TENURE ARRANGEMENTS AND ACCESS TO CREDIT:THE CASE OF SMALL-SCALE FARMERS IN THE NORTHERN PROVINCE

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It has been argued that indigenous land tenure arrangements influence individual incentives to invest in improvements (like watering points) and the ability to finance such investment through access to credit. In this study, data from small-scale livestock owners in the Northern Province are analyzed. The results indicate that those stockowners who operate on communal grazing with restrictions on the use of the common resource, earn more net farm income and invest in watering points. They are also more likely to have access to credit as compared with those stockowners who operate on open access with no restrictions on the use of the commons. The results have some positive implications for the formation of group schemes to manage livestock production in communal grazing areas in South Africa.

1. INTRODUCTION

The complex nature and state of agriculture in Sub-Saharan Africa in recent years has set debate over the suitability of customary land tenure for capital intensive agriculture (Migot-Adholla and Bruce, 1994). Dorner (1972) has questioned the appropriateness of customary tenure systems for capital intensive agriculture and the adoption of new technologies. During the 1980s, many researchers (i.e. Boserup, 1981; Cohen, 1980; Noronha, 1985; Feder and Noronha, 1987; Bruce, 1981; etc), raised serious questions about the rigidity of customary land tenure systems. They suggested that indigenous tenure systems are dynamic and have historically adapted to economic and technological changes. However, Binswanger and McIntire (1987) characterized the typical stages of transformation from more diffuse and collective to more specific and exclusionary individual rights and concluded that the trend towards increased privatization provides the necessary incentive to invest in the particular land. From this and other observations, it is evident that indigenous tenure arrangements may not be entirely inimical to capital intensive agriculture. Harisson (1978) however contends that because customary tenure systems are deeply embedded in cultural and political systems and generally offer members of particular social groups overlapping multiple rights of land use, they tend to exclude nonmembers of use rights of the land. According to Migot-Adholla and Bruce (1994) these processes of customary tenure arrangements distort factor markets and undermine full integration of rural economies into national and international markets. In addition, because they permit partible inheritance, customary tenure systems contribute to land fragmentation and encourage uneconomically wasteful litigation. Anim and Lyne (1994) also found that in rural areas of the former Ciskei, private access to communal grazing land was more or less limited to those households or individuals who have influence on the local chiefs.

To remedy these problems, development specialists in South Africa and elsewhere have favoured intervention programmes of land reform aimed at changing rules governing access to land and introducing new institutions of land administration. For example, Lyne and Nieuwoudt (1990) suggest privatization of communal grazing land as the only solution to investment problems while Vink (1986), on the other hand, suggests an institutional approach to livestock production in communal grazing areas in South Africa.

It has been argued that restricted access to land which provides tenure security is an important condition for agricultural development (Place *et al*, 1994). Compared with open access with it's weak insufficient property rights, secure rights based on economic theory are believed to increase access to credit use. This, again, is believed to lead to investment which raises productivity growth (Feder *et al*, 1988). Whether greater security of land rights under indigenous tenure has a positive payoff through these linkages is the crucial issue which this study intends to address.

Place *et al*, (1993) attempted to use a reduced form equation describing the joint effect of supply- and demand-side factors on the household's use of credit in Ghana, Kenya, Uganda, Rwanda and Somalia. The dependent variable was a household's level binary variable for the use of credit in the past year. However, in some cases, credit use was too infrequent in most regions to warrant statistical analysis. Again, the study covered areas of rainfed agriculture only. Nevertheless, they came to a conclusion that the use of formal credit was positively related to land rights but did no appear to be significant. The question still remains about the suitability of indigenous land rights for extensive pastoral and livestock systems. In the South African context the debate has been carried on without benefit of rigorous empirical tests of the relationship between indigenous tenure arrangements and the probability of a farmer having access to credit.

The objective of this study is therefore to examine the relationship between credit use and tenure security. Based on research by Place *et al*, (1993), credit is considered a binary variable reflecting the incidence of credit used during a specified period. In a similar manner, a binary logit regression model is employed in this study to examine the relationship between credit use and tenure security.

2. DIFFERENT PROPERTY REGIMES

According to Cousins (1995), there are four types of property regimes: (1) State property; (2) Private property; (3) Common property; and (4) Non-property or open access. In the Northern Province, where this study was carried out, small-scale stockowner operate mostly on open access and common property or group schemes (Fényes, 1982; Balyamujura, 1995). These two property regimes are therefore discussed in this section.

Non-property (or open access): Non-property refers to the type of property institution where there are no defined group of users or 'owners' and so the benefit stream is available to anyone (Wilson and Thompson, 1993). Individuals have both privilege and no right with respect to use rates and maintenance of the asset. The asset is an 'open access' resource (Bromley and Cernea, 1989; Anim and Lyne, 1994). Under this regime, no individual is excluded from the use of the resource or its benefits and this is equivalent to there being no property rights at all (Lyne and Nieuwoudt, 1990). The individual rights of inclusion therefore depend on rights of the group or community to exclude others. It is for this reason that 'open access' has been accurately described as "everyone's property is nobody's property" (Baber, 1991).

Open access to a resource implies the absence of restrictions affecting its use (Wilson and Thompson, 1993). It is these restrictions that define the various rights, ranging from open access through common property and finally private property regimes, but whatever the arrangements, a move from unrestricted open access to a structure of well defined use rights results in agreement with a minimum coalition to call for the observation of the restrictive rules (Runge, 1981). Thus the process of forming restrictive rules involves reaching agreement and if all possessors of the rights to the resource reach consensus then the need for coercion and the social costs of enforcing the regime will be much lower (Runge, 1985). Runge (1985), also views the decision by a person on whether or not to cooperate in observing a rule as a binary choice with externalities. It is binary because the choice is between cooperation and defection with external effects because a decision to cooperate or not alters the use of the resource by the other agents (Runge, 1985). In the study area, this type of property regime was the most common and has arisen due to the history of tenure arrangements but more importantly due to population pressure on land. This type of property regime was selected for comparison with groups schemes (common property or communal tenure systems).

Common property: Common property refers to the case where the management group (the 'owners') have the right to exclude non-members, and non-members have a duty to abide by exclusion (Hardin, 1968). Individual members of the management group (the 'co-owners') have both rights and duties with respect to use rates and maintenance. Common property is characterised by a number of norms and conventions that regulate the use of the resource and are importantly characterised by restricted access (Anim and Lyne, 1994). Common property is not everybody's property but it is owned by a finite and distinct group of individuals (Baber, 1991). An individual's right to the benefits from this jointly held resource are dependent upon the membership of, or acceptance by the group or community. This community or joint owners have the right to exclude others (Baber, 1991). In the study area this type of property regime was found to be acceptable to the community and seemed to be emerging in diverse forms, for example, in the form of group schemes, but appear to attract mostly elite farmers rather than the subsistence farmers in the area. Since the present land reform policies encourage this type of tenure arrangement, farmers in this group were selected for analysis.

3. DATA COLLECTION

Three agricultural districts in the Northern Province were selected for the study: Nebo, Sekhukhune and Thabamoopo. A combination of structured and open ended questionnaires were used for data-gathering. This was done through personal interviews with each respondent.

It should be noted that the technique of an interview method has its limitations due to its dependence on the respondent's memory and the possibility of induced or unintentional bias which could not be ruled out (Murphy and Sprey, 1982:27; Tapson, 1990:75). Nevertheless, these deficiencies which could not be entirely eliminated, were minimised by the open ended questionnaires which were added to the structured questionnaires to introduce some flexibility in providing answers to the questions (Behr, 1983:150). Furthermore, the enumerators were briefly prepared so as to be able to rephrase some difficult questions in the local language (Selltiz *et al*, 1961:238; Bembridge, 1984:22; Tapson, 1990:75).

In most cases the questionnaires were completed by enumerators from the responses of the stockowners. Where possible, the respondents completed the questionnaires under the supervision of enumerators (livestock inspectors). Enumerators were used to avoid sample bias because small independent farmers, often illiterate, tend to be suspicious of visitors from outside the village (Bembridge, 1986; Fényes, 1982:1).

In all a total of 134 stockowners constituted the sample for the survey. The raw data collected were cross checked with figures from the Lebowa Agricultural Corporation (LAC) and the Department of Agriculture and Forestry in Lebowa.

4. METHODOLOGY

This study adopted a theoretical model describing the relationship between tenure arrangements and access to credit. Nevertheless, it would be too naive to claim a complete agreement on the conceptual and methodological approach for studying such a complex topic. Nevertheless, some conclusions are made using general descriptive statistics.

The general conclusion reached that there is a positive relationship between tenure arrangements and access to credit, has also been reached by other researchers of the World Bank from studies in other African countries, for example: Kenya, Senegal, Somalia, and Uganda (Roth *et al*, 1994; Golan, 1994; Carter *et al*, 1994; Migot-Adholla *et al*, 1994). In this study, the concern is not about the amount of credit obtained by the stockowner, but the probability of a positive event (access to credit) occurring. A causal model is hypothesized and because of the way in which stockowners were asked to respond to the survey instrument, the observations on the dependent variables of the model are dichotomous, i.e., they have values of one or zero (Garrod and Willis, 1995). Therefore, ordinary least squares (OLS) would be inappropriate because of the implied heteroscedasticity of the error terms (Gordon *et al*, 1994). Moreover, the use of generalized least squares (GLS) with correction for heteroscedasticity is inappropriate because the predicted value of the dependent variable may still be outside the unit interval between i.e. zero and one (Gordon *et al*, 1994).

In an attempt to constrain the estimated probabilities between the 0 and 1 range, alternative functions have been developed. Recently, univariate and multivariate logit and probit models have been used extensively to study farmers behaviour (Anim and Lyne, 1994; Gordon *et al*, 1994;

Hussain *et al*, 1994). The two most popular cumulative distribution functions (CDF) commonly chosen to model regressions where the response variable is dichotomous:

(i) The Logistic CDF (Logit model); and

(ii) The Normal CDF (Probit model or Normit model) (Gujarati, 1988:480).

A logit model is used because its underlying assumptions are less restrictive than those of other methods. Additionally it is free from the problems attendant with the use of OLS or GLS. Discriminant analysis is also another possibility but is rejected at this stage because it assumes the existence of two distinct population groups (Gordon *et al*, 1994) as in the first analysis where two groups of stockowners (open and communal access) were considered. Probit analysis is a third potential estimation technique but it is also not used in this paper because as noted by Gordon *et al* (1994), the distributional assumptions necessary to validate the probit analysis are frequently not fulfilled in econometric models. A logit model however is more appropriate because it enables one to hypothesize that there is some probability of an incidence occurring at any given circumstance. In the logit model, it is assumed that the odds of the dependent variable are a log-linear function of the exogenous variables, X_i, of the form:

$$L_i = In\ (p_i/1-p_i) = \beta X_i + \mu_i$$

where
L_i = the log of the odds ratio (*Logit*);
p_i = a column vector of exogenous variables;
β_i = a row vector of slope coefficients;
X_i = independent variables in the equation; and
μ_i = error term (Gujarati, 1988:480).

The hypothesized logistic regression model can be expressed as follows:

Access to credit = $\beta_0 + \beta_1$ Tenure + β_2 Net farm income[1] + β_3 Watering points + β_4 Net off-farm income + Control variables + e

where
β_0 = constant;
β_i = weighting coefficients; and
e = error term.

The coefficients of "Tenure", "Net farm income", and "Watering points" are expected to be positive, while that of "Net off-farm income" is expected to be negative.

5. RESULTS

5.1. Socio-economic characteristics of stockowners

From the definition of open and common property arrangements, stockowners in the study area were grouped into two i.e. those operating under open access and under common property arrangements. Out of 134 respondents 87 stockowners operated on open access while 47 were on common property grazing (Table 1).

There are more male stockowners with common property access to grazing than those on open access. Stockowners on open access grazing are older, the majority are married, and they have more children than those on common property grazing.

The possession of radio and television sets, measured as a proxy for the use of mass media, was higher amongst stockowners with communal access to grazing than those on open access. In general, private investment (i.e. improvements like fencing, watering points, herd quality improvement and pasture improvement) amongst stock owners on open access was comparatively lower than on common property grazing. The weak evidence of pasture improvement amongst stockowners on open access grazing is in line with economic argument that stockowners on open access lack incentives to improve the quality of the pasture (Lyne and Nieuwoudt, 1990). The distribution of private investment shows that investment of less than R30 000 is higher amongst stockowners on open access than on common property grazing.

Investment of more than R61 000 is higher amongst stockowners on common property (Table 2). Net farm income, off-farm income and access to credit are higher amongst stockowners on common property grazing as compared to those on open access. However, the stocking rate is higher amongst the latter group.

5.2. Variable correlations with tenure arrangements

The results of the correlations showing the relationship between selected socio-economic variables and tenure arrangements are reported in Table 3. All the variables except the number of cattle owned on the commons, show positive relationships with tenure arrangements. The results suggest that the higher net farm income, access to credit, investment in fencing, watering points, pasture improvement and herd quality improvement, the more likely a stockowner has restricted access to grazing land. However, a more potent predictor of restricted access to grazing land was whether a stockowner invested in fencing (r = 0,75), watering points (r = 0,62) and have access to credit (r = 0,68).

In contrast, the results suggest that stockowners owning large numbers of cattle are less likely to operate on restricted access grazing. An indication that low stocking rate is associated with restricted access to grazing land in the study area. These results seem to support the economic argument that tenure and group arrangements influence individual incentives to invest in improvements like fencing, pastures and watering points and ability to finance such investment through borrowing.

5.3 The logistic regression analysis

The results of the logistic regression analysis are presented in Table 4. Exponential (b_i), or exp (b_i), presented in the last column, is the factor by which the odds, or probability of having access to credit, changes when the corresponding explanatory variable increases by one unit (Norusis, 1990:49). If b_i is negative, exp (b_i) is less than one and the factors represented by the corresponding variable decreases the odds. Conversely, if b_i is positive, exp (b_i) is greater than one and the odds are increased. Therefore, exp (b_i) indicates the direction of the change in the odds associated with respective explanatory variables. Interpretation of logit coefficients differ from linear regression (Barlow and Nieuwoudt, 1995).

The coefficient signs for the variables **Tenure**, **Net farm income**, and **Watering points** are positive, while that for **Off-farm income** is negative as expected. The results

Table 1: Socio-economic characteristics of stockowners

Variable	Units	Open access (n=87)	Common property (n=47)	Overall (n=134)
Sex (=1, male; =0, female)	%	31,00	40,00	34,00
Age	years	59,16	52,45	58,81
Marital status =1, married; =0, otherwise)	%	70,00	68,00	69,00
Number of children	%	6,43	5,49	6,10
Use of mass media (-1, if access to radio and TV; = 0, otherwise)	%	19,00	26,00	22,00
Private investment	(R/year)	22 131,01	26 504,26	23 664,93
Net farm income	(R/year)	5 589,2	14 956,60	8 874,78
Net 0ff-farm income	(R/year)	3 373,56	5 770,21	4 214,18
Access to credit (= 1, if access to credit; = 0, otherwise)	%	15,00	85,00	49,00
Number of cattle owned		20,14	18,77	19,66
Fencing (= 1, if invested in fencing; = 0, otherwise)	%	00,00	66,00	23,00
Watering points (= 1, if invested in watering points; = 0, otherwise)	%	2,00	55,00	21,00
Pasture improvement (= 1, if invested in pasture improvement; = 0, otherwise)	%	00,00	17,00	6,00
Herd quality improvement (= 1, if invested in herd improvement; = 0, otherwise)	%	6,00	26,00	13,00
Good veld condition (=1, if veld was assessed to be 'good'; = 0, otherwise)	%	23,00	32,00	26,00

Table 2: Distribution of estimated value of private investment

Private investment (Rand/year)	Open access (n=87) (%)	Common property (n=47) (%)	Overall (n=134) (%)
Less than 30 000	73,60	68,10	22,40
31 000 - 60 000	21,80	23,40	22,40
More than 61 000	4,60	8,50	6,00

Table 3: Selected variable correlations with tenure arrangements (tenure = 1, if stockowner had restricted access; = 0, if stockowner had open access to grazing land; n = 134)

Variable	Correlation coefficient (r)
Private investment	0,1082
Net farm income	0,2989**
Net off-farm income	-0,1514
Nuber of cattle owned	-0,0627
Access to credit facilities	0,6848**
Fencing	0,7464**
Watering points	0,6223**
Pasture improvement	0,3428**
Herd quality improvement	0,2837**
Veld quality improvement	0,0970

** P < 0,001; (1-tailed)

suggest that the odds of having access to credit facilities, decreases with increasing off-farm income. An indication that those stockowners who depend on off-farm income in the area do not have to rely on credit facilities for investment in livestock production. The opposite is true with restricted access to grazing land, net farm income, and investment in watering points. It is highly probable that those stockowners who have restricted access to grazing land as compared to those with open access, share to a

Table 4: Estimated logistic regression model

Dependent variable = Probability of having access to credit **Number of observations: 134**							
Variable	Estimated coefficient	s.e.	Wald	df	Sig.	R	Exp (B)
Tenure	4,90**	1,80	7,42	1	0,01	0,174	133,64
Net farm income	0,01**	0,00	19,65	1	0,00	0,313	1,00
Net off-farm income	-0,01	0,00	1,60	1	0,21	0,000	1,00
Number of cattle	0,06	0,05	1,32	1	0,25	0,000	1,06
Fencing	1,95	1,61	1,46	1	0,23	0,000	0,14
Watering points	2,43*	1,27	3,66	1	0,06	0,096	1,36
Pasture improvement	7,27	28,30	0,07	1	0,80	0,000	1440,09
Herd quality	0,74	1,62	0,21	1	0,65	0,000	0,48
Good veld condition	1,38	1,19	1,33	1	0,25	0,000	0,25
CONSTANT	6,48**	1,60	16,41	1	0,00		
		Chi-square		df		Sig.	
-2 Log likelihood		44,982		123		1,0000	
Model Chi-square		134,887		10		0,0000	
Improvement		135,887		10		0,0000	
Goodness of fit		95,539		123		0,9684	
Access to credit correctly classified = 96,30%							
Non-access to credit correctly classified = 90,57%							
Overall percentage of 134 cases correctly classified = 94,03%							

** $P < 0,01$; * $P < 0,10$

lesser extent, exclusive rights to the resource, and its rents accrue to the group as a whole. They could have been able to obtain credit from the government or financial institutions.

A statistically non-significant -2LL (minus two log of the likelihood), indicates the predicted model is not significantly different from the perfect model (Barlow and Nieuwoudt, 1995). The goodness of fit statistic which compares observed probabilities with those predicted by the model is not significant. In other words, the observed probabilities are not significantly different from those predicted by the model. An indication that the model is reliable (Norusis, 1990:52). The improvement statistic tests the null hypothesis that coefficients for variables added at the last step are zero (Norusis, 1990:5).

The classifications of access and non-access to credit groups are very high (96,30% and 90,57% respectively). The function also correctly classified a total of 94,03 per cent of the 134 cases in each group (when prior probabilities reflected relative group sizes). These results enforce the goodness of fit statistic (Barlow and Nieuwoudt, 1995). The high values of the Wald statistic for "Tenure", "Net farm income", and "Watering points" suggest that amongst the non-control variables, these variables are significant and have relatively high partial contributions to access to credit. The results indicate that tenure arrangements, net farm income, and investment in watering points are highly significant contributors of stockowner's access to credit in the study area. However, net off-farm income is not. These results seem to support the economic argument that tenure and group arrangements influence the ability to finance investments in improvements through borrowing.

6. CONCLUSIONS AND POLICY RECOMMENDATIONS

Empirical evidence in this study shows that user groups are likely to benefit from access to credit facilities for investment. Higher farm income is also likely to influence the possibility of getting access to credit for investments in fixed improvements (eg. watering points). In common with most other pastoral tenure systems, resource control in Bedouin Libya, watering points tendered to be held by groups, sometimes large ones (Behnke, 1994). However, investment is particularly sensitive to the size of the user group (Wynne and Lyne, 1995). Individual investment can be precluded by free-riding within the group but collective investment is possible if there is sufficient proportionality between individual contributions and benefits (Wynne and Lyne, 1995). Nevertheless, the transaction costs of negotiating and enforcing such complex rules is likely to be high, even in a small group. Evidence presented by Olson (1971:54) suggests that significant investment is unlikely if user groups have more than six members. Efficiency also suffers because of land market constraints. A potential buyer or tenant seeking exclusive rights to land held by a user group has to identify and negotiate with all of its legitimate owners. The larger the group the more costly will be the market transactions and the lower the value of the land as collateral. Out of the 143 stockowners sampled 35% operated on communal grazing. Members of each group were large (more than six). Under these conditions user groups do not appear to be appropriate institutions to manage communal grazing in the Northern province. However, certain non-user group arrangements could satisfy the conditions necessary to encourage both conservation and investment. The potential solution requires members to surrender their inclusive rights to a management team in exchange for other benefits (eg. cash dividends and services). Although management will have exclusive use rights, the land will still remain common property resource. Transaction costs will be reduced because decisions will be taken by a small team regardless of group sizes which are generally big in the area. Experience has shown that non-user groups constituted as private companies, close cooperations, business trusts and partnerships can perform well in a competitive market economy (Wynne and Lyne, 1995). For example by concentrating managerial power in the hands of a small team, Maori land was converted from an unproductive open access resource into an asset that

could be farmed exclusively by a hired manager or by tenant farmers with the proceeds distributed as both cash dividends and services to the co-owners (Lyne, 1996).

NOTE:

1. F.D.K. Anim is currently researching this topic for a PhD thesis at the University of Pretoria. H.D. van Schalkwyk has been on the staff of the University of Pretoria when this paper was written.

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