *ex post* on whether to comply with the terms and conditions of the farm credit. Alternatively a farmer may consider *ex ante* whether or not to accept the terms and conditions of the farm credit. Based on this assumption, a rational borrower will borrow farm credit if and only if he or she expects to derive some benefit from the contract given his or her characteristics, say $e*$. Then the value of receiving *k* for the borrower is denoted as $\pi(k,e^*)$. In period t_1, the borrower farmer either repays and incurs a cost of $\pi(k,e^*,w)$, or does not pay and incurs the punishments listed in equation 4. Thus given farmers characteristics e^*, repayment occurs with probability $f_{e^*}^{w''}\partial F(e,w/e^*)$. The farmer therefore agrees to the contract if and only if equation 5 holds i.e.

$$\pi(k,e^*) \geq f_{e^*}^{w''}\pi(f,e^*,w)\partial F(w/e^*) + f_{w}^{e^*}[G(e^*,w) + P(e^*,w,C) + V(e^*,w) + R(e^*,w)]\partial F(w/e^*) \quad (5)$$

where, the first term of the equation is the borrower farmer's gain by complying with the loan i.e. repaying *f* value of principle loan amount plus interest and other charges in future by accepting *k* value of credit now. The second term refers to the expected cost of complying when compliance occurs (repayment is done) and the third term which is identical to equation 4 represents the expected cost of punishment when compliance does not occur (loan defaulting).

From equation 5 it can be observed that if the enforcement is zero i.e. *e=w''*, the credit supplier expects no payments at all, and no contract is concluded. Similarly, if enforcement is very harsh and even the most trustful borrowers are occasionally unable to comply, the expected cost of punishment is larger than the gains from engaging in the contract. As a result, the borrower either does not borrow at all or reduces the risk of default by borrowing smaller amount of *k*. Fafchamps argues that for a transaction to occur enforcement must be sufficiently strong to deter opportunistic breaches but not so strong to scare away all potential borrowers.

2.3.3 Credit Suppliers Compliance to Contract Model

Consider that at time t_0 a credit supplier is asked to supply k amount (cash or in kind) in exchange for a future promise of f amount (cash or kind). Let $\Pi(k)$ and $\Pi(f)$ be the value of k and f to the credit supplier. The supplier will be willing to participate in the transaction if there are gains from the contract concerned i.e. if $\Pi(k) > \Pi(f)$. In forming beliefs about the likelihood of receiving f, a rational supplier evaluates the chances of being paid i.e. the probability that equation 5 will be satisfied. To evaluate this probability, the supplier uses all the available information (υ) at time t_0. Among others this information includes prior information about the distribution of potential characteristics of the borrower farmer, information gathered overtime through direct interaction with the farmer concerned, and the information conveyed by others about the borrower. Let $f(e,w/\upsilon)$ be the joint cumulative distribution over e and w that captures the credit supplier's beliefs given information υ. Assuming that it is easier for a farmer to repay in good states (i.e. without shocks) and that the farmer has more to lose in good states than in bad states, we can postulate w^* as the level of shock w at which equation 5 is exactly satisfied and the borrower farmer with characteristics *e* is just indifferent between compliance (loan repayment) and breach (loan default) of contract. Thus equation 4 takes a form of equation 6:

$$\pi(f,e,w^*) = G(e,w^*) + P(e,w^*C) + V(e,w^*) + R(e,w^*) \quad (6)$$

Equation 6 shows that for any shock w above w^* the farmer repays hence compliance to the contract. For any shock below w^* no payment is made hence the farmer defaults. Thus a rational credit supplier agrees to a contract (offers a loan contract) if and only if amount he or she expects to receive is greater than what is supplied. Formally this statement can be presented as:

$$\pi(k) \leq E[\pi(f)/v) = \pi(f)\Pr(Payment) = \pi(f)\int_{e'}^{e''}\int_{w'}^{w''}\partial F(e,w/v) \quad (7)$$

Where (*e'*, *e''*) and (*w'*, *w''*) are respectively the lowest and highest values that e and w can take. The double integral in equation 7 is necessary to take care of the fact that the probability of being repaid must be computed over all possible features of the borrower of which the supplier does not know. Equation 7 indicates that if the supplier had complete knowledge of the farmer's characteristics, *e*, then the probability of supplier being repaid would be equal to the probability that the exogenous shock w, is greater than w^*.

The credit supplier may be able to affect the probability of repayment by affecting the contractual form, *C*. For instance mortgaging farmer's real assets to service the debt or arranging for legal security, which tends to be costly. Assuming there are *n* possible forms (C_n) that a contract can take, each with own cost B_n, the supplier must choose the contractual form, C_n so that $E[\Pi(f)/v] - \Pi(k) - B_n$ is maximised. Fafchamps (opt cit) argues that the solution to this optimisation problem can be to bypass formal guarantees if contract enforcement mechanisms other than $P(e,w,C)$ are sufficient. If the transaction can be enforced through repeated interactions for example, namely through $V(e,w)$ and $R(e,w)$, one can expect the credit supplier to use little or no use at all of formal guarantees and of the court system. Small transactions are more difficult and costly to enforce through courts than large transactions, as result small farmer loan transactions are mainly self-liquidating, with immediate loan repayment and no delayed obligations (Fafchamps, opt cit).

3.0 Methodology

Literature on methodologies of rural financial studies in developing countries shows two major distinctive approaches. The first is the Rural Financial Market Approach (RFMA). This is principally based on the neoclassical economic assumptions of the perfect competitive market in which rural financial market linkages, roles and operations are holistically analysed. This approach has been a focus of rural credit analysis for many scholars in rural financial markets (e.g. Adams and Vogel, 1986 etc). The second alternative approach used to study rural financial market has been the Agricultural/Farm Finance Approach (FFA). This approach is based on the supply mechanism for financing agriculture. FFA leads to a conclusion that the prime role should be to promote lending institutions to channel credit to agriculture. The approach has an emphasis in individual entities in the market such as lenders, borrowers, traders, intermediaries etc and their interaction. The defunct state controlled farm credit initiatives followed the basics underlining this approach[30].

Compared with RFMA, FFA looks more appropriate for a developing country like Tanzania where competitive markets are yet to be realised (Kashuliza, 1994). However, the later is linked to market distortions by the state through market controls and subsidisation of state owned institutions. The current policy debate in rural financial market as also put forward by Dorward et al (1998) is to devise a policy that ascertains what the governments can do to enable private credit institutional innovations in forms and terms that conform to smallholder seasonal needs. Therefore due to its top down approach as well as the potential for state controls over the market, proponents of market reforms (neo-classical economists) see FFA as inappropriate approach. Therefore the RFMA would seem necessary at this time to assess an overall impact the liberal rural financial market has had so far in rural areas and in agriculture sector in particular. Nevertheless, as previously discussed, financial market reforms in Tanzania have not yet managed to yield expected competitive rural financial market. This implies that adoption of RFMA in studying rural financial markets in Tanzania may not as well be appropriate.

Nonetheless, due to the importance of both approaches, and the specific objectives of this study, both approaches were adopted to some extent. Whereas, FFA was used to study farm level individuals and variables and their relationship to farm credit, the RFM was used to assess the reasons behind delays in establishing formal, competitive and sustainable rural financial market in Tanzania. Both FFA and RFMA follow the Neoclassical Economics (NCE) principle assumption of perfect credit market in which within given time and space, some form of uniform cost of borrowing (interest rate) across all economic agents is exogenously determined by market forces of supply of and demand for credit.

The New Institutional Economics (NIE) theory is the best alternative and ideal approach for assessing the real functioning of the rural financial market particularly in Sub Saharan Africa (Dorward et al, 1998). From the NIE view, markets are perceived as rarely perfect, hence incorrect to adopt the Neoclassical Economics theory of competitive markets to analyse market behaviour. NIE approach incorporates both the RFMA and FFA. According to NIE, the economy works along the continuum between market hierarchies (formal, state regulated institutions) and competitive market. In the continuum is a set of various transaction cost minimising market contractual hybrids (informal and semi-formal institutions) which are in transition from hierarch of arrangements towards NCE's perfect market. It can be rightly stated from Williamson's (1995) view on Transaction Cost Economics (TCE) analysis that unless there is an alternative to such market arrangements, the prevailing contractual arrangements are efficient because they bridge the unmet credit demand (for this case) by smallholder agriculture. The current study applies NIE approach to assess the supply chain of the credit market for small-scale farmers' seasonal credit demand.

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[30] See for example Kashuliza (1994); and Temu (1994) for the application of FFA in Tanzania prior to the prevailing reforms.

3.1 Data collection and analysis methods

As pointed above, the study followed the *quali-quant mixed methods* research approach where qualitative data were computed into quantitative data. This thus necessitated transforming qualitative data analysis into quantitative data analysis. Major tools used to collect data were interviews (oral and semi structured questionnaire), documentation review and observation. The study followed the Dorward's (2001) simplest pathway in primary data collection in which a researcher observes variables of interest in the field and immediately records the data. Data were collected from 75 purposefully observed bilateral credit contractual arrangements between suppliers of credit and borrower farmers or credit intermediaries. The data collected from suppliers were geared towards quantifying transaction cost of lending/borrowing across each contractual arrangement as well as data on determinants of market entry.

3.2 Choice and measurement of variables used in the study

3.2.1 Repayment to Debt Ratio (RRATIO)

RRATIO was the dependent variable in farm credit demand and compliance models. A borrower farmer will repay the loan if there is a net gain from repaying. The gain can be in form of monetary profit or non monetary gain like good social relationship with the credit supplier. Thus different borrowers value the gain from the credit contract differently depending on the contract terms and conditions and also on the features of the institutional arrangement through which farmer received farm credit. RRATIO which is principally the repayment rate was computed as a ratio of the amount so far repaid to the total debt. Total loan was measured as a summation of principle, interest, fees and charges the farmer was supposed to pay at the end of the contract, and all costs incurred in the course of making repayments. The transaction costs included transport costs to and from repayment office for each instalment as well as opportunity cost of time spent in making payments. A farmer who had fully repaid had a ratio of 1 whereas a farmer who completely failed to repay has a value of 0. Figure 2 and table 1 indicate that the repayment rate (RRATIO) was about 78% with about 40 out of 75 (53.3%) of farmers having fully repaid their loans.

Table 1: Descriptive Statistics of selected determinants of farm credit repayment

	N	*Minimum*	*Maximum*	*Sum*	*Mean*	*Std. Deviation*
RRATIO	75	.00	1.00	58.28	.7770	.29866
CCOMPLIANCE	75	.01	2.47	30.04	.4006	.49057
VBIRELATE	75	.01	1.00	36.62	.4883	.36358
FCHARACTER	75	-11.00	16.00	68.00	.9067	4.08085
FSHOCKS	75	-18.00	14.00	25.00	.3333	8.16441
CGUILTINESS	75	-8.00	22.00	194.00	2.5867	5.52658
CCOERCION	75	-10.00	10.00	-6.00	-.0800	2.86998
VMULTIREL	75	857.14	358666.67	3660667.5	48808.90	51357.24
VCREDIT	75	1500.00	1920000.0	4725890.0	63011.86	225408.38

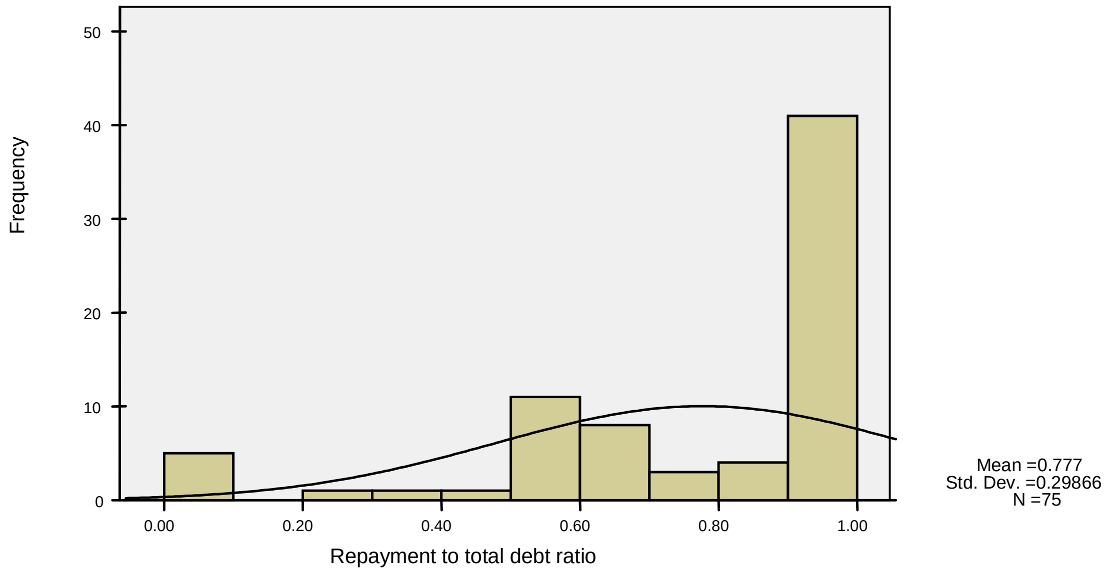

Figure 2: Farm Credit repaid to total debt ratio

3.2.2 Cost of Compliance with credit repayment (CCOMPLIANCE)

Cost of compliance with credit repayment was measured as ratio of total debt to total farm income. For the farmer to comply with loan repayment, total debt must not override total farm income from crops to which the farm credit was used. A ratio of 1 implies that a farmer breaks even by repaying (earns no profit) but does not face coercive costs implied in case of failure to repay. Controlling for other costs of production, a CCOMPLIANCE ratio above 1 implies that farm income alone is not sufficient to cover the total debt thus the cost of compliance with repayment is unbearably high. Therefore the higher the CCOMPLIANCE ratio the lower the amount of farm credit debt repaid by borrower farmer. Farm credit with a CCOMPLIANCE ratio of 0 or near to zero will not receive any repayment from the borrower farmer unless the farmer finds coercive actions too costly to incur. Figure 3 shows that a larger proportion of farmers had a CCOMPLIANCE score of less than 0.5 with sample CCOMPLIANCE score of 0.4 but none had a zero score (Table 1). Thus CCOMPLIANCE is negatively related to RRATIO.

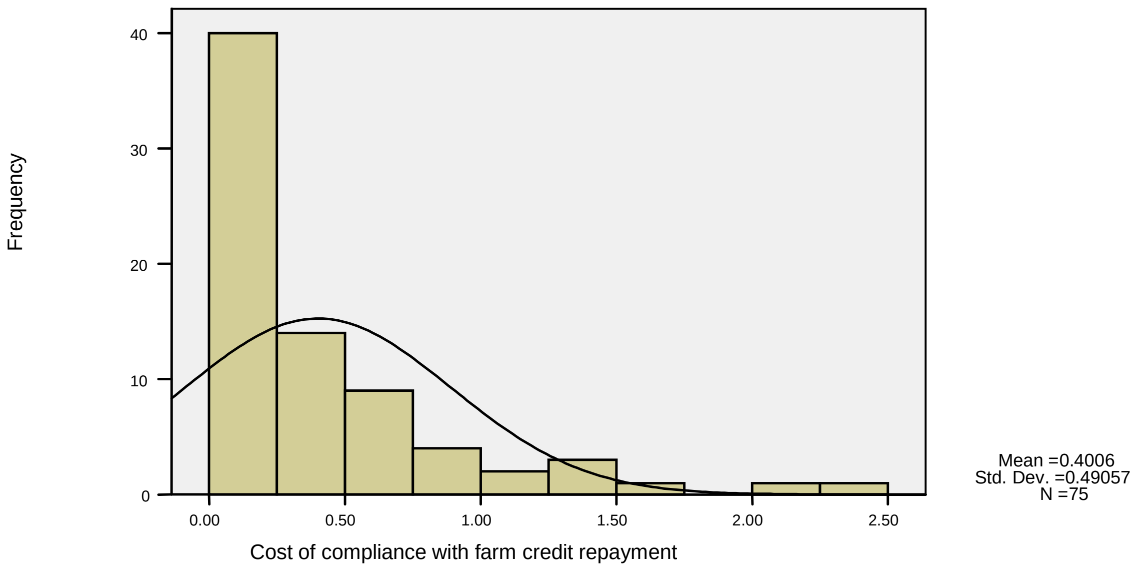

Figure 3: Cost of compliance with farm credit repayment

3.2.3 Quality of farmer's characteristics (FCHARATER)

The quality of the farmer's characteristics is a variable that depicts farmer's description of own attributes relevant to credit borrowing. This information is embedded in the farmer himself to which a credit supplier may not have an access. The assumption is that borrowers know what their strengths and weaknesses are when borrowing, which could have an impact in their ability or willingness to repay.

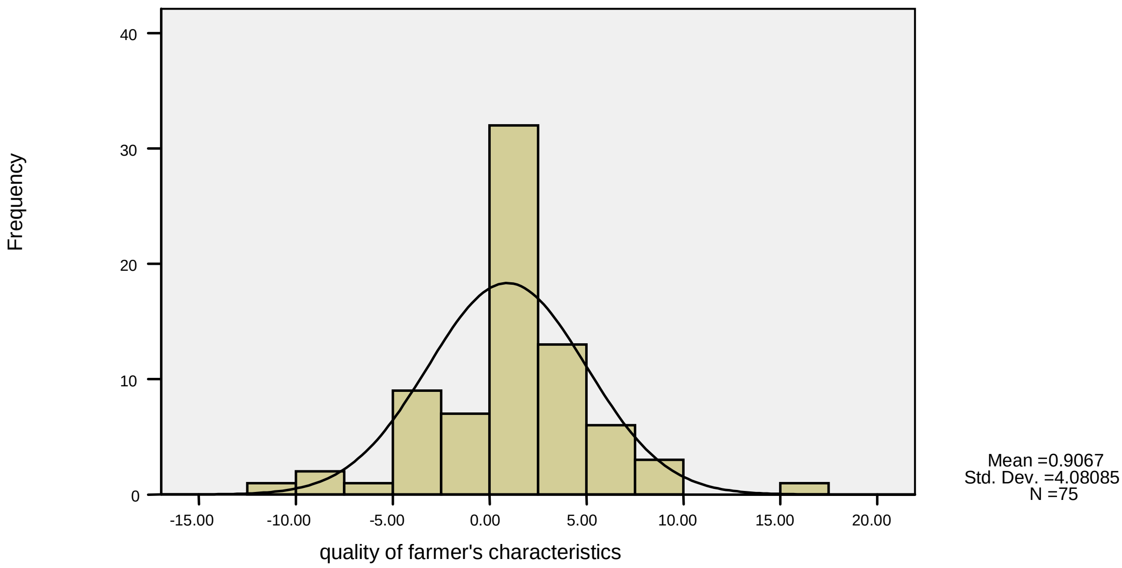

Figure 4: Quality of farmer's characteristics

A weighted score was obtained for each borrower. Using attitudinal scale some characteristics of importance to the farmer (e.g. multiple sources of income, experience in borrowing, ability to increase yield and sales, social capital, reputation from community etc) were arranged in ascending order of their importance each with a corresponding weight. The overall score for each respondent was computed as the summation of the weighted scores from all the important attributes. The higher the positive score the higher the borrower quality and vice versa. Table 1 shows that although the mean sample FCHARACTER score was small, it was positive implying that the qualities of the borrowers were important in their abilities to repay the due loans. Thus FCHARACTER is expected to significantly have a positive relationship with RRATIO hence compliance to credit contract.

3.2.4 Unanticipated farm output shocks (FSHOCKS)

Unanticipated shocks affecting farm performance such as bad weather, theft, pests and diseases, low commodity prices, low demand and other commodity market failures affect individual farmers differently. FSHOCKS variable was computed as a weighted score of all important attributes of unanticipated shocks that might have affected credit repayment potential of the borrower. Many honest smallholder borrower farmers experiencing any form of farm income shocks would be willing but not able to repay the borrowed credit because their farms are not insured. Some lending institutional arrangements do lend to borrowers who have alternative sources of income in addition to farm income with expectation that non farm income would supply loan repayment during the shock period.

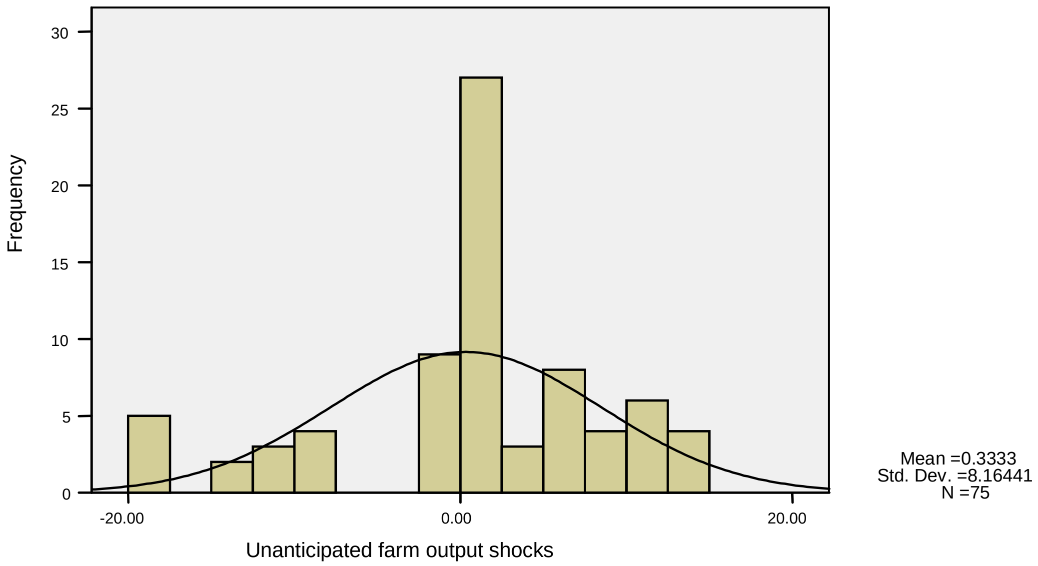

Figure 5: Unanticipated farm output shocks

In general terms presence of shocks negatively affects expected RRATIO and hence increased probability of failure to comply with the credit contract.

3.2.5 Utility Cost of Guilt or Shame (CGUILTINESS)

Although it is argued that shame and guilty are not amenable in economic modelling (Fafchamps, 2004), shame and guilt are however very important determinants of one's reliable honesty to credit repayment. The major problem relies in assessing them. CGUILTINESS measures the cost implied in a borrower's efforts to overcome likely guilt or shame from the community resulting from failure to repay. CGUILTINESS was measured as a score of most important attributes that best described the extent to which they influenced farmer's behaviour to comply with the credit repayment to avoid feeling guilty or ashamed. Examples of such attributes include respectable community leadership, commitment to religious beliefs, loyalty to the laws and regulations, reputation of the household, relationship with people with high public reputation (e.g. religious leaders), involvement in politics, highly respected member of the family by the public (e.g. one's close relative) etc. Perception of these attributes was obtained from farmers using a 5 point attitudinal Likert scale. For each farmer, CGUILTINESS was computed as the summation of weighted sores from each attribute in the Likert scale. The higher positive score indicates the extent to which it would be too costly (in terms of felt guilt or shame) if one failed to repay the loan and vice versa. Thus CGUILTINESS has a positive impact on RRATIO and consequently compliance to credit contract.

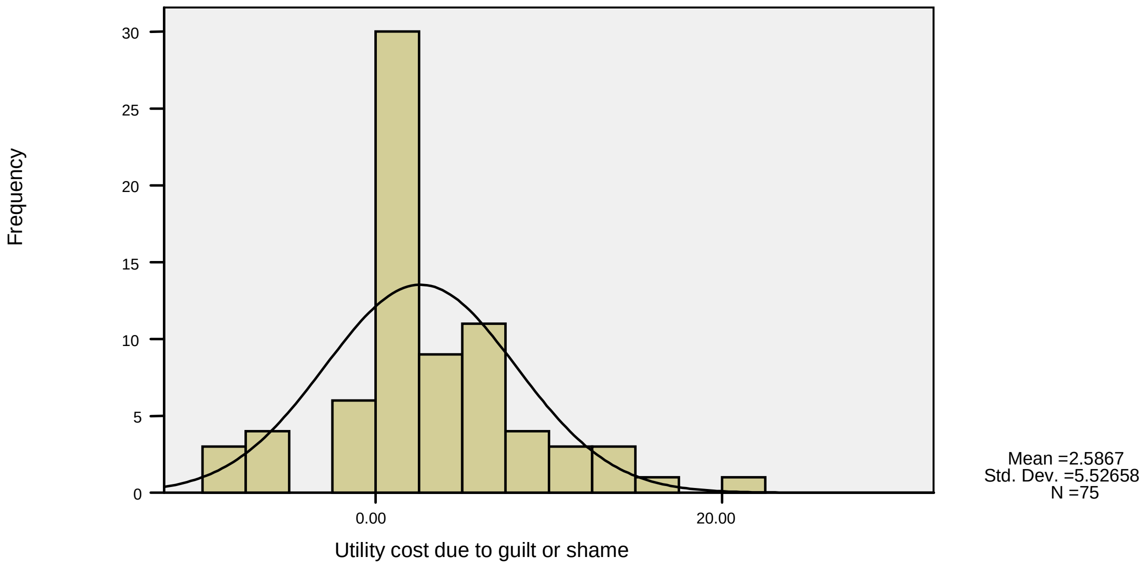

Figure 6: Utility cost due to guilt or shame

3.2.6 Cost due to Forms of Coercion (CCOERCION)

Forms of credit repayments enforcement such as coercion which are adopted by many rural credit suppliers do impart some costs to borrower farmers. The costs range from monetary and physical injury to psychological depending on the form of coercion used. Whether formal (e.g. use of police or courts) or informal (e.g. physical attack by hired third party persons), any form of coercion has a cost implication to a borrower and indirectly as opportunity cost of overcoming the coercion threats (e.g. transport costs and opportunity costs of time spent on seeking for an excuse from the lender). If for instance, for any contract in which the probability of CCOERCION is beyond certain higher levels, potential borrower farmers will not be motivated to apply for that particular farm credit, however important the credit is to the farmer. CCOERCION was measured as a score transformed from a 5 point attitudinal scale where farmers were asked to rate the extent to which the avoidance of consequences of coercive actions likely to be adopted by the farm credit supplier in case of failure to repay. The higher the positive score the higher the cost of forms of coercion.

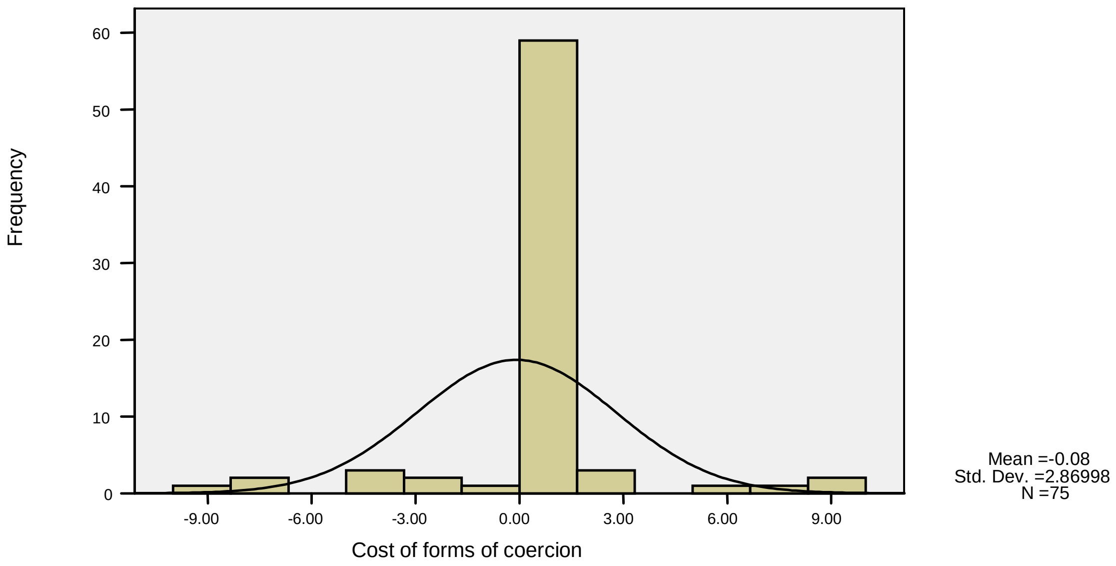

Figure 7: Cost of forms of coercion

3.2.7 Lost Value of Bilateral Relationship (VBIRELATE)

The lost value of relationship between credit supplier and a borrower farmer was measured as the farmer's opportunity cost of the supplier's termination of exchange dealings if the farmer defaulted. Thus VBIRELATE was computed as the ratio of the total volume of transaction from private supplier of the largest volume of the most important input credit to the farmer to farmer's total operational (transformation) cost of the farming system to which the loan was (to be) committed during the given farming season.

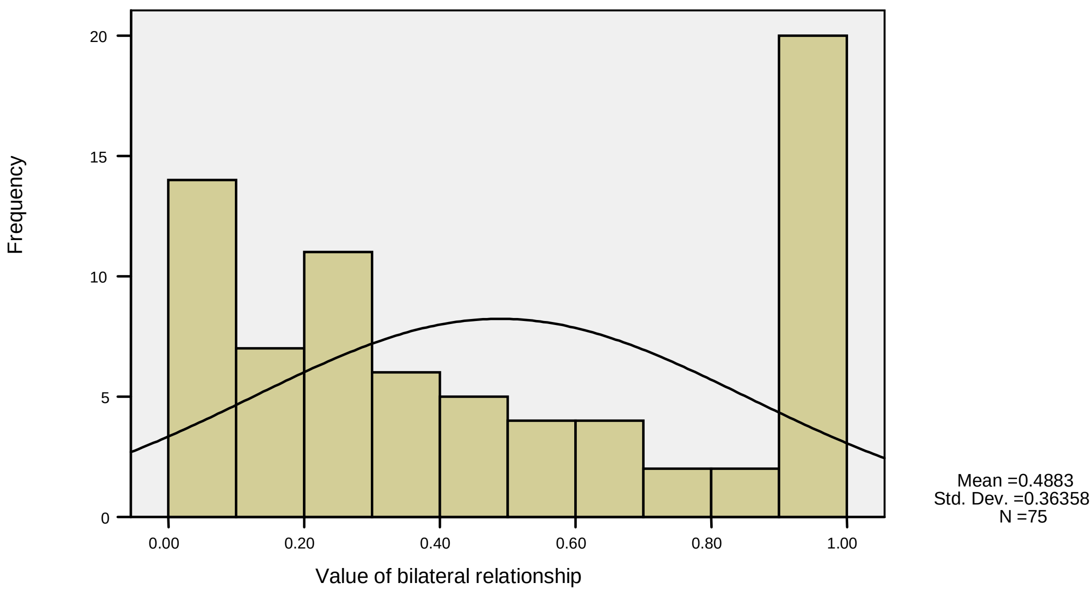

Figure 8: Value of bilateral relationship

A farmer with a higher ratio (close to 1) is likely to repay the loan as this implies a substantial financial deficit to finance production in the subsequent season should the bilateral relationship be terminated. This is expected to be so common in rural areas where credit market is more or less monopolistic. Table 1 shows that sample mean VBIRELATE was 0.49 ranging from 0.01 to 1. Therefore we postulate that VBIRELATE is positively related to RRATIO.

3.2.8 Loss of Value of Multilateral Relationship (VMULTIREL)

A farmer who has lost reputation from a bilateral relationship with a credit supplier is likely to lose reputation from all relationships with trade partners in other market dealings in which the farmer participates. This is common especially in rural areas where traders dealing with the same do share information about the farmer provided that their individual market share is not affected by the shared information. Where a farmer receives more than one service (e.g. input credit and output market), a failure to repay the loan could lead to a direct loss of reputation not only in input credit but also in output market dealings with the other trade partners. The opportunity cost of loss of value of multilateral relationship is the total gain from the foregone dealings which are reflected in total farm income.

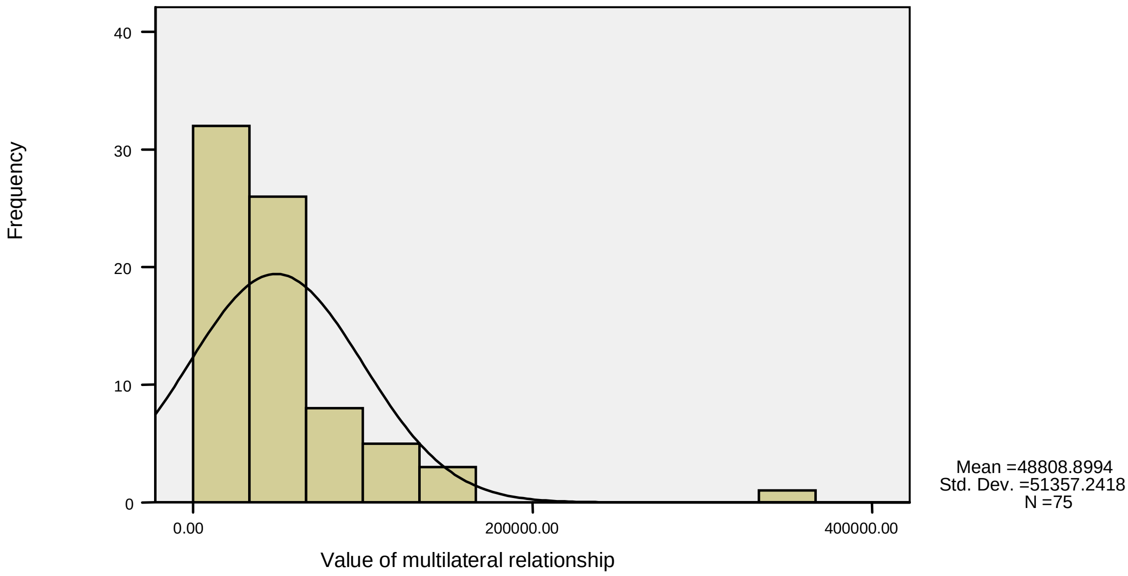

Figure 9: Value of multilateral relationship

To take into consideration the effect of farm size on total farm income, average total farm income was used as a proxy measure of VMULTIREL since a farmer would likely earn no farm income without any trade partners dealing with the farmer. The average farm income (value of crop sales per total farm size) which was measured in TShs per ha reflects the capability of the borrower's farm to generate sufficient returns to cover loan repayments as well as farmers' needs. However farmers can generate higher incomes if production and marketing environments are favourable. A farmer is largely dependent on credit from all market participants (productive input suppliers, crop buyers, labour suppliers etc) to realize higher incomes. Farmers with higher farm incomes are likely to repay their due loans after crop sales compared to those with low levels of farm returns. Thus the farmer has to keep all the market agents by fully complying with the farm credit terms otherwise he or she may face retaliation from the market actors which may lower farm incomes. Therefore it can be hypothesized that farm returns increases with access to all markets and vice versa, holding other factors (e.g. weather) stable across farms. Table 1 indicates that the sample mean value for VMULTIREL was TShs 48,808.90; however the range between minimum and maximum VMULTIREL was very significant. VMULTIREL is expected to have a direct positive impact on RRATIO.

3.2.8 Value of farm credit borrowed (VCREDIT)

Demand for farm credit was measured in terms of the monetary value of total farm credit a farmer borrowed in the previous season. It is assumed that given farmers characteristics and external environment, the farmer will increase amount of farm credit if the implied cost of repaying the loan do not exceed the benefits and vice versa. In addition, if the farmer views the threats of failure to repay being higher or socially unbearable, this may force the farmer to borrow smaller amount of the credit that he/she feels repayable. A farm credit with very flexible repayment conditions/cost is expected to trigger farmers to increase volume of credit. Heavy farm credit borrowers in the study area had higher rates of failure to timely repay the loans.

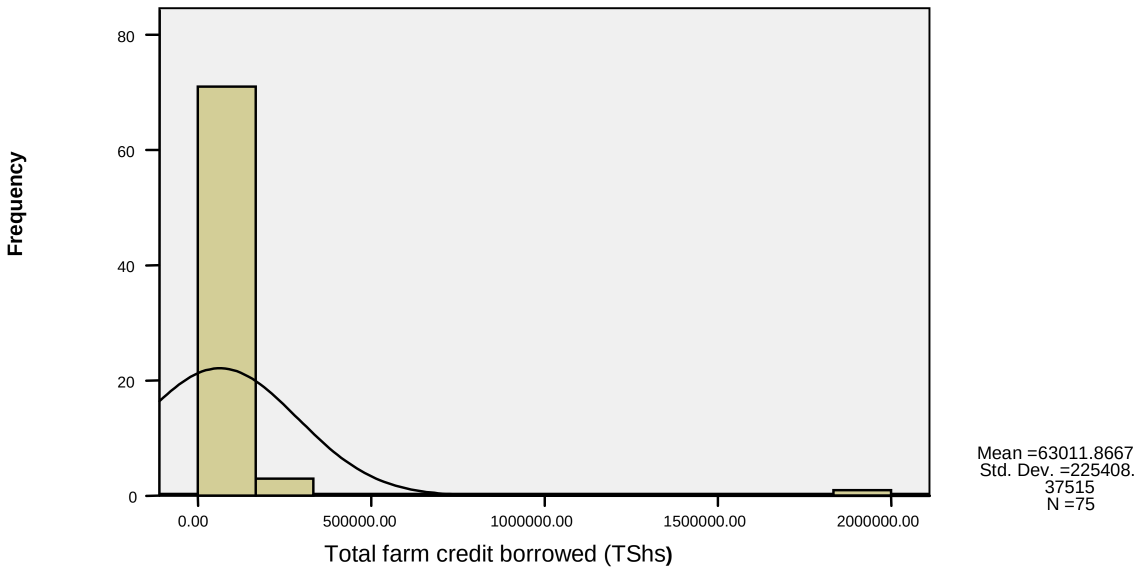

Figure 10: Total farm credit borrowed

It was also observed that the relatively well off farmers comprised of less than 15% of sample farmers were likely to fully comply with loan repayment and that these farmers had on average, acquired the least amount of farm credit. This presumes that repayment rate decreases with increase in volume of farm credit. Figure 10 and Table 1 show that the sample mean VCREDIT was TShs 63,011.89 and that most of the farmers on average had borrowed farm credit less than TSh. 200,000 although a very small proportion of borrowers obtained significant volume of farm credit of up to almost TShs. 2 million

4.0 Results and Discussions

Equation 3 was estimated based on survey data to model the demand function for farm credit in the study area. Table 2 summarises the definitions and descriptive statistics for selected variables in the analysis. A backward linear regression analysis was run to estimate equation 8.3 using Ordinary Least Squares Estimator.

Table 2: Variable definition and descriptive statistics for farm credit demand model

Variable	Definition/measurement	Descriptive statistics/frequency		
		Mean	Minimum	Maximum
FARM CREDIT(QD)	Total amount of farm credit (inkind +cash credit in TShs)	63,011.87	1,500.00	1,920,000.00
AVEREVENUE (Y)	Ratio of total crop sales to total land under crop production (TShs/ha)	48,808.90	857.14	358,666.67
LAND (F)	Total acreage of own suitable for farming/farm business (ha)	6.27	0.75	30.0
INTEREST(P_i)	Average interest rate (average of summation of interest rates on inkind and cash farm credit)	94.50	0.00	300.00
LABOUR(ha)	Number of hours spent by farmer on own farm out 10 hours working day	6	1	10
EDUCATION (S)	=1 if farmer had post primary education = 0 if otherwise			1 = 55 observations 0 = 20 observations
EXPERIENCE (E)	= 1 if farmer had acquired farm credit in the 80s, 90s and 2000s = 0 if otherwise			1 = 43 observations 0 = 32 observations
WEALTH (W)	Total monetary assets of farm assets and livestock (TShs)	399,621.47	6000.00	**2,203, 2000.00**
ACCESS (A)	Number of input credit source from which farmer has borrowed	2	0	**5**

Table 3: Correlation matrix for selected variables in the demand for farm credit model

	Education	*Experience*	*Wealth*	*Access*	*Interest*	*Land*	*Labour*	*Farm Credit*
Education	1							
Experience	-.150	1						
Wealth	.085	.182	1					
Access	-.170	-.280(*)	-.014	1				
Interest	.122	.036	-.085	-.029	1			
Land	.021	.178	.055	-.198	-.172	1		
Labour	-.481(**)	.439(**)	.037	-.246(*)	.044	-.148	1	
Farm Credit	.159	-.153	.048	.011	-.211	.210	-.181	1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The correlation coefficient matrix presented in table 3 shows no threat of multicolinearity problems because no pair of variables had significantly large Pearson coefficient to justify presence of serious collinearity problems[31]. It is however shown that access to many suppliers of farm credit and farmer's borrowing experience are negatively linearly collated. The same relationship is seen between number of hours a farmer spends on farm business and education as well as access to suppliers of farm credit. Experience and labour are positively collated. However, as noted before the correlation coefficients are too small to pose a threat of colinearity problems. The absence of significant linear correlation coefficient conforms the assumptions made on the demand model (equation 2) in which the demand function was assumed to be non linear.

Table 4 summarises the results of the regression analysis. In model 1 all the 8 explanatory variables were included in the analysis but only 5 explanatory variables were retained in the last regression step which is represented by model 4 in Table 5. The goodness of fit of the regression analysis was interpreted in terms of the significance of the ANOVA's F test statistic and R^2. In interpreting the regression output, both the unstandardised and standardised regression coefficients were considered. Whereas unstandardised regression coefficients express effects in terms of the natural units of the variables, standardised regression coefficient express effects in terms of standard deviation. In this study the Standardised coefficients are used to interpret the

[31] Several authors have offered guidelines for the interpretation of correlation matrix coefficients. The current study adopted the interpretation suggested by Cohen (1988) who suggested the following interpretation for correlation in psychological research.

Correlation	*Negative*	*Positive*
Small	-0.29 to -0.10	0.10 to 0.29
Medium	-0.49 to -0.30	0.30 to 0.49
Large	-1.00 to -0.50	0.50 to 1.00

coefficients because it's easier to immediately tell how strong an effect is i.e. how close to -1 or +1 without thinking about variable unit.

Table 5 shows that Model 4 is the best farm credit demand model because the model has all the variable parameters statistically significant. Model 4 indicates that average farm revenue and land are statistically significant at 1% significance level, education at 5% and borrowing interest rate and wealth at 10%. The model has negative elasticities for education level and interest rate suggesting that demand for farm credit decreases with increase in level of borrower's education and/or increase in borrowing interest rate. The negative impact of increase in borrowing interest rate on demand for farm credit somewhat conforms to the conventional demand theory as well as to the model hypothesis. The negative impact of level of education on demand for farm credit contradicts with the model hypothesis. The model suggests that the higher the education level the less the quantity of borrowed inputs will be demanded by the farmer. Although education is expected to be an important human capital that can trigger capability to outsource and use farm input credit, it seems to be the opposite for smallholder farmers in the study area.

There are several reasons that can explain this scenario. One of the explanations is that many of these farmers as described in previous sections are part time farmers with formal wage employment in the formal sector. Such farmers undertake farming as business to diversify their income sources by purchasing inputs using own savings. The alternative explanation is linked to the risk averseness of more educated farmers since they are capable of computing marginal returns from farming business. With the diminishing marginal returns in smallholder agriculture, highly educated farmers will shirk away from borrowing inputs to intensify production but rather will undertake extensive farming system by employing cheap farm labour. Many of the farmers with post primary education were also involved in input credit supply business. They hold relatively large consignment of input such as fertiliser and supply it on credit to other farmers and use the remaining lot to their own farms.

Thus these farmers will only apply fertilisers in their farms if they remain with surplus and they will rarely outsource such inputs. Another explanation for the negative impact of education level on demand for farm credit is the thinness of input market. The typology of smallholder farmers covered in chapter seven indicated that the educated farmers comprising of about 18.7% of sample were relatively large farmers who would require larger quantities of inputs than the current suppliers could afford. As such they tended to forego borrowing inputs all together since the credit limit was just too small to fulfill their investment demand.

Table 5: Estimated demand function for farm credit

Model	Explanatory Variables	Unstandardised coefficient		Standardized coefficient	t-value	Sig.	R^2	Adj R^2
		B	Std. error	Beta				
1	(Constant)	2.068	1.040		1.989	.051		
	EDUCATION	-.293	.161	-.249	-1.825	.073		
	EXPERIENCE	-.038	.270	-.072	-.142	.887		
	WEALTH	.118	.115	.112	1.023	.310		
	ACCESS	.207	1.265	.082	.164	.870	.658	.515
	AVEREVENUE	.425	.154	.332	2.764	.007		
	LABOUR	.093	.323	.035	.288	.774		
	INTEREST	-.358	.223	-.174	-1.605	.113		
	LAND	.603	.217	.327	2.783	.007		
2	(Constant)	2.032	1.000		2.031	.046		
	EDUCATION	-.292	.159	-.248	-1.834	.071		
	WEALTH	.120	.113	.114	1.059	.294		
	ACCESS	.031	.274	.012	.114	.909		
	AVEREVENUE	.423	.152	.331	2.782	.007	.658	.511
	LABOUR	.092	.320	.035	.286	.776		
	INTEREST	-.359	.221	-.174	-1.623	.109		
	LAND	.604	.215	.328	2.810	.007		
3	(Constant)	2.051	.979		2.095	.040		
	EDUCATION	-.294	.157	-.250	-1.871	.066		
	WEALTH	.119	.112	.113	1.063	.292		
	AVEREVENUE	.424	.151	.332	2.817	.006	.658	.508
	LABOUR	.089	.317	.034	.282	.779		
	INTEREST	-.364	.217	-.176	-1.677	.098		
	LAND	.600	.210	.325	2.856	.006		
4	(Constant)	2.111	.949		2.225	.029		
	EDUCATION	-.271	.134	-.231	-2.019	.047		
	WEALTH	.119	.112	.112	1.063	.092		
	AVEREVENUE	.426	.149	.333	2.851	.006	.657	.504
	INTEREST	-.365	.215	-.177	-1.693	.095		
	LAND	.588	.204	.319	2.877	.005		

Model 4 confirms earlier arguments by Kelly (2005) that demand for farm credit depends to a large extent on what happens to the crops during production as well as during the postharvest processes including crop marketing. This is envisaged in the significant positive impact of farmers' wealth, average farm revenue and access to land. Wealthy farmers own near to liquid assets such as livestock which can be sold to generate income, part of which can be used to repay the due cash credit. It was found that goats had liquid demand in the study area hence in some instances were used as form of collateral accepted by many local suppliers of farm credit.

The results of the model suggest that a one unit increase in either yield (average revenue) or land resource endowment increases demand for farm credit by one third. It was observed earlier that from mid 1990s to most recent more land was put under cotton and tobacco production in the study area due to improved commodity markets for these commodities. Output for these crops is highly dependent on the application of pesticides to control fungal diseases in cotton and nematodes in tobacco. Thus in the same period the demand by farmers for fungicides and nematocides had also increased. The construction by the state of the irrigation scheme for paddy production in Nyakayenzi village in the study area increased land to farmers who had little or had none at all. Since output of paddy production is to a greater extent determined by use of improved seeds and application of pesticides, this increased demand for these inputs which were supplied on credit under varying forms of contractual arrangements (credit contractual arrangements are covered in chapters nine and ten). The next section explains the farmers' compliance to credit repayment which is an essential part of the credit contract.

4. 2 Determinants of farmers' compliance to farm credit repayment

A multivariate regression model was estimated with the rate of repayment measured as the ratio of loan repaid to total debt (RRATIO) as the dependent variable. The backward regression analysis was used to estimate significance of 10 explanatory variables. At each stage, a variable with the least correlation with the dependent variable was excluded resulting to 10 different models. The Pearson's correlation coefficient was used to observe the multicolinearity between associations of pairs of variables. The correlation analysis helps to identify pairs of explanatory variables with very high correlation coefficient which if both are included in the regression analysis might result to autocorrelation or multicolinearity problems. Table 6 shows that all pairs of variables had small to medium Pearson's correlation coefficients. Although some variables had significant correlation, none of the variable pairs had large coefficients i.e. coefficients $\geq \pm 0.5$ which could signal the presence of multicolinearity problem.

Table 7 represents output of models 1 and 10 only whereas table 8 shows all the variables excluded in the last stage (model 10). It can be observed that model 10 contains explanatory variables which are significant at $p \leq 0.05$. The model explains about 46.1 percent of the variation in rate of repayment. The significant F value indicates that this is a significant amount of explained variables.

Table 6: Correlation Matrix for Selected Farm Credit Repayment

	RRATIO	*CCOMPLIANCE*	*VBIRELATE*	*FCHARACTER*	*FSHOCKS*	*CGUILTINESS*	*CCCOERCION*	*VMULTIREL*	*VCREDIT*
RRATIO	1								
CCOMPLIANCE	.048	1							
VBIRELATE	-.135	-.177	1						
FCHARACTER	.148	.040	.030	1					
FSHOCKS	.026	-.011	-.188	.027	1				
CGUILTINESS	-.196	.076	-.159	-.185	-.108	1			
CCCOERCION	.062	.252*	-.083	.130	.127	-.185	1		
VMULTIREL	.256*	-.118	-.156	.140	-.215	-.048	-.025	1	
VCREDIT	-.083	.488**	-.100	.155	-.102	.042	.359**	.034	1

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Results in model 10 in table 7 indicate that the coefficients of cost due to forms of coercion (CCOERCION), quality of farmer's characteristics (FCHARACTER), utility cost due to shame or guilty (CGUILTINESS), value of multilateral relationship (VMULTIREL) and value of farm credit (VCREDIT) were significant at ≤0.05. Except for VCREDIT whose parameter estimate had unprecedented sign, the parameters for CCOERCION, FCHARACTER, CGUILTINESS and VMULTIREL conformed to the expected signs. The cost of compliance with farm credit repayment (CCOMPLIANCE), value of bilateral relationship (VBIRELATE) and unanticipated farm output shocks (FSHOCKS) were excluded in model 10 because they exhibited very low partial correlation with the repayment rate hence their parameter estimates were statistically insignificant. Though statistically insignificant the parameter estimate for CCOMPLIANCE had expected sign whereas parameter estimates for VBIRELATE and FSHOCKS had signs contrary to set hypotheses.

Table 7: Results of the backward regression analysis of determinants of farm credit repayment[ab]

Model	*Variable*	*Unstandardized Coefficients*		*Standardized Coefficients*			
		B	Std. Error	Beta	*t*	*Sig.*	*Adj.R^2*
1	(Constant)	.793	.136		5.836	.000	
	CCOMPLIANCE	-.036	.080	-.059	-.449	.655	
	VBIRELATE	-.072	.102	-.087	-.707	.482	
	FCHARACTER	.019	.009	.263	2.184	.033	
	FSHOCKS	.001	.004	.018	.149	.882	
	CGUILTINESS	.015	.007	.279	2.198	.032	0.516
	CCOERCION	.014	.013	.101	.821	.415	
	VMULTIREL	1.35E-006	.000	.232	1.716	.091	
	VCREDIT	7.88E-008	.095	.138	2.088	.048	
10	(Constant)	.745	.048		15.401	.000	
	CCOERCION	.009	.064	.194	2.104	.027	
	FCHARACTER	.017	.008	.229	2.033	.046	0.461
	CGUILTINESS	.012	.006	.225	2.023	.047	
	VMULTIREL	1.61E-006	.000	.277	2.507	.004	
	VCREDIT	7.88E-008	.095	.138	2.088	.031	

a Dependent Variable: repayment to total debt ratio
b Model 10 F value = 4.146 Sig. (at p≤0.05) = 0.009

Table 8: Excluded variables[k] from model 10 by backward regression

Model		*Beta In*	*t*	*Sig.*	*Partial Correlation*	*Collinearity Statistics*
						Tolerance
10	FSHOCKS	.071(j)	.629	.531	.075	.938
	CCOMPLIANCE	-.091(j)	-.818	.416	-.097	.981
	VBIRELATE	-.127(j)	-1.134	.261	-.134	.948

j Predictors in the Model: (Constant), cost due to forms of coercion, quality of farmer's characteristics, utility cost due to guilt or shame, value of multilateral relationship, value of farm credit borrowed

k Dependent Variable: repayment to total debt ratio

5.0 Conclusion

It is thus convincing to assume that farmers are not only motivated by the factors shown in table 5 (model 4) to demand for farm credit, but also have to be able to complete the transaction by repayment of the loans when due. Acquiring the farm credit alone is not a guarantee that a farmer will be able to repay the loans and be able to repeat borrowing in the following season. In a similar study Ngaruko (2008) pointed out that in general terms there was tendency for decreasing number of farmers going for repeat-borrowing whereby the number was higher in the first borrowing than in the subsequent seasons from same source of credit/principle supplier. This suggests that high demand for farm credit is realised in the first time borrowing than in the subsequent seasons hence demand for credit decreases with farmer's repeat (experience in) borrowing.

The demand analysis of farm credit has shown that demand for farm credit is determined by incentive and capacity to acquire the credit. The major incentive factors were expected increase in average farm income, low cost of borrowing and access to land. The major factors of capacity to borrow were resource endowment (wealth) and education. However the analysis indicated that education had a negative impact on demand for farm credit. This is so mainly because most of educated farmers were wage employees in no farm sub sector hence they tended to use their own income to purchase inputs. Farm labour and experience in borrowing were not found significant factors determining demand for farm credit. The findings on farm credit repayment factors conforms to the hypothesis that under conditions of market coordination failures and thinness of markets, the compliance to farm credit transaction contracts is mainly based on nature of the human relationship between transacting parties rather than the cost of borrowing (interest rate).

The results of this study suggest that the agrocredit repayment rate by borrower farmers in the study area increased with increase in implied cost of forms of coercion used to enforce repayment, quality of borrower farmer's characteristics, utility cost of borrower's degree of guiltiness or shame, value of multilateral relationships with market actors and value/volume of borrowed agrocredit. As noted before the parameter estimate for the volume of borrowed agrocredit had a positive sign contrary to the hypothesis. This implies that the increase in quantity of agroinput credit is associated with increased performance of the crop to which the credit is used, which in turn enables the farmer to repay the loan. Thus smaller quantities of agroinput credit were not sufficient enough to yield surplus farm income to repay the loans hence low repayment rate for small borrowers.

Given the fact that the explanatory power of the model was not very high and that the current study was conducted with a small number of observations from a single district and for a shorter period of time, it could be premature to generalize these findings. Wider coverage of similar studies using panel data could increase reliability of these findings.

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