A STUDY OF LAND RENTAL MARKETS AND INSTITUTIONS IN COMMUNAL AREAS OF RURAL KWAZULU-NATAL

by

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Submitted in partial fulfilment of the

requirements for the degree

DOCTOR OF PHILOSOPHY

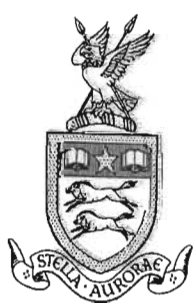
in the

Department of Agricultural Economics

University of Natal

Pietermaritzburg

1996



I hereby certify that, unless specifically indicated to the contrary in the text, this dissertation is the result of my own original work.

D.N. Thomson

ABSTRACT

Most rural households in KwaZulu engage in wage employment and have little incentive to make good use of their arable land for crop production. Crop incomes are low relative to off-farm incomes and many households find it cheaper to buy food than to grow it themselves. However, this does not explain why - despite intense population pressure and acute poverty - arable land is left idle in KwaZulu. The anomaly arises because there is no rental market to transfer unused arable land to people who can and would farm it. A rental market offers farmers an opportunity to expand their operations for either subsistence or commercial production while other households, unwilling or unable to farm, earn rental income from land they previously left idle. More important, these efficiency and equity gains are not achieved at the expense of creating a landless class.

Initially it was hypothesised that land rental in KwaZulu was constrained by high transaction costs, including risk. It seemed that potential lessors were reluctant to lease land out as they risked losing their land permanently. Institutional changes were introduced in the Upper Tugela Catchment to promote an active land rental market. Tribal authorities agreed to support the market and to uphold rental contracts in customary courts. Despite this assurance, households were reluctant to enter into lease agreements. Many households were willing to lease land out, but few were prepared to farm additional land. The fundamental problem was insecure land tenure. Survey data gathered in the Upper Tugela Catchment and at Tugela Ferry revealed that livestock were invading arable lands during the summer and damaging crops. In effect, crop farmers had lost their exclusive rights to arable land.

The first step taken to improve tenure security in the Upper Tugela Catchment was to re-instate customary rules, particularly those assigning exclusive rights to arable land. Tribal councillors agreed to the establishment of a representative 'Rules Committee', whose initial task was to define an annual 'planting date' after which all livestock had to be removed from arable lands. Dispute procedures were also clarified and compensation rates set for crops damaged by stray livestock. Results the following season were encouraging as the number of respondents suffering crop damages caused by stray livestock declined from 71 to 31 per cent.

Overall, efforts to reduce risk perceptions and to improve tenure security raised the number of rental transactions from three to 17 - an increase from four to 25 per cent in the number of households engaged in rental transactions. The average area rented increased from 0.63 hectares to 1.71 hectares. Lessees farmed their land more intensively than lessors. They applied inputs at five times the rate that lessors did, made greater use of contractor services, and invested much more in tractors, ploughs and planters. Equity also improved. Land transferred from larger to smaller farmers, while income transferred from wealthier to poorer households.

ACKNOWLEDGMENTS

The author would like to thank the following individuals and organisations who made this research possible:

Professor M.C. Lyne, Department Agricultural Economics, University of Natal, for his expert guidance and encouragement throughout the duration of this study.

The following members of the Land Rental Steering Committee for their constructive comments and guidance: Mr D.A. Stewart (Lima Rural Development Foundation), Mr L. Cornelius (Development Bank Southern Africa), Mr P.Simms (KwaZulu Finance and Investment Corporation), Dr. F. Kars and Mr T. van Rooyen (Department of Agriculture).

The staff at Lima Rural Development Foundation, especially Mr N. Zondi for his time and effort in assisting with field work. Mr N. Qwabe and Ms P. Dlamini for their assistance during field work.

Professor Nieuwoudt and staff, Department of Agricultural Economics, University of Natal, for their constructive criticism.

The Development Bank of Southern Africa for financial support.

Mr A.P. Austen-Smith and Ms K. Hepburn, Austen-Smith & Co. Attorneys, for their assistance in drawing up the lease agreements.

My colleagues in the Department of Agricultural Economics, University of Natal, for their friendship, especially Mr G Moor and Mr M Kuhn for their useful input into this study.

Holly de Jong, for proof reading the draft.

The Dedekind family for their hospitality and accommodation during field work.

Lastly, I would like to thank my parents and family for their support and encouragement throughout my studies.

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INTRODUCTION

The main objective of this study is to establish guidelines to promote a rental market for arable land in KwaZulu[1]. Land use in KwaZulu is paradoxical. Farms are very small and most households import food, yet arable land is farmed extensively and large tracts are left fallow. KwaZulu covers an area of approximately 2.8 million hectares, of which 411 621 hectares are considered potentially arable (Lyne, 1989:8). Estimates reveal that more than 100 000 hectares of potentially arable land lie idle each season.

Lyne and Nieuwoudt (1991) attribute this anomalous situation to the absence of a rental market for farmland. They argue that both allocative efficiency and equity would improve if land could be rented. Allocative efficiency improves because the market imposes an opportunity cost on under-utilised and idle farmland. Households would rather lease their land out than forego rental income. Equity improves because voluntary rental transactions benefit both lessor and lessee. Land transfers to those households short of land for subsistence or commercial farming purposes, while rental income transfers to those households who cannot or prefer not to farm. Further, renting does not create a landless class, nor does it oblige lessors to relocate their homes.

Lyne and Roth (1994) hypothesise that rental markets may be constrained by high transaction costs, uncertainty and insecure tenure. It is often claimed that property rights are secure in

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[1] For the purposes of this study, KwaZulu is defined as the communal areas of rural KwaZulu-Natal.

communal areas (Binswanger *et al*, 1992; Cross, 1988:16-18; Low, 1986). This may be true when security of tenure is defined as the ability to use land for a certain period and for a defined purpose (Feder and Noronha, 1987). However, these limited property rights do not guarantee that individuals can reap the benefits of their efforts, or transact land to their advantage. From an economic perspective, tenure security comprises three components, namely, breadth, duration and assurance of property rights (Place *et al*, 1994). If any one of these conditions is lacking, tenure is not secure. Well defined and exclusive rights to land are necessary conditions for secure tenure and low transaction costs.

Proponents of the Coasian transaction cost theory like Demsetz (1967), Uchendu (1970), and Ault and Rutman (1979) contend that communal institutions are dynamic, and that property rights evolve according to local conditions. They argue that factors such as technical innovation and improved knowledge encourage farmers to lobby for more exclusive land rights. This theory, although plausible, ignores problems associated with collective action and opposition groups (Bardhan, 1989). Institutions may be sluggish in responding to change if they protect vested interests (Hayami and Ruttan, 1985:95).

This dissertation challenges the view that tenure is secure in KwaZulu, and that technical innovation has resulted in more exclusive property rights to land. Rather, it supports the view that institutional change should be facilitated. Bruce and Freudenberger (1992) argue a case for adaptive strategies that effect gradual but predictable changes in tribal customs and laws.

This dissertation reports a programme of 'action research' conducted in the Upper Tugela Catchment region of KwaZulu. The aim of the programme was to initiate institutional changes that would improve tenure security and reduce risk and transaction costs in the rental market for cropland. The programme commenced in 1993 with a series of household surveys to elicit information about rental market activity, land use and household incomes. These baseline surveys were conducted both in 'study' areas where institutional change was facilitated, and in control areas where institutional change was not facilitated. This information was gathered to monitor the impact of institutional change on land use and equity over a two year period. The surveys were also designed to elicit information about tenure security and the risks associated with rental transactions. This information was used to formulate adaptive strategies that would accelerate institutional change.

The next phase of the programme involved extension efforts to generate support for institutional change within the study areas, and to implement changes that were accepted by tribal authorities and the wider community. Additional surveys were conducted to gauge response to the institutional changes and rental transactions were monitored to identify unanticipated problems and constraints. In this way, strategies were continually revised and checked in order to produce a set of guidelines to promote institutional change.

Data were also gathered in two other areas (Tugela Ferry and Mvoti Valley) where irrigation projects had been operating for some time. This information was used to check whether or not technical innovation had induced the type of institutional change needed to support voluntary rental transactions.

The first chapter of the dissertation considers theoretical relationships between institutions, market transactions, allocative efficiency and household welfare. Chapter 2 describes the institutional arrangements needed to support an efficient rental market for land, examines the state of these institutions in KwaZulu and other communal areas, and explores the consequences of weak or missing institutions.

Chapter 3 questions the Coasian view that land rights evolve endogenously when prospective farmers lobby for more exclusive property rights. It is argued that adaptive strategies should form the basis of land reform programmes in communal areas. Adaptive strategies produce incremental changes in customary tenure and are distinct from replacement strategies like land titling.

Chapter 4 describes the study areas and outlines the research methodology employed at each site. This chapter also describes the initial round of institutional changes introduced in the Upper Tugela Catchment. Chapter 5 presents descriptive statistics from sample surveys. Attention is focused on land rights observed in the Upper Tugela Catchment and on institutional problems affecting the rental market.

Chapter 6 investigates the effect of tenure insecurity on rental market activity in the Upper Tugela Catchment. In particular, it explores the relationship between incentives to farm and conflicting rights to arable land. Grazing institutions, which influence property rights to cropland, are discussed and an attempt is made to quantify transaction costs in the rental market. This chapter also examines the impact of technical innovation on property rights to land.

Chapter 7 reports the results of the institutional changes facilitated in the Upper Tugela Catchment and the final chapter offers guidelines to promote a rental market for arable land in communal areas. The conclusions focus on the importance of adaptive strategies as a component of development policy and the role that government should play in their formulation and implementation.

CHAPTER 1

INSTITUTIONS AND ECONOMIC EFFICIENCY

This chapter considers theoretical relationships between institutions, market transactions, allocative efficiency and equity.

1.1 Institutions and Property Rights

Over the past several decades there has been a renewed interest in institutional economics. This school of economics focuses on organisational issues and extends the range of neo-classical economics by considering how the structure of property rights and transaction costs affect incentives and economic behaviour (Furubotn and Richter, 1991:1). This overview is not intended to provide a comprehensive review of the topic. Rather it emphasises aspects of institutional economics that are relevant to the land rental market and which are discussed more fully in Chapter 2.

1.1.1 Institutions defined

Thomas Veblen the founder of American Institutionalism, argues that "economic interest does not act in isolation, for it is but one of several vaguely isolable interests" (Veblen, 1919 cited by Gruchy, 1987:24) and that an economist must have a sense of cultural perspective, recognising the importance of institutions in all economic phenomena (Zingler, 1974).

John Commons (1931) defines institutions as the outcome of collective action which constrains individuals choices or bargaining through customs and laws. Commons contends that due to scarcity there is a conflict in interests in human relationships. These conflicts are bargained out by goal-seeking individuals who use whatever power they have been granted or have elicited to achieve goals which are influenced by future expectations (Miller, 1978).

Definitions of institutions have converged over time with many elements in common. Institutions comprise rules and conventions that determine the behaviour of individuals with respect to each other (Runge, 1984, North, 1990). These rules may be self-policing or policed by an outside agency (Schotter, 1981:11) Institutions may either be formal or informal. The former being those governed by law, and the latter consisting of conventions and codes of behaviour. For the purposes of this study an institution is defined as a set of customs, constraints or rules which sets precedents for transactional relations among individuals or groups.

There are three basic categories of institutions:

- Constitutional order. Fundamental rules about how society is organised - the rules for making rules.
- Institutional arrangements. Institutions that are created within the rules specified by the constitutional order. These arrangements include laws, regulations, associations, contracts, and property rights in land.
- Normative behavioural codes. The cultural values that legitimize institutional arrangements and constrain behaviour.

The constitutional order and normative behavioural codes evolve more slowly, but institutional arrangements may be more readily modified (Feder and Feeny, 1993:241). This study focuses on institutional arrangements that define communal land tenure and which influence land rental transactions.

Nabli and Nugent (1989:8) identify certain characteristics pertaining to institutions. First, it is important to understand the nature of rules and constraints which define an institution. A person must have an holistic view of an institution rather than studying rules separately. Second, the rules and constraints must be applicable in social relations. The rules must be able to govern the action of the participants. This may be voluntarily achieved through custom, or it may be policed by an outside agency. Finally, the rules and constraints must be understood and have some degree of stability. Beghin and Fafchamps (1994) identify characteristics pertaining to 'good' institutions. These institutions should promote exchange and market forces by securing property rights and future return on investment, through **predictable** rule of law.

1.1.2 Property rights defined

Modern institutional economics focuses on the institution of property and the rules governing property rights (Furubotn and Richter, 1991:3). Property rights are the characteristics of property institutions, a subset of all institutions (Runge, 1984). They reflect the social rules and conventions that determine ownership structures, which ultimately structure incentives in human exchange. Applying the logic of Beghin and Fafchamps, property rights should facilitate transactions by reducing uncertainty.

Property rights form relationships among individuals, as economic agents do not operate independently. Individuals face uncertainty as to how the actions of others will affect the way in which their own decisions will benefit them. Pejovich (1990:27) defines property rights as follows:

> **...property rights specify the norms of behaviour with respect to economic goods that all persons must observe in their interactions with other people or bear the penalty cost of non-observance.**

Predictability.

Property rights reduce uncertainty by providing individuals with information that allows them to form expectations which are more predictable in their dealings with others (Demsetz, 1967; Runge, 1984). There are many forms of property rights, and these rights might be corporeal, such as the right to exclude others, or incorporeal such as the right to vote or freedom of speech. Exclusive rights may pertain to institutions such as private property where an individual can exclude others from benefit streams. On the other hand, inclusive rights ensure that many individuals have access to a particular resource, such as communal grazing. Different property institutions are characterised by various combinations of these two basic rights which define the choices available to decision makers and result in different penalty-reward structures (Furubotn and Pejovich, 1972). This is particularly relevant in communal areas because households usually possess a combination of these basic rights.

1.2 Allocative Efficiency and Equity in the Exchange of Property Rights

Efficiency and equity are contentious economic topics that have been the centre of many debates. Neo-classical economists claim that efficiency and equity can be measured objectively, while institutionalists claim it is a subjective measurement (Pasour, 1981).

1.2.1 Neo-classical approach

Neo-classical economists are largely concerned with the allocation of resources in a market economy and the operation of demand and supply within the market. The neo-classical paradigm takes institutions as given, often applying Walrasian general-equilibrium systems without regard to the complex of institutions on which contracts in real world markets crucially depend (Bardhan, 1989:3). Price and quantity in the market are determined by equating supply and demand, and discounting imperfect information and uncertainty. Market participants are 'rational' price takers who are not able to influence the market price through their buying and selling. Under these highly idealised conditions, optimising behaviour by market participants brings about the most productive pattern of resource use for the entire economy (Pasour, 1990). A set of three marginal equivalencies are satisfied at market equilibrium:

1. The marginal rates of substitution are the same for all consumers.
2. The marginal rate of substitution between any pair of inputs is the same for all producers using the input.
3. The marginal cost of production is the same for all firms and is equal to product price.

According to the First Theorem of Welfare Economics, every competitive equilibrium is Pareto efficient (Arrow, 1985). Pareto efficiency is achieved when an individuals position cannot be improved without causing a deterioration in the position of some other individual. The initial distribution of property rights is irrelevant as these rights can be voluntarily and costlessly traded to reach a new Pareto efficient allocation of rights. Consequently, the concepts of efficiency and equity become separable if the neo-classical assumptions hold (Bardhan, 1989:5). The Pareto criterion is therefore based on the premise that the existing distribution of wealth, and the existing power structure in society, is morally acceptable.

When equilibrium is disturbed in the Walrasian model, a new equilibrium is instantaneously attained because, transaction costs are zero, implying that the costs of adjustment are zero. As a result, no effort is required in exchange and prices alone suffice to allocate resources to their highest value uses. Prevailing property institutions are thus regarded as exogenous to the economic system, with individuals being endowed with property rights in much the same way as they are endowed with natural resources (Ruttan, 1978:334). Under these conditions institutions cannot enhance efficiency (Barzel, 1989:9).

1.2.2 Limitations of the neo-classical approach

While an understanding of general equilibrium theory is vital in dealing with market relations involved in production and exchange, the role of institutions cannot be ignored. After all, markets are institutions that facilitate exchange by reducing the cost of transacting. Coase (1988:7-9) contends that for any market to approach perfect competition, an intricate system of rules or regulations would be needed to create order in the system.

1.2.2.1 Transaction costs

In the Walrasian model, commodities and markets are homogeneous, concentrated at a single point in space, and exchange is instantaneous. Neo-classical theory emphasises the gains from trade, but ignores the costs of trade. In his seminal paper Coase (1960) concludes that the neo-classical paradigm will yield its predictive results only in the absence of transaction costs. Every trade agreement involves a contract that must be defined and enforced. It is these costs of defining and enforcing contracts that constitute transaction costs. Transaction costs are therefore important as they determine which type of contracts will be entered into, or whether costs may preclude contracting.

Coase (1960) states that regardless of the initial assignment of property rights, an efficient market equilibrium solution will be reached, provided that property rights are well defined and there are zero transaction costs. Coase however, failed to broaden the topic of transaction costs in his paper. The topic is more explicitly covered by authors such as Demsetz (1964), Lancaster (1966), Cheung (1969), Williamson (1985) and North (1990), who generally categorise transaction costs as factors that prevent markets from operating efficiently, or which inhibit markets altogether.

Randall (1972:176) defines transaction costs as:

> **... the costs of making and enforcing decisions. Included are the costs of obtaining information, establishing ones bargaining position, bargaining and arriving at a group decision, and enforcing the decision made.**

These costs can be divided into *ex ante* and *ex post* costs. Williamson (1985:20) identifies *ex ante* costs as the costs of drafting, negotiating and safeguarding an agreement. However, people are not omniscient. Contracts are often incomplete because they do not cover all contingencies. If contracts were self enforcing and able to deal with all possibilities, *ex post* costs would not exist (Datta and Nugent, 1989:37). It is necessary to monitor and to police transactions because people are opportunistic and engage in rent seeking behaviour. Cheating, shirking and moral hazard are responsible for the *ex post* costs associated with contracts. These costs are manifest in formal legal action, renegotiation of contracts, monitoring and binding parties to the contract. Transaction costs are likely to increase when there are a large number of agents involved, the sophistication and level of technology increases, or when there is a disintegration of communal, tribal, familial and cultural traditions that reduce risk (Datta and Nugent, 1989:42).

The initial distribution of property rights influences the distribution of income and wealth in a society as it determines who will benefit from income flows generated by the use of resources. If transaction costs are positive, property rights will not transfer costlessly and efficiency and equity are not separable.

In order for goods to be exchanged and realise their highest market value, the property rights to the good must be well defined. A decision maker cannot transfer to others more rights in a good than he himself possesses (Furubotn and Richter 1990:6). A clear definition of property rights therefore reduces transaction costs by creating certainty in exchange of the good. However, the process of defining and enforcing a property rights system is not costless and information is scarce.

1.2.3 Institutional approach

According to Samuels (1988:3) "it is not the market which allocates resources but that the market gives effect to the institutions which form and operate through it". An economic system is more than a system of logical relationships concerned with the allocation of scarce resources (Gruchy, 1987:21). Institutional economics studies the structure of institutions which form the market and the structure of rights which govern whose interests count in effectuating demand and supply (Samuels, 1988:3). It is thus necessary to go beyond the non-ethical approach of neo-classical economics to include institutions (like property rights) as **endogenous** variables in the economic system.

Institutional economics seeks to construct pattern models which explain human behaviour by placing it in its institutional and cultural context. Within this model, the existing institutional structure has a profound effect on the behaviour and future expectations of individuals (Dugger, 1979). The approach is based on two behavioural assumptions:

1. Bounded rationality. It may be presumed that all economic agents are not hyper-rational. Rather, they experience limits in formulating and solving complex problems and in processing information.

2. Opportunism. Opportunism is closely related to moral hazard. Opportunism extends the usual assumption of self-interest seeking to make allowance for self-interest seeking with guile (Williamson, 1981).

Given these assumptions, economic agents will have different perceptions of transaction costs and benefits attached to any market exchange of rights. The only source of valuation of assets is the revealed choice behaviour of parties to potential exchanges. Therefore, there is no means through which an external observer can determine whether or not trade, as observed, stops short of some idealised norm. As long as exchange is voluntary in a legal market order, efficiency of resource use **within an institutional setting** is ensured (Buchanan, 1986). The implication is that resource allocation is conditioned by institutional arrangements and that efficiency is only comparable between institutions and not within an institution.

Buchanan (1986) suggests that agreement is the ultimate test of efficiency. He argues that agreement on a change in the rules within which exchanges are allowed to take place would be a signal that the previously existing rules are less preferred. Since it is assumed that economic agents are driven by self-interest, it can be concluded that the new institution is more efficient than the old. It follows that the allocation of resources will be more efficient under the new institutional setting when compared to the old. However, it must be noted that resource allocation prior to the institutional change was efficient given the constraints of that institution.

There appears to be no 'ceiling' to efficiency. As long as individuals agree to institutional change, and trade is voluntary, the new dispensation can be deemed more efficient than the old. However, if artificial restraints are placed on trade by authorities, the allocation of resources can only be labelled as 'presumably inefficient', as it is not possible to observe agreement - the test of efficiency - between parties (Buchanan, 1986).

The concept of allocative efficiency of land is central to this thesis, as it is hypothesised that a rental market for arable land will improve land use efficiency in communal areas. This statement however needs to be qualified. Pasour (1990:12) contends that efficiency measurements must be based on some norm or standard of comparison, which proves difficult as most real-world activities are compared to those of the perfect market. One of the objectives of introducing a land rental market is to bring unutilised land into production. Efficiency comparisons can therefore be based on land use before and after changes in communal land tenure. It is reasonable to surmise that allocative efficiency has improved if the institutional changes bring idle land into production. However, this measure of improvement does not imply that land has transferred to its highest use.

CHAPTER 2

LAND RENTAL MARKETS IN COMMUNAL AREAS

Despite the presence of willing lessors and lessees and the mutual benefits of land rental, very few households engage in rental transactions in KwaZulu. This chapter examines the institutional arrangements needed to support an 'efficient' rental market in land and describes the state of these institutions in KwaZulu. In addition, it explores the consequences of weak or missing institutions. It is hypothesised that improved tenure security and lower transaction costs would increase the incidence of land rental transactions in KwaZulu. This chapter draws largely from previous research conducted by the author, Lyne and Ortmann (Lyne *et al*, 1996).

2.1 Renting as a Measure of Efficient Land Use

It is widely recognised that customary land tenures provide households with social security. Although fears of (additional) distress sales when customary tenure is replaced by fee simple title may be exaggerated, they are not entirely unfounded and are likely to be compounded by the disruption of local institutions responsible for maintaining social stability (Barrows, 1974). The consequences of distress sales would be particularly severe for households where social security is weak and expected off-farm earnings are low.

According to the survival principle, in the absence of high transaction costs and uncertainty about future income streams, incentives exist for a less productive farmer to sell land to a more productive farmer (Johnson, 1972). If society views land as a scarce resource, an efficient land market is necessary for efficient land use otherwise rents would not be maximised. However, World Bank analyses of survey data gathered in Kenya, Ghana and Rwanda (Migot-Adholla *et al*, 1991) did not reveal any positive relationship between farm productivity and 'complete' transfer rights - defined as the respondent's perceived right to sell land.

Where farms are very small and households value land for the social security it provides, there is no guarantee that the offer price of productive farmers will exceed the reservation price of owners that have few alternative forms of insurance. Consequently, land saleability, perceived or otherwise, may have little bearing on how efficiently land is farmed as it could reflect incentives other than those which tend to equalise the marginal product (less transaction costs) of the last unit of land across farmers. Of course, use rights would still transfer to farmers commanding more skills, capital or family labour if the rental market for agricultural land were efficient as there would be an opportunity cost to penalise under-utilisers. Although levels of investment in fixed improvements are expected to be lower on rented than on owner-operated land due to moral hazard and transaction costs (Kille and Lyne, 1993), there remain strong incentives to conserve and invest when both tenure and contracts are secure. As these conditions are also necessary for an efficient rental market (Section 2.4), the link between productivity and transferability would more likely be found in the rental market for farmland. However, rental markets carry their own risks and

transaction costs which may constrain their operation even where land can be sold - see, for example, Migot-Adholla *et al*, 1991.

2.2 Evidence of Constrained Rental Markets

In this section attention is focused on evidence that rental markets are inactive despite the presence of potential lessors and lessees. Clearly it is not sufficient just to demonstrate that the incidence of renting is low as this may only reflect a relative abundance of land or that households have very similar resource endowments and economic opportunities. For this reason the evidence is largely descriptive and hints at the causes of market inefficiency discussed later.

Previous research conducted by the author in KwaZulu shows that land is not abundant and, although farm sizes tend to be uniformally small, households face very different economic opportunities owing to the existence of a highly differentiated wage labour market (Thomson and Lyne, 1991). While the vast majority of rural households derive only a small fraction of their total earnings from farming, a significant number are very dependent upon agriculture. Evidence presented in Section 5.2 demonstrates that the rental market for arable land is severely constrained in the Upper Tugela Catchment. Almost half of the households sampled wanted to rent land left idle by neighbours, yet only four per cent did so. Few households were willing to lease land out. Of those respondents who indicated that they were willing to lease their land out, almost 40 per cent claimed that their property rights were 'too insecure' - a finding consistent with Thomson and Lyne's argument. Risk and high

transaction costs raise the reservation price of potential lessors and tend to confine the population of lessees to farmers who can cover the risk premiums charged by lessors.

Empirical studies conducted in KwaZulu have shown that renting is virtually synonymous with more intensive cropping and surplus production even though lessors attempt to reduce their chances of losing land by renting to close friends and relatives (Nieuwoudt and Vink, 1989). A similar study conducted in KwaZulu by the author during 1991 revealed that 155 out of 308 households sampled wanted access to additional land. However, only 19 households engaged in rental transactions - in most cases the State was the lessor (Thomson, 1991:11). In an earlier study, Lyster (1990:57) found that 86 per cent of all surplus producing farmers in the Vulindlela district of KwaZulu indicated they needed more arable land. However, only 20 per cent of these farmers hired unutilised land from their neighbours.

There is little information regarding the extent of private rental transactions in the other homelands of South Africa, but a survey of emerging farmers (surplus producers) conducted in the Transkei during 1992 (Lyne *et al*, 1996) revealed that 21 per cent of the respondents rented land in. However, within the subset that operated land under customary tenure only, the proportion was lower (13 per cent) and the majority claimed that renting was not allowed. Even amongst these emerging farmers, land was farmed more intensively by those who rented in.

A similar situation prevails in Lesotho. The principal source of income is remitted wages, and long-term opportunities in urban occupations are sufficiently insecure as to discourage

(non-farm) households from surrendering their land rights (Lawry, 1993). Although rental transactions in the form of share-cropping are common, Lawry presents evidence that the rental market is constrained. Arable land is under-utilised despite intense population pressure and the existence of potential lessees. Case studies revealed that emerging farmers were looking for greater control over operations and profits than share-cropping would permit but that cash rentals required the chief's cooperation and involved unnecessary transaction costs due to a weak legal environment. The *de facto* situation is that land is often under-utilised even though it is not abundant and is sought by farmers.

2.3 Rental Market Activity, Efficiency of Land Use and Equity

This section attempts to demonstrate the relationship between a rental market for farmland, efficiency of land use and equity using secondary data sources.

2.3.1 Rental market activity and land use efficiency

It was argued in section 2.1 that, where farms are small and households hold land as social security, the link between productivity and transferability of land is most reliably studied in rental markets. In section 2.2 it was established that land rental markets are often constrained in communal areas. It was also hypothesised that the group of observed tenants is likely to be characterised by farmers confident of their ability to cover premiums charged by lessors who risk losing their land rights. Following this logic, an inverse relationship may be anticipated between rental market activity and the productivity gap (income per hectare operated) between lessees and other households (Lyne and Roth, 1994).

Variables illustrating productivity differences observed in samples from KwaZulu and Transkei are presented in Table 2.1. The data suggest that renting does transfer land to farmers who gross more income per hectare. A comparison of net incomes would provide a more accurate test of the market's efficiency advantages but cost data were not recorded in the Transkei survey. Deducting expenditure on improved seed, fertiliser and chemicals yields a per hectare gross margin significantly higher on land operated by renters in KwaZulu where the market is particularly weak.

Table 2.1 Rental market activity, land use efficiency and household characteristics in regions of Transkei (1992) and KwaZulu (1991)

Region	Transkei (emerging farmers)		KwaZulu	
	Rent	Other[1]	Rent	Other[1]
Households	11	42	7	125
Households renting in (%)	21		5	
Farm size (ha)	8.54	9.02	0.83	1.36
Area operated (ha)	11.81	9.02	1.39	1.36
Income/ha operated (R)	1670	1112	439	193
Gross margin/ha operated (R)			251	80
Farm income (R)	19745	10023	610	262
Non-farm income (R)	11708	10072	7284	4833
Hhld income (R)	31453	20095	7894	5098
Family size	11.18	7.86	7.29	7.38

Notes: 1. Other = households that do not rent land in.

(Source Lyne *et al*, 1996)

The data also suggest that renting transfers land to households that have more capital and labour per unit area. Less developed rural areas are often characterised by imperfect markets for capital, skills and contractor services. Moreover, even though labour markets are generally active, some family labour is often less than perfectly marketable. Under these circumstances, land rental is expected to make a significant contribution to efficient resource allocation.

In an evaluation of the farmer support programme (FSP) initiated by the Development Bank of Southern Africa (DBSA), Lyne and Ortmann (1991) estimated the relative contributions of credit and extension (the main components of FSP in KwaZulu) to differences between 'subsistence' and 'emerging' farmers. Households were defined as emerging farmers if they produced and sold a surplus. Given similar farm sizes, it was postulated that emerging farmers would rent in more land, use more institutional credit, and purchase more fertiliser, chemicals, and contractor services than subsistence farmers. It was also anticipated that more surplus producers would own farm equipment and know the local extension officer (advisor) by name. The results are presented in Table 2.2.

The variable measuring contact with extension officers was excluded from the analysis because its estimated coefficient had a t-value smaller than one. As expected, the signs of the estimated coefficients are all positive. Area of land rented in has the largest standardised coefficient and was therefore judged to be the single most important variable distinguishing between subsistence and emerging farmers.

Table 2.2 Estimated discriminant function for 'subsistence' and 'emerging' farmers in KwaZulu, 1990 (n=234)

Explanatory variable	Standardised coefficient	t value[1]	Group means Subsistence	Group means Emerging
Area rented (ha)	0.611	6.1***	0.00	0.31
Fertiliser (kg)	0.465	3.8***	151.00	756.80
Chemicals (R)	0.407	3.8***	1.94	29.89
Equipment (%)	0.271	2.0**	4.30	19.20
Contractor (R)	0.234	2.1***	75.50	318.39
Credit (R)	0.194	1.6*	42.89	228.70
Advisor (%)			56.70	76.90
Number of cases			26	208

Notes: [1] * denotes statistical significance at the 10 per cent level, ** at the 5 per cent level and *** at the 1 per cent level of probability.

(Source: Lyne *et al*, 1996)

2.3.2 Rental market activity and equity

A land rental market resulting from secure tenure and contracts avoids the problem of landlessness associated with land sale. Potential lessors need only rent out land that they do not require in the short-term, and do not have to relocate. Provided that rental arrangements are voluntary, removing constraints to renting will create positive opportunities for many households - particularly the poorest. Landholders who are either unwilling or unable to use all of their land would gain opportunities to earn rental income, and households short of land for subsistence or commercial farming would gain opportunities to extend their farming operation.

Although fixed transaction costs and imperfections in related markets - for example, discriminatory access to cheap credit - will tend to skew the distribution of benefits generated by these openings, such distortions will be less apparent in regions where farm size patterns are egalitarian. The data presented in Table 2.1 support the view that land rental would improve equity in KwaZulu and other communal areas. Rental transactions tend to equalise areas operated by transferring land from larger to smaller farmers. The data also suggests that income would be transferred from wealthier to poorer households.

Studies by Lawry (1993) in Lesotho and by Riddell (undated) in Madagascar concluded that rental transactions sustain many households that would otherwise be destitute. These findings also demonstrate that rental markets add to the social security provided by customary land rights. In the absence of a rental market, land rights are a less efficient source of liquidity, and governments may be obliged to shoulder more responsibility for the rural poor. In summary, the evidence does not contradict Bell's (1990) view that tenancy, as a voluntary market response, is neither inherently nor inevitably damaging to the interests of the poor. However, the emergence of conditions necessary for a rental market could harm certain rural households - Section 2.4.

The equity implications of a rental market for farmland are not confined to rural households. Consumers and work-seekers stand to benefit from 'static' increases in production resulting from more efficient allocation of agricultural resources. In the dynamic world, renting has enabled many farmers, who had a will to learn but little else, to climb the 'agricultural ladder' as it does not divert scarce working capital into land purchase (Binswanger *et al*, 1992; Foster, 1989). Perhaps more relevant in Southern Africa where farm sizes are

diminishing due to sub-division, renting helps to retain human and financial capital in agriculture as it permits adjustments in the scale of farming operations. Lastly, experience and information generated by rental contracts could be valuable to households and bureaucrats alike in areas where land sales are emerging and use rights are not documented.

In summary, renting does not alter income distributions because rent still accrues to those people initially endowed with property. However, it does improve income opportunities for potential lessees and lessors, and for service providers because allocative efficiency improves.

2.4 Causes of Inefficient Land Rental Markets

An 'efficient' land rental market is defined here as one which accomplishes the productivity and equity gains referred to in the previous section. Viewed from this perspective, 'efficiency' involves the usual neoclassical conditions, *viz.* security of tenure and low transaction costs (Nieuwoudt, 1990). Property rights must be secure and transaction costs low relative to rental income. High transaction costs could shift the potential lessee's offer to a point where it no longer exceeds the reservation price of the lessor (Atwood, 1990). Conversely, insecure property rights could raise the lessor's reservation price above the lessee's offer price, as a risk premium is built into the reservation price.

Place *et al* (1994:19) define land tenure security as:

> **... the individual's perception of his/her rights to a piece of land on a continuous basis, free from imposition or interference from outside sources, as well as his/her ability to reap the benefits of labour and capital invested in land, either in use or upon alienation.**

According to Place *et al* (1994:20) tenure security is a function of three components:

1. The **breadth** of rights. This refers to the bundle of property rights assigned to an individual, including the right to use, transfer and exclude others from the land.
2. **Duration** is the length of time for which a given set of rights is legally valid.
3. **Assurance** implies that rights are held with varying degrees of certainty in the present and future.

In KwaZulu, property rights to land are usually held in perpetuity and can be bequeathed to an heir. However, the breadth of rights is often inadequate. Individuals seldom enjoy fully exclusive rights to arable land. In most cases the individual's right to exclude others is a primary right that can only be exercised during the summer months. Other individuals can exercise secondary rights to graze livestock or to gather natural resources on this land when it is fallow.

Assurance depends largely upon compliance with customary laws, the certainty of laws governing property rights and, the extent to which these rights can be enforced. Customary

laws and property rights to land are not documented in KwaZulu. The local headman (*induna*) serves as a 'walking talking' deeds office (Stewart, 1994). Current proposals to document existing rights to land (Department of Land Affairs, 1996:43-45) will do little to improve tenure security if they lack breadth, duration or assurance.

If assurance is lacking, use rights and their duration are rendered uncertain even if they are well defined in customary (and national) law. For example, a user whose rights to a particular parcel of land are recognised and are broad enough to permit transfer of use to another party, could lose his or her rights by entering into a rental contract that is not enforceable. Tenure is also insecure if the quantity (breadth) of rights allocated to a user is inadequate. Thus a user who does not have the right to transfer exclusive use of land to a tenant does not have secure tenure. In either case, the rental market for land would be constrained by insecure tenure.

Following this approach, certain transaction costs are expected to vary inversely with security of tenure. According to Johnson (1972), transaction costs increase when property rights are not clearly defined and allocated owing to the high cost of discovering the owner and establishing one's own rights. A potential lessee seeking exclusive rights to a parcel may find transaction costs prohibitive if there are many legitimate claimants, each possessing inclusive rights to the same parcel. Here, high transaction costs faced by the lessee are matched by tenure insecurity (inadequate breadth of rights) on the part of the users. Risks that reduce tenure security could also be viewed as raising transaction costs. In the first example where tenure insecurity was attributed to an unenforceable contract, the underlying problem might have been inadequate policing. Uncertainty about institutions and laws that

would be applied to disputes, unpredictable judgements, and fuzzy procedures to establish or defend contracts would likewise serve to undermine assurance and tenure security. Alternatively, the risk premiums attracted by these circumstances could be interpreted as transaction costs.

Transaction costs prevent markets from operating efficiently and may inhibit markets altogether if property institutions do not provide information and certainty regarding the exchange of property rights. Previous surveys conducted in KwaZulu by the author (Thomson, 1991:15-16) revealed a common perception that households would be dispossessed of arable land left idle over successive seasons. However, the respondents did not know how long land could be left unused without jeopardising their property rights. In addition, many households perceived that they would be dispossessed of land that they leased out - despite the absence of customary laws prohibiting rental transactions (Stewart, 1994). The author concluded that rental markets were constrained by high transaction costs, and that transaction costs were high due to uncertainty and inadequate property rights. More specifically, the lack of assurance was attributed to concerns that:

- A tenant may claim the land he is renting. Forty per cent of respondents claimed that they would lose their land if they rented it to other households.

- Lessees may claim lessors' crop at harvest time, or lessees may not pay the agreed rental. Almost 80 per cent of the rental arrangements observed involved transactions between relatives, close friends or with the government. In these cases, transaction costs were low as there was little risk of losing land, crops or rental income.

- Tribal authorities may reject rental transactions. Tribal authorities build allegiance through control over land. A household that leases out land could pose a threat because; (a) it is usurping the chief's authority by reallocating land, and (b) tenants may not align themselves with the tribal authority. If renting does compromise allegiance, the threat of dispossession may be very real. Alternatively, tribal authorities may empathise with poorer households who rely on secondary use rights to land, or they may be predisposed to special interest groups, like influential stock-owners who keep cattle as store of wealth.

- If property rights to land are not exclusive, transaction costs are high because contractual parties have to deal with many inclusive users. In KwaZulu this problem is compounded because secondary users, such as stock-owners, may also resist a rental market. Land that is not under cultivation is available to other households as communal grazing. If land is rented out, uncultivated land may be brought into production, reducing the supply of communal grazing. Again, the source of resistance could be the rural elite as cattle are a store of wealth. Poor households that rely on secondary rights to gather natural resources such as thatching grass may also oppose a rental market.

In summary, exclusive rights to land *ceteris paribus*, enhance tenure security or reduce transaction costs and are therefore central to an efficient land rental market (Kille and Lyne, 1993). Table 2.3 is extracted from Lyne and Roth (1994) and lists six 'institutional' variables that convey information about tenure security and transaction costs in parts of KwaZulu, Mozambique, Somalia and Uganda where representative household survey data

were available. The last three variables listed in Table 2.3 indicate the presence (1) or absence (0) of attributes in the study areas.

Table 2.3 Rental market activity and institutional variables in regions of Uganda, Somalia, KwaZulu, and Mozambique

Region	Uganda				Somalia	KwaZulu	Mozambique
Households observed	Busaana 123	Kabulasoke 107	Bukuya 124	Kibinge 126	Shebelle 113	132	Maputo 121
% Hhlds renting in	41	33	27	22	7	5	0
% hhlds that:							
- perceive customary restraints or undue risk in land rental[1]	2	33	25	34	81	69	68
- purchased land	31	29	19	28	25	0	9
- have title to some land	11	20	21	14	32	0	58
Rental procedures transparent	1	1	1	1	0	0	0
Precedents affirm tenure security	1	1	1	1	0	0	0
Land sales upheld by national courts	1	1	1	1	0	0	0

Notes 1. Respondents that perceived customary restraints or undue risk in renting were those who claimed that land could be rented only to kin (Uganda), that they would be dispossessed if a tenant farmed their land (KwaZulu), or that tenants might claim rented land as their own (Somalia and Mozambique).

(Source: Lyne and Roth, 1994)

The vast majority of agricultural land in KwaZulu is State owned, with land rights administered by local (often tribal) authorities. Under national law, households may not sell or mortgage their holdings. Evidence from Africa shows that national laws prohibiting land sales seldom eliminate the sale market (Feder and Noronha, 1987). There is certainly scope for a gap between reality and national land law in KwaZulu because land disputes are ultimately settled by tribal, not judicial, courts (Thomson and Lyne, 1993). This is not to suggest that land markets are active in KwaZulu. From a market perspective, it does not matter how the law is established - all that is required is certainty of the law (Johnson, 1972).

The evidence presented in Section 2.2 suggests that tribal courts in KwaZulu have not set firm precedents for cases involving disputes over land rental arrangements. Further, it would appear that procedures for establishing rental contracts are not clear. In the sugar belt and Umzumbe district of KwaZulu where rental arrangements have been observed, outside agents had to bring the contractual parties together (Lyne and Nieuwoudt, 1991; Thomson and Lyne, 1993).

In Mozambique, land was nationalised after Independence in 1975. Individuals and collectives can register a title, which is a lease of use rights granted by the State, but the land law of 1979 prohibited all private land transfers. Despite economic liberalisation since 1985, property sales are still not recognised. Nevertheless, some land sales have been observed and, contrary to the sample estimate reported in Table 2.3, district officials claimed that renting had become more common since 1986 despite recent attempts by Government to clamp down on private transactions (Roth *et al*, 1992). Even so, case studies reported by Boucher *et al* (1993) suggest that rental transactions are characterised by gross confusion and that State enforcement of land rights is both weak and inconsistent. This view is supported by Roth *et al's* (1992) observation that renting is nearly always between family members or close friends to avoid having the land claimed by tenants.

Likewise, in Somalia, the Agricultural Land Law of 1975 asserted State ownership over all agricultural land, and provided for leasehold titles (concessions) granting use rights. Initially, concessions could not be purchased or rented, but these restrictions were relaxed before the household survey (Roth, 1993) reported in Table 2.3 was completed. Exactly what effect the statutes had on land markets is not clear but rental transactions described by

respondents were informal agreements and there was little evidence of transparent procedures for establishing contracts. Land disputes frequently involved tenants who refused to vacate parcels at the end of their contractual term. Whereas other land disputes had been taken to judicial courts, this avenue was closed to rental disputes and there were few indications of firm local precedents - most respondents considered dispossession to be a very real threat and perceived renting to be risky. The official view that land should be reallocated to those who farm it may have aggravated local uncertainty.

The situation is quite different in Uganda. Here, land rental predated the colonial era - a period which saw exclusive rights to surveyed farms entrenched in law, and subsequent growth in the land sale market. In 1975, the Land Reform Decree declared all land in Uganda to be public land, and converted existing freehold titles into long-term leasehold titles. The law permitted market transactions in titles provided that written consent was obtained from the Uganda Lands Commission. In reality, there was very little change in the way transactions were conducted or registered (Roth *et al*, 1994:174).

Troutt (cited by Lyne *et al*, 1996) observed that local authorities in her study areas (Table 2.3) often acted as brokers, matching willing buyers and sellers, and applied well established procedures to witness land sales. Unfortunately, methods used to validate rental contracts were not observed as these transactions usually involve neighbours and are not so conspicuous. Outsiders are not excluded from the rental market, but their entry is constrained by asymmetric information. Disputes over rental contracts are taken either to the village chief or elected village authority - Resistance Council. Although this duality does create space for confusion, verdicts seldom differ and parties have recourse to local judicial

courts. In Troutt's view, decisions are predictable regardless of which institution hears the case, and local precedents reinforce security of tenure.

Table 2.3 demonstrates a strong inverse relationship ($r=-0.94^{**}$ across regions) between the incidence of renting and the proportion of respondents who perceived transactions to be risky or subject to customary restrictions. Whilst it might be anticipated that tenure would be most secure in regions where the incidence of land purchase or land titles is highest, neither of these variables was significantly correlated with rental market activity. There is some evidence of a positive correlation between renting and the incidence of purchased land ($r=0.75$) despite legal prohibitions on land markets in Somalia and Mozambique. The reverse holds for land titles ($r=-0.46$). This result most likely reflects legal restrictions on land transfers that accompanied land registration in Somalia and Mozambique but it is also consistent with the view that titling is neither a sufficient nor a necessary condition for a land rental market, and that it may aggravate tenure insecurity by creating conflicting claims to land.

The remaining variables are positively correlated ($r=0.92^{*}$) with the incidence of renting. Rental markets are more active where (a) procedures for establishing contracts are transparent, (b) local precedents set in land disputes confirm security of tenure, and (c) national law sanctions local precedents. With the exception of land titles, the 'institutional' variables are highly inter-correlated but the data are too flimsy to isolate their relative contributions to the rental market. More importantly, the statistics do not explain why some regions are characterised by local institutions that constrain renting.

2.5 Lease Arrangements

2.5.1 Cash lease agreements

Cash lease arrangements are generally characterised by fixed rental payments for the leased land. The landlord supplies the land, while the tenant is responsible for all production costs. The tenant receives the proceeds of the entire crop produced. With a fixed cash rent the landlord fails to benefit from abnormally good yields/prices, while the tenant faces financial risk in years of low yields/prices (Helmers *et al*, 1985).

The decision to lease out a parcel of land is based on the lessor's reservation rent - the minimum rent he is prepared to accept. The reservation rent is a function of indefinite choices that a lessor faces when deciding to lease out land. This depends on factors such as the age of the lessor, how risk averse the lessor is, and sources of off-farm income (Currie, 1981:86). A risk averse lessor may have a high reservation rent if renting is perceived to be more risky than farming. On the other hand, lessors with low off-farm incomes may have a relatively low reservation rent owing to liquidity constraints. Older lessors especially widows, may also have a relatively low reservation rent due to family labour and management constraints.

A lessee's limit rent is the maximum rent the lessee would be prepared to pay for a unit of land. This is a complex function of inter-related factors such as the lessee's risk-aversion, off-farm income, ownership of farming implements and access to credit (Currie, 1981:83-84). More risk averse lessees will have lower limit rents if farming is risky and

lessors are likely to claim their crops. Lessees with lower off-farm incomes may also have low limit rents due to liquidity problems. Ownership of assets and access to credit markets are expected to have a positive influence on limit rents. For example, a lessee will have a low limit rent if he or she does not own implements and the market for these services are imperfect or missing.

The outcome of negotiations between lessor and lessee is dependent on the limit and reservation rents respectively. If a lessor's reservation rent exceeds a lessee's limit rent, a rental contract will not be concluded. Conversely, if the lessor's reservation rent is less than the lessee's limit rent, a rental contract will be concluded. The level of rental income earned by the lessor and paid by the lessee depends on the relative profitability of agriculture. The more profitable agriculture is relative to other occupations, the higher the rental (Currie 1981:89).

2.5.1.1 Farmer incentives

Lessees aim to maximise their income over the lease period, while lessors aim to maximise rental income (Schickele, 1941). Lessees operating under a cash lease agreement are entrusted with full responsibility for managing the rented land. The lessees are free to allocate fixed and variable inputs according to their own management objectives. All economic surpluses from the marginal inputs are captured by the lessees. Provided that the length of the lease agreements allow lessees to capture all of the returns to their investments, lessees will apply inputs to the same extent as owner operators - to the point where marginal costs equal marginal value product (Barlowe, 1986:402).

2.5.2 Crop-share lease agreements and inter-linked contracts

Land, labour, credit and other input markets are interlinked in agrarian economies. Rural economies of developing countries are often characterised by imperfect or missing factor markets. Societies adapt to the absence of a complete set of markets by developing institutions to perform the functions of the missing market. For example, share-cropping is partly an institutional adaptation to the absence of appropriate markets (Stiglitz, 1989:24).

2.5.2.1 Crop-share agreements

Crop-share tenancy usually is characterised by the lessor supplying land, and the lessee supplying labour and machinery. Input expenses, such as seed and fertiliser are often shared by the parties. Ideally, the lessor and lessee should share the crop income in the same proportions as they contribute resources (Helmers *et al*, 1985). However, crop-share agreements tend to be dominated by fixed share arrangements, as lessors seldom have accurate *ex ante* information about how productive prospective lessees are (Currie, 1981:107). Singh (1989:37) observed that crop shares tend to be fixed by lessors.

The transaction costs of negotiating and enforcing a crop-share agreement may be higher than that of a cash lease. The extent to which input costs and crop yields or income are shared need to be clearly specified in the contract, and the lessor has to bear additional costs in monitoring the yields or incomes to verify his share.

2.5.2.2 Farmer incentives

It is often claimed that crop-share leases are less efficient than cash rental arrangements. Lessees do not apply inputs to the point where marginal costs equal marginal value product because the lessee only obtains some share of the benefit (Helmers *et al*, 1985; Barlowe, 1986:408). However, Hayami (1988), Stiglitz (1989), Singh (1989) and Sutinen (1975) argue that a crop-share agreement can achieve the same degree of efficiency as a fixed rent contract or owner-farming. Share-cropping may not only work as an incentive device, but also as a self-selection device. Crop-share lease agreements allow lessees to shift a portion of farming risk to lessors if input costs are shared. This is beneficial to risk averse tenants. Lessees are also evaluated as a credit risk in terms of their overall performance by lessors. Thus lessees wanting to maintain their leaseholds apply inputs in much the same way as owner-operators and cash tenants.

2.5.2.3 Inter-linked contracts

Interlinked contracts differ from the anonymous and systematic inter-dependence of economic action portrayed by competitive general equilibrium theory because the terms of one transaction are contingent upon the terms of another (Bardhan, 1990:237). Interlinked contracts may be defined as transactions in more than one commodity or service made between the same pair of individuals and linked in an essential way. If the contracts could take place independently then they are not interlinked. An essential feature of this definition is that delinking the contracts would be infeasible or costly for at least one party. The

infeasibility of delinking contracts indicates the complete absence of certain markets (Braverman and Srinivasan, 1984:65).

Bardhan (1990:239) identifies the following benefits of interlocked transactions:

1. Interlinking saves transaction costs and contract enforcement costs. The costs of dishonesty and shirking in one transaction increase for an agent due to the spillover effects threatening other transactions.

2. Interlinked contracts provide a way of partially circumventing imperfect or non-existent markets. Interlinked contracts are often the result of imperfect credit markets in developing agrarian economies. A land market may develop to compensate for the missing market - normally through a share-cropping arrangement.

2.5.3 Land borrowing arrangements

Borrowing arrangements are usually pledges between family and friends. Lessors do not charge rental, and lessees are not obliged to offer any returns from the land as payment. These are generally short-term arrangements that take place in times of need.

CHAPTER 3

INSTITUTIONAL INNOVATION AND THE EVOLUTION OF LAND TENURE INSTITUTIONS

This chapter investigates institutional change and the evolution of communal land tenure systems. Increased agricultural productivity is often explained solely in terms of technological change. This is an erroneous view as economic growth results from both technological and institutional innovation. Nabli and Nugent (1989:22) define economic development as "economic growth accompanied by 'efficient' institutional change". Institutional innovation is driven by the search for an organisational structure that will effect the realignment of property rights and reduce transaction costs within an economy. For an institution to be efficient it must have the support of individuals within the community - it should be well adapted to the needs and resource constraints facing a particular community. Institutional innovation may evolve endogenously through the demand for institutional change, or it may be supplied exogenously by an outside agent.

According to the Evolutionary Theory of Land Rights (ETLR), individuals will convert the tenure system from one of common ownership, to one where individual land rights are more clearly defined when land becomes a scarce resource. This transaction cost approach has been used to explain the enclosure and privatisation of land in regions where population pressure was mounting and farming prospects improved (Uchendo, 1970; Ault and Rutman, 1979). To appreciate ETLR and other theories of institutional change applied to land rights,

it is first necessary to define three fundamental property regimes; open access, common property and private property. It must be emphasised that the descriptions which follow are not mutually exclusive. Communities may apply all or some of these property regimes - not only to different tracts of land, but also to different resources found on the same area of land (Feder and Feeny, 1993:242).

3.1 Open Access

Under open access (*res nullius*) rights are not assigned and no individual is excluded from the use of a particular resource. The lack of any exclusivity enables all individuals to capture the benefit streams emanating from that resource. Open access is thus accurately described by the maxim "everybody's property is nobody's property" (Baber, 1991:17).

Use rights cannot be exchanged because transaction costs, like the number of potential users, are infinite. Lyne (1989:54) contends that land used for grazing can be regarded as an open access resource because there is little evidence of rules or of penalty systems to enforce such rules. As a result, stock-owners consider only their own private costs and returns when using the commons and tend to exploit the resource up to the point where the costs of keeping an additional animal on the common equals the value of its average product. There is no incentive for a stock-owner to stint on, or to improve the common because economic benefits accrue to free-riders.

3.2 Common Property

Common property occurs when use rights are assigned to a well-defined group of users who are able to enforce rules that exclude non-members from their joint property and which restrict its use by individual members. Runge (1985) argues that not every member of the group need adhere to the rules. Each individual has to decide whether to be bound by the rules or to defect and free-ride. As long as a strong coalition are prepared to adhere to the rules, members of this group are better off than if there had been no rules at all. These rules are normally time honoured customary institutions enforced through intensive social interactions, as individuals fear loss of reputation or even ostracism by breaking the rules (Hayami, 1988:6; Runge, 1981).

Wade (1987) identifies important characteristics of successful user groups. Groups are more likely to succeed where a small, well defined and homogeneous group has restricted access to a compact common property resource with well defined boundaries. The individuals in this group should reside close together, and close to the resource in order to facilitate policing. The group's constitution should be well defined with clear dispute procedures and penalty systems for those who break the rules.

User groups need to be small, otherwise transaction costs - the costs of negotiating and enforcing rules - may become prohibitive. Where the net benefits of collective action are small, members of user groups will have little incentive to formulate and enforce rules (Lyne, 1995). Common property institutions constrain the allocative efficiency of land because they inhibit land transfers to better farmers outside of the group. Market

transactions are inhibited by high transaction costs because potential buyers and lessees will have to identify and negotiate with all members of the user group. Investment in common property is curtailed because rules that encourage collective investment (by sharing benefits in proportion to individual contributions) are extremely difficult to negotiate and enforce - even when user groups are small. Transaction costs and opportunities to free-ride will increase rapidly if some members are either unwilling or unable to share costs (Lyne, 1995).

3.3 Private Property

Private property institutions assign exclusive rights to individual owners. These owners can be individuals in their private capacity or legal entities such as family trusts and companies. Owners are usually entitled to alienate their entire bundle of private rights to the resource through permanent transfer, such as sale, or through temporary transfer, by renting. Under these conditions land is highly mobile because transaction costs are low. The market imposes an opportunity cost on land that is under-utilised, shifting it to its highest-valued use.

Buchanan (1993) argues that exclusive property rights increase individual 'liberty'[2] because individuals are less dependent on the behaviour of others, and are therefore free to seek the highest value for their resource. The incentive to conserve and improve land is dependent on the extent to which the owner can capture the returns from such investment. Under private property and market transferability, a land owner has an incentive to invest as he would benefit in the form of increased profits and increased value of the land (Nieuwoudt,

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[2] Buchanan (1993:2) defines liberty as an inverse relationship between an individual's well-being and his dependence on others behaviour.

1992). The market value of land is a function of the present value (PV) of the future rent stream generated by the asset (Nieuwoudt, 1980):

$$PV = \frac{Ro}{(i-g-k)}$$

where:
Ro = constant annual rents in real terms
i = the farm mortgage rate
g = rate of growth in real farm profits (rents)
k = inflation rate

The market system in which private property rights are traded communicates comprehensive information in the form of prices. Management decisions which reduce expected future incomes are reflected in lower prices. Private property therefore encourages resource conservation as it motivates current owners to take future generations into account. It also strengthens incentives to invest in improvements because future rent streams can be realised at any time by selling the property (Pasour, 1990:200-201).

3.4 The Evolutionary Theory of Land Rights (ETLR)

This theory draws from the Hobbesian Jungle. The anarchistic 'jungle' described by Hobbes in 1651 is typical of open access in which there is no acknowledgement of boundaries, laws or conventions. As long as the supply of land exceeds the demand for land to the extent that the price of land is zero at the margin, the absence of exclusive and transferable property rights does not have any damaging consequences. Shifting cultivation - slash and burn - techniques predominate (Ault and Rutman, 1979). Under these conditions individuals have no incentive to demand more exclusive rights, as externalities are small relative to the costs of establishing and enforcing these rights (Johnson, 1972).

Authors such as Uchendu (1970) and Hecht (1985) argue that land becomes a scarce resource and acquires value to farmers as a result of (a) increasing population pressure, (b) improved knowledge, (c) technological change, (d) rising product prices (especially for export crops) and (e) farmer support programmes. When land becomes scarce and farming prospects improve, farmers attempt to assert increasingly exclusive rights to land because they cannot capture the benefits of rising product prices or new technology unless they are able to exclude free-riders. New institutions and property rights evolve to secure tenure and lower transaction costs in response to the "desires of the interacting persons for adjustments to new benefit-cost possibilities" (Demsetz, 1967:350). In the end, the farmer lobby may result in fully exclusive, private property rights.

3.4.1 Limitations of the evolutionary theory of land rights

The ETLR although helpful in identifying members of a community who may demand a change in the property rights structure, has discounted the important role that vested interest groups and collective action play in institutional change. Implicit in the ETLR is that individuals are able to lobby effectively for more exclusive land rights. To begin with, farmers may not be able to organise a powerful lobby - especially if group sizes are large and opinion is not unanimous. Olson (1971:34) argues that larger groups, especially those with egalitarian shares of the benefits of collective action, are plagued by free-rider problems because they have higher organisational costs relative to smaller groups. Consequently, a smaller group interested in maintaining the *status quo* may inhibit any changes in the property rights structure.

By affecting property rights and transaction costs, institutions have the effect of either facilitating or retarding economic growth. The restructuring of a property rights institution results in a change in the distribution of income and wealth in a community. It is inevitable that there will be resistance from individuals or groups, especially secondary users (for example, stock-owners), who stand to lose if farmers privatise land. Institutions may show inertia and be sluggish in responding to change if they protect vested interests (Hayami and Ruttan 1985:95). The adoption of new institutions could be further retarded by uncertainty. Imperfect information about new institutions can result in the preservation of existing institutions as individuals know more about the institutions and conventions by which they have lived (Stiglitz 1989:26). Endogenous change is not only unpredictable, but could also produce undesirable outcomes like a poor and landless class through 'land grabbing' and possibly distress sales (Lyne *et al*, 1996).

Lyne and Roth (1994) argue that increasing population pressure and better farming prospects will not necessarily produce a predictable shift toward more exclusive land rights. They contend that commercial farming may be the result, rather than the cause, of more secure land tenure.

3.5 Supply of Institutional Innovation

3.5.1 Land titling

Platteau (1995:6) adopts the Hobbesian view that individuals would willingly accept rules imposed by an outside agent as long as the institutions guaranteed by the agent improve the

security of property rights. Platteau argues that tensions and conflicts generated by demands for more exclusive land rights result in efficiency losses and social unrest. This encourages the national government to carry out administrative reforms, including the formal registration of private property rights.

In theory, land titling is expected to increase tenure security, stimulate investment and allow the emergence of a land market (Barrows and Roth, 1990). In practice, attempts to replace customary tenure with title-deeds have not been very successful. According to Dickerman (1989:xxvi), no projects can be singled out as a success or held as models for emulation. This section draws on some African experiences to highlight reasons underlying the failure of land titling programmes.

In Kenya, Atwood (1990), Coldham (1979) and Collier (1983) observed that land titling created more, not less, uncertainty. Customary law dominated national law in determining property rights - judicial courts, despite no longer recognising customary land rights, settled claims to registered land in favour of those with customary use rights (Coldham, 1979). Due to poor legal support and information about existing land rights, titling has resulted in conflicting claims to land. Land registration increased land disputes and changed the nature of these disputes. Shipton (cited by Dickerman, 1989:112) noted that disputes were mainly over boundaries before registration, and ownership after registration. Conflicting land claims persisted because changes in ownership were not registered. A recent sample survey of freehold farmers in KwaZulu showed that 41 per cent of respondents did not have secure property rights because the farm was registered to a deceased person, and 32 per cent had

non-exclusive property rights because the same land was registered to many different people (Kille and Lyne, 1993).

The Somalian Land Law of 1975 proclaimed state leasehold tenure as the only legal form of tenure. Results from a study by Roth *et al* (undated) revealed that many households had not bothered to register their land 12 years after the law was passed. Reasons given by respondents were that 'costs were too high', 'procedures were too complicated' or that they were 'unfamiliar with registration'. Perhaps a more compelling reason was that concessions (title-deeds) obtained from the government could be revoked if land exceeded size limits, was used for non-agricultural production or was not farmed productively. Besteman (1990) concluded that land reform in Somalia did little to improve tenure security and undermined security provided by customary tenure.

Empirical evidence from Africa suggests that investment in agriculture did not increase when title-deeds replaced customary tenure. Studies conducted by Roth *et al* (undated) in Somalia, Carter *et al* (undated) in Kenya and Migot-Adholla *et al* (1991) in Ghana have indicated that titling contributed very little to investment in agriculture or to land improvement. However, Kille and Lyne (1993) found that exclusive and assured land rights were a significant determinant of investment on free-hold farms in KwaZulu - but that these conditions had little to do with titling.

In addition, titling has not facilitated land markets. On the contrary, some of these programmes prohibited all market transfers. Evidence from Somalia and Mocambique where land transfers were banned during the 1970's shows that rental markets virtually collapsed

due to increased risks (Lyne and Roth, 1994). Collier (1983) reports that there is no tradition of tenancy in Kenya because landowners perceived they would be dispossessed of land they leased out. Land markets, which were considered a major advantage of tenure conversion, have yet to emerge 40 years after titling. This nullified the credit and investment objectives of registration (Migot-Adholla *et al*, 1991).

It is clear from these experiences that indigenous tenure systems will continue to be an important part of the socio-economic landscape in Africa for the foreseeable future. Customary law has continued to operate *de facto* in all three cases (Coldham, 1979; Riddell, undated) because:

1. Tribal authorities are often the only reliable and respected source of information about property rights.
2. People are familiar with customary institutions
3. It is cheaper to use existing administrative capacity and infrastructure.

Nevertheless, customary institutions must change to meet new needs. To avoid the pitfalls of replacement strategies like titling, and the unpredictable outcomes of endogenous institutional change, Bruce and Freudenberger (1992) recommend adaptive strategies.

3.5.2 Adaptive strategies

Adaptive policies facilitate gradual but predictable changes in tribal customs and laws. The policies recognise that indigenous legal systems are unique. Therefore, tenure reform

programmes will be distinct, vary from place to place, take different forms and progress at different paces. An adaptive strategy examines the role of dispute resolution and places emphasis on a legal framework that supports the evolving tenure system (Bruce and Freudenberger, 1992). Recording transactions, disputes and precedents is another important element of the adaptive approach. Keeton (1966) claims that it was the search for customary rules of tenancy and their generalisation and enforcement by courts that transformed privileges (granted by dictators) into rights, and established the Common Law in England.

Hayami and Ruttan (1985:107-110) hypothesise that a new institutional innovation will be supplied if the returns from implementing the innovation exceed the marginal cost of mobilising the resources necessary to introduce the innovation. In Section 3.4.1 it was established that institutional change will be resisted by those who benefit from the existing structure of property rights. Therefore, to alter the evolution of land tenure from an unpredictable process to a more pragmatic one, losers have to be compensated. Identifying potential losers and finding ways to compensate them are important elements of the adaptive approach. If tenure is secured at the expense of households who rely on secondary use rights, acceptable compensation may involve alternative forms of social security, like adequate pension and unemployment benefits, or options to exchange use rights for serviced residential sites, shareholdings in ranching incorporations, etc (Lyne *et al*, 1996).

Institutional change requires powerful leadership (Kanel, 1974). In KwaZulu, adaptive strategies would have to be accepted and endorsed by the local chief and his councillors. Tribal authorities administer the relevant legal and judicial systems (Thomson and Lyne,

1993). The principle of compensation could therefore be applied to traditional leaders when institutional changes recommended by an outside agent impose administrative or political costs on them. Previous research conducted by the author revealed that some chiefs disallowed rental contracts between prospective lessors and farmers because they relied on their control over land allocation to prevent political rivals from settling in their domain (Thomson and Lyne, 1993). The chiefs who endorsed rental contracts were those who received financial compensation. Some benefitted from participating in the rental market - usually as lessors - and others raised tax revenues from the transactions.

Viewed from a neoclassical perspective, institutional changes that promote land rental without customary safeguards against land sale represent a 'second best' solution because investment levels are expected to be lower due to moral hazard inherent in tenancy arrangements (Kille and Lyne, 1993). However, land sale has equity implications that are politically unacceptable (Department of Land Affairs, 1996:21-22). In addition, it may not generate the same level of allocative efficiency found in a rental market - Section 2.1. It was for these reasons that adaptive strategies were used to facilitate institutional change in the Upper Tugela Catchment. There was no *a priori* reason to believe that adaptive strategies would be any cheaper than a replacement strategy. When applied to large areas, adaptive strategies require substantial commitment from government - to support research, compensation, and negotiations with local authorities; to document transactions, disputes and precedents; to disseminate information; and to ensure that national laws sanction local precedents (Lyne *et al*, 1996).

CHAPTER 4

RESEARCH SITES AND DATA COLLECTION

This chapter describes the survey techniques employed to gather data for the purpose of formulating and monitoring adaptive strategies, and to gauge the impact of technical innovation on institutional change. A total of four household surveys were conducted in the Upper Tugela Catchment between December 1993 and February 1996, and one in Tugela Ferry during February 1995. Two distinct types of information were gathered from households. First, socio-economic data were collected in order to test the impact of land rental on household welfare and the allocation of farm resources. Second, data relating to property rights was assembled to gauge household perceptions about tenure security. Additional information was obtained during meetings with tribal authorities and agricultural extension officers in the study areas.

4.1 Description of the Study Areas

KwaZulu-Natal stretches along the eastern seaboard of South Africa and covers a total area of 9.2 million hectares (Map 4.1). Prior to 1994 the province was split into two regions; Natal and the self-governing homeland of KwaZulu. Agriculture and property rights in these two regions were distinct. Natal was dominated by commercial agriculture and private land tenure, and KwaZulu by subsistence agriculture and communal land tenure. After South Africa's first democratic elections in 1994 the two regions were amalgamated under one

A Upper Tugela Catchment
B Tugela Ferry Irrigation Scheme
C Mvoti Valley Irrigation Scheme

Map 4.1. Location of study areas in KwaZulu-Natal

provincial administration. However, this has had little effect on agriculture and property institutions in the province. Land tenure arrangements in the rural areas of KwaZulu are still administered by tribal chiefs and their *indunas*. This study focused on three communal areas in KwaZulu.

4.1.1 Upper Tugela Catchment

The Upper Tugela Catchment lies within the Okhahlamba magisterial district of the province. The region borders the Drakensberg mountain range between the towns of Winterton and Bergville. It comprises of two tribal wards; the Betterment Planned ward of Amazizi and the larger unplanned ward of Amangwane. Betterment Planning was a government programme that separated arable and residential allotments, and which relocated households to village settlements (Yawitch, 1981:48-49; Davenport, 1987). The remaining land was set aside for communal grazing. The two tribes control approximately 100 000 ha of land.

The Upper Tugela Catchment was selected as an appropriate area to initiate institutional change for three reasons:

1. The region has been prioritised for development by the Provincial Government and hosts a larger ongoing project known as the Upper Tugela Catchment Development Initiative. The object of the Development Initiative is to slow the rate of soil erosion, to facilitate sustainable utilisation of natural resources, and to improve the inhabitants quality of life (Integrated Planning Services, 1991).

2. The Upper Tugela Catchment has good crop potential and is heavily stocked with cattle. Most of the region falls within Bioclimatic Group 4 (Highland Sourveld) with the remaining north-east section located in Group 6 (Moist Tall Grass Veld). The region experiences summer rainfall with mean annual rainfall ranging from 800mm in Group 6 to 1500mm in Group 4. Mean annual temperatures range from 13°C in Group 4 to 18°C in Group 6. Prolonged periods of drought are rare. The mix of high cropping potential and abundant livestock presented an obvious test for institutional changes aimed at promoting a rental market for arable land.

3. The region included both planned and unplanned tribal wards. This facilitated comparisons between the main tenure institutions found in KwaZulu.

4.1.2 Tugela Ferry

Tugela Ferry is located in the Msinga magisterial district. Topography is generally hilly, and crop production is confined to an irrigation scheme on the banks of the Tugela River. The irrigation scheme was established over 80 years ago and covers approximately 653 hectares divided amongst 1 842 plotholders. Although government extension staff maintain records of plotholders, tenure arrangements are governed by customary law. The main crops grown are maize, sweet potatoes, tomatoes and vegetables. Tomatoes make up the bulk of the cash crop.

Tugela Ferry is situated within Bioclimatic Group 10 (Riverine and Interior Lowland). Vegetation is typically short mixed thicket and short to medium woodland. Annual rainfall

ranges between 600mm to 700mm. Annual temperatures range between 18°C and 23°C with temperatures becoming excessive for most crops during the period December to January. Mild to severe frosts are experienced. Areas outside of the irrigation scheme are best suited to extensive cattle ranching. The irrigation scheme was selected as a study site to identify property institutions that may have been induced by technical change and intense population pressure.

4.1.3 Mvoti Valley

The Mvoti Valley is situated in Bioclimatic Group 1 (Coastal Lowlands). Rainfall ranges from 850mm to 1 400mm per annum and is well distributed throughout most of the year. Annual temperatures fluctuate between 20°C and 22,5°C with very little frost occurring. The area is located close to the Glendale Sugar Mill and the town of Stanger.

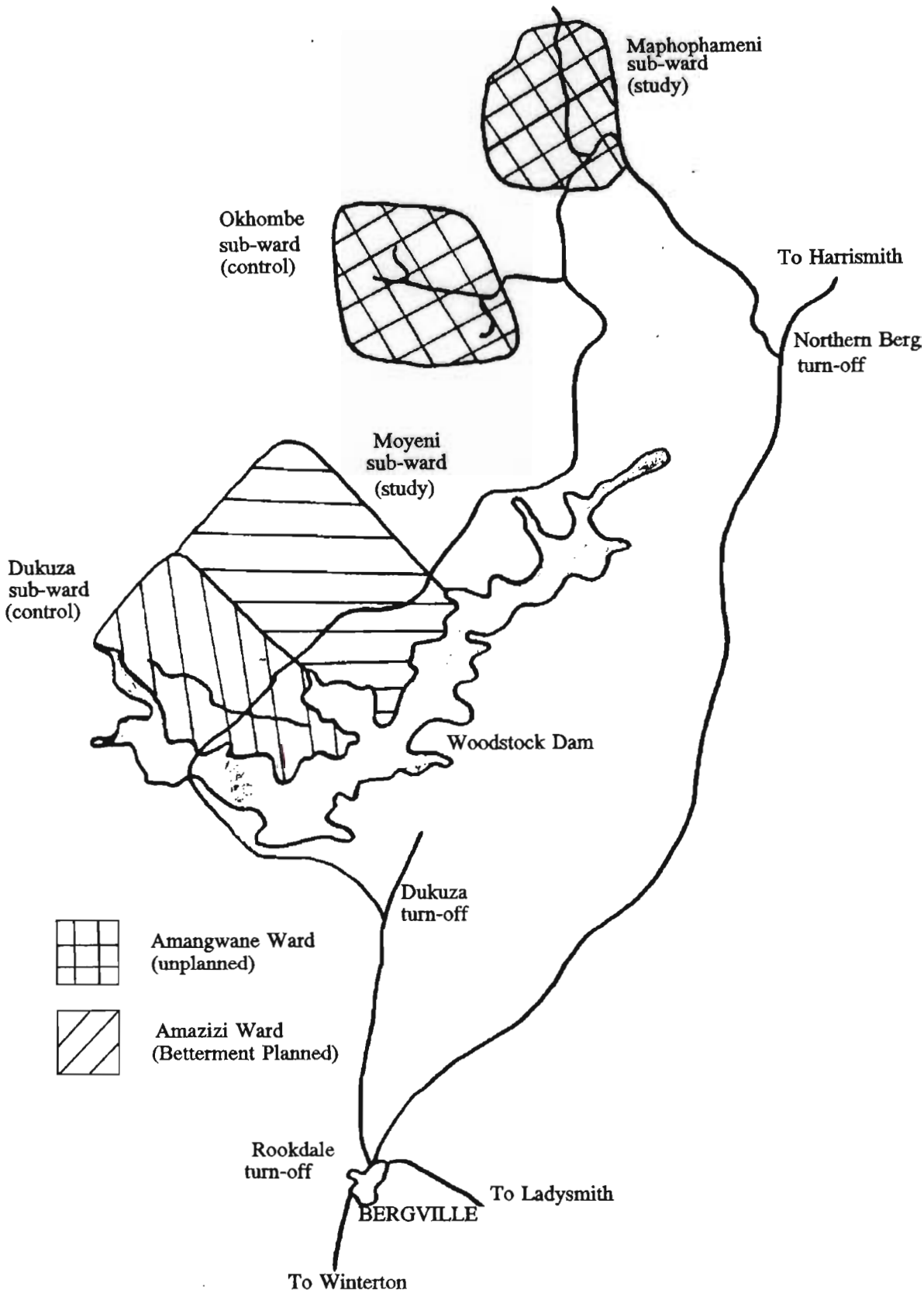
The predominant crop is sugar-cane. A total of 4 140 small cane-growers cultivate an area of 6 063 hectares. This constitutes almost 40 per cent of Glendale Mill's cane supply (Glendale Sugar Millers, undated). Two irrigated sites were selected for study: Sinamfini covers an area of 272 hectares farmed by 151 small cane-growers, and DakaDaka measures 230 hectares with 140 small cane-growers. Land tenure is governed by customary law in both areas. These sites were also selected to identify institutional changes that may have accompanied the commercialisation of agriculture. The sites differ from Tugela Ferry in that livestock are far less prevalent and population density is much lower.

4.2 Household Surveys

Before the study commenced in the Upper Tugela Catchment, control and study sub-wards were designated in each tribal ward. Unfortunately, due to the sensitivity of the project, the control and study wards were defined by tribal councils, and could not be selected randomly. In the Betterment Planned ward of Amazizi, the sub-ward of Maphophameni was designated for study purposes, and Okhombe as control. In the unplanned ward of Amangwane, the sub-ward of Moyeni was designated for study and Dukuza as control (Map 4.2). Data were gathered in four household surveys. The surveys had two objectives:

1. To test the impact of the institutional changes initiated on rental market activity and tenure security.
2. To test the impact of voluntary rental transactions on household welfare and the allocation of farm resources

Survey work in Tugela Ferry and Mvoti Valley focused on discussions with agricultural extension officers and prominent farmers. There was little evidence of inter-household rental transactions at Mvoti Valley and no attempt was made to broaden the enquiry. However, extension staff at Tugela Ferry indicated that households did engage in rental transactions. A household survey was conducted in Tugela Ferry to test for a relationship between technical innovation and exclusive property rights to land.



Map 4.2 Location of Upper Tugela Catchment study areas

4.2.1 Sampling technique and survey instruments

The most basic form of probability sampling is simple random sampling, whereby sample units are generated from the study population with equal probabilities (Barnett, 1974:22-23). The basic aim is to draw a sample that is an honest representation of the target population. Simple random sampling requires that all sample units are listed and sampling is ideally carried out on homogenous populations which are not known to be highly variable (Steel and Torrie, 1980:560). This may however limit the sample's usefulness in further statistical analysis. These problems may be overcome by employing stratified random sampling.

Stratified random sampling involves classifying the target population into non-overlapping subpopulations called strata each of which is internally homogeneous (Cochran, 1953:65). Random samples are then drawn independently from each stratum. The target population is often divided into strata along geographical lines for administrative convenience. Stratification may result in a gain in precision of estimated population characteristics provided that within stratum variance is less than between strata variance (Barnett, 1974:83-84). This technique was employed to survey households in the Upper Tugela Catchment, and at Tugela Ferry. Sample households were interviewed and their fields measured. Appendix B presents a generalised version of the questionnaires applied to respondents. The first part of the instrument elicited quantitative information about household and farm characteristics, including rental transactions. The second part focused on actual and perceived tenure security.

4.2.2 Upper Tugela Catchment

A baseline survey of 160 households was conducted during December 1993 and January 1994. Households and strata were identified using a 1:100 000 orthophoto map. A sample size of 80 households was drawn within each ward (stratum). Sample sizes were roughly proportional to population sizes in the study and control areas. The object of this survey was to gather base information on household demographics, land rental market activity and constraints to farming in the region. Names of household heads were recorded for the follow-up survey.

Survey methodology was similar to that described by Lyne (1981) and Stewart (1986). Three enumerators were employed to interview respondents. In addition, a local councillor was recruited to introduce the survey team to respondents and to explain the aims of the survey. While interviews were being conducted, the respondents' arable fields were measured by the author using a calibrated measuring wheel. Completed questionnaires were checked by the author after each interview.

The baseline survey was followed by surveys of all households known to be engaged in rental transactions within the study areas. The first census was conducted during the 1994/95 growing season. A total of 17 lessors and 19 lessees were interviewed. A second census was conducted during the 1995/96 growing season in the Amangwane ward only where the tribal authority had given full support to the process of institutional change. Nine lessors and 12 lessees were interviewed. These surveys focused largely on the allocative efficiency and

equity aspects of rental transactions. Although the samples were small, the respondents had been exposed to the market and therefore represented a well-informed source of information.

A follow-up survey of baseline respondents (1993/94 survey) was conducted during January and February 1996 in the Amangwane ward only. Almost 87 per cent of the original respondents were re-visited in the study area of Moyeni and 83 per cent in the control area of Dukuza. A total of 68 households were re-visited.

4.2.3 Tugela Ferry

A sample of 80 households with access to irrigation beds was drawn in Tugela Ferry during February 1995. A random sample of 40 households was drawn from each of two strata, Irrigation Blocks 2 and 7, using list frames provided by the Department of Agriculture. These strata were chosen for two reasons: First, Blocks 2 and 7 experience relatively few water shortage problems and are farmed more intensively than other blocks. Second, they are administered by different chiefs and the farmers in Block 7 belong to a particularly close and trusting kinship group.

Survey methodology was similar to that employed in the Upper Tugela Catchment, but it was not necessary to measure arable allotments as all irrigated plots were 0.1 hectares in area. Nevertheless, the plots were visited to establish the area left fallow by respondents.

CHAPTER 5

CHARACTERISTICS OF HOUSEHOLDS, FARMS AND PROPERTY RIGHTS IN THE STUDY AREAS

Statistics reflecting household characteristics were computed to provide base information about households sampled in the Upper Tugela Catchment and at Tugela Ferry. Household demographics, farming enterprises and property rights to land are described in this section. Evidence of a constrained rental market and the potential efficiency and equity gains of promoting land rental transactions in the Upper Tugela Catchment are also presented.

5.1 Upper Tugela Catchment

5.1.1 Household demographics

Most respondents were female (Table 5.1). Men tend to work as migrant labourers and crops are usually raised by women. Many of the male household heads present during the interviews were reluctant to answer questions relating to crop production. The mean age of respondents was almost 50 years. On average, households had five *de facto* members, including 3.3 children and 0.6 pensioners.

Table 5.1 Household composition and income, Upper Tugela Catchment, 1993/94

	Amangwane (n=80)	Amazizi (n=80)
Household composition		
De facto female head (%)	77	77
Age of respondent (yrs)	47	51
Number of years resided in the ward	20	17
Widows (%)	28	27
Number of children	3.33	3.23
Number of pensioners	0.70	0.57
De facto household size	5.03	4.80
Off-Farm income		
Monthly cash income (R)	(57.69)	(95.93)
Monthly pension income (R)	223.97	200.00
Monthly remitted income (R)	(154.02)	(84.30)
Total non-farm income	435.68	380.23

Notes: 1. Estimates in parenthesis have coefficients of variation (CV) greater than 20 per cent

5.1.2 Farm sizes and land use

Farm sizes are generally small, with average arable allotments measuring approximately 0.85 hectares (Table 5.2). Only 36 per cent of all respondents had arable allotments greater than one hectare. The largest arable allotment measured 6.1 hectares.

Table 5.2 Farm size and land use, Upper Tugela Catchment, 1993/94

		Amangwane (n=80)	Amazizi (n=80)
Garden plot	(ha)	0	0.20
Arable allocation	(ha)	0.84	0.66
Farm size	(ha)	0.84	0.86
Area cropped	(ha)	0.70	0.65
Area left fallow	(ha)	0.14	0.21
% left fallow		16	24

Due to Betterment Planning, households in Amazizi were allocated garden plots next to their homesteads and arable allotments in designated arable areas. It was clear that households made better use of their garden plots because arable allotments were located some distance from their homesteads. This may also explain why more arable land is left fallow in Amazizi than in Amangwane where arable allotments still surround the homestead.

5.1.3 Farm enterprises

Almost 60 per cent of households in Amangwane, and 50 per cent in Amazizi own cattle (Table 5.3). Cattle are kept largely as a store of wealth (Doran *et al*, 1979). Stock-owners tend to be more influential members of the community (Low 1986:111). Mean herd sizes are similar for owners in both tribal wards.

Table 5.3 Farm enterprises, Upper Tugela Catchment, 1993/94

		Amangwane (n=80)	Amazizi (n=80)
Livestock			
Households possessing cattle	(%)	60	49
Oxen		1.04	1.05
Bulls		(0.90)	(0.29)
Female cattle		1.50	(2.09)
Total cattle		3.44	3.43
Small stock		8.60	6.80
Crops			
Households growing maize	(%)	96	95
Households growing beans	(%)	37	40
Households growing potatoes	(%)	36	44
Households growing vegetables	(%)	21	30
Households growing fruit	(%)	24	44

Notes: 1. Estimates in parenthesis have CV's greater than 20 per cent.

Most households grow maize (Table 5.3) for subsistence purposes. Few grow land intensive crops such as vegetables and potatoes. Households growing more than one crop usually inter-crop, especially maize and beans. Households planting fruit trees generally do so close to their homesteads.

5.1.4 Farm characteristics

Cattle sales are low (Table 5.4). The majority of respondents are engaged in subsistence farming. Crop sales are insignificant, with only two respondents reporting positive gross margins for crop production. Cash revenue is less than input expenditure because farm produce is largely consumed by the family. Fertiliser and contractor services account for the bulk of farm expenditure. Few households purchase improved seed.

Table 5.4 Farm characteristics, Upper Tugela Catchment, 1993/94

	Amangwane (n=80)	Amazizi (n=80)
Crop expenditure: (R)	304	194
Fertiliser costs	170	116
Seed costs	(3)	(1)
Contractor services	131	77
Crop sales (R)	(15)	(8)
Livestock sales (R)	(69)	(160)
Farm gross margin (R)	-220	-26

Notes: 1. Estimates in parenthesis have CV's greater than 20 per cent

5.1.5 Property rights

The principal statute governing land in KwaZulu is the KwaZulu Ingonyama Trust Act No. 3 of 1994. The Act establishes a statutory trust, known as the Ingonyama Trust in whose name all land in KwaZulu is registered. The beneficiaries of the trust are the members of the 249 tribes and communities listed in the schedule. The Act authorises the trustee to deal

with land in accordance with Zulu indigenous law or any other applicable law (Rutsch, 1994:5-6). The implication is that authority over the land is vested in the chief acting on behalf of the tribe. Almost 96 per cent of the baseline respondents perceived that the chief owned their land.

According to customary law, each married man in the community has a right to residential and arable land sufficient for his family's needs. In practice, households are granted usufructory rights to land. The household head is assigned individual usufruct to arable land and communal usufruct to grazing land. - that is they have the right to grow crops, and graze livestock on unused land in the community. Any arable land not under cultivation becomes communal grazing land. The only way to 'privatise' arable land is to cultivate it. In winter all land becomes communal, and stock-owners are entitled to use stover on cropland for grazing (Thomson and Lyne, 1995). Households do not possess the right to permanently alienate the land, and are therefore unable to sell or mortgage their land. Some 65 per cent of the respondents acquired land through tribal allocation and 35 per cent through inheritance.

A more detailed survey of respondents in Amangwane conducted during 1995/1996 revealed that households perceived much broader property rights to land, especially to arable and residential allotments (Table 5.5). The vast majority claimed that household heads could bequeath or lease out their arable and residential allotments, and 21 per cent claimed they could sell these allotments. However, few respondents believed that the household head could transfer land without prior approval from his or her family and the tribal authority.

Table 5.5 Perceived transfer rights, Amangwane, 1995/96 (n=68)

	Arable land	Grazing land	Residential land
	(%)	(%)	(%)
Right to **sell**:			
Yes	(21)	(4)	(21)
No	79	96	79
Tribal authority permission required	91	-	91
Family permission required	88	-	88
Right to **lease**:			
Yes	93	(9)	87
No	7	91	13
Tribal authority permission required	91	-	91
Family permission required	91	-	90
Right to **bequeath**:			
Yes	100	(13)	99
No	-	87	1
Tribal authority permission required	88	-	88
Family permission required	91	-	91

Notes: 1. Estimates in parenthesis have CV's greater than 20 per cent

Almost 91 per cent of respondents in Amangwane indicated that they were unable to use their arable land throughout the year as they had to surrender it for communal grazing once they had harvested their crops (Table 5.6). All households felt they could make fixed improvements to land, but had little incentive to improve communal grazing land owing to free-riders. The vast majority of respondents perceived that secondary rights to gather natural resources were restricted to the immediate community and very few indicated possession of such rights. They claimed that households could not gather natural resources on uncultivated land without express permission from the tribal authority.

Table 5.6 Perceived land use rights, Amangwane, 1995/96 (n=68)

	Arable land	Grazing land	Residential land
	(%)	(%)	(%)
Use land throughout the year	(9)	88	100
Make permanent improvements on the land	100	-	100
Secondary rights restricted to the community only	87	84	91
Right to gather natural resources	(3)	(6)	-
Rules controlling the gathering of natural resources	99	96	-

Notes: 1. Estimates in parenthesis have CV's greater than 20 per cent

However, the *de facto* use of natural resources was quite different (Table 5.7). The estimates presented in Table 5.7 indicate whether natural resources are gathered locally or purchased on markets outside of the communal area. It is quite clear that households do gather natural resources locally. In practice there is no enforcement of rules restricting the quantity of natural resources that can be gathered by members of the community (Zondi, 1995). Population growth and poverty have resulted in a shortage of certain open access resources. Most households have to purchase firewood as communal woodlots have shrunk. One respondent who established his own woodlot complained about the community felling his trees.

Table 5.7 Gathering and purchase of natural resources, Upper Tugela Catchment, 1993/94

	Amangwane (n=80)		Amazizi (n=80)	
	Gather[2]	Purchase	Gather[2]	Purchase
	(%)	(%)	(%)	(%)
Thatch	69	46	85	25
Clay	98	0	97	(3)
Firewood	41	72	59	54
Timber	31	39	18	31
Water	100	-	100	-

Notes: 1. Estimates in parenthesis have CV's greater than 20 per cent
2. All natural resources were gathered on uncultivated land

The majority of respondents interviewed in Amangwane believed that they were entitled to fence off their arable and residential allotments, but not grazing land (Table 5.8). These results and those presented in Table 5.6 are consistent with the view that households are assigned exclusive rights to land cultivated during the summer months. However, these rights are not easy to enforce. This issue is explored in Chapter 6.

Table 5.8 Perceived exclusion rights, Amangwane, 1995/96 (n=68)

	Arable land	Grazing land	Residential land
	(%)	(%)	(%)
Right to fence off land	99	(10)	99
Right to exclude livestock during summer	100	(3)	
Right to exclude livestock during winter	(1)	(1)	
Right to claim compensation for damaged crops	99	(1)	

Notes: 1. Estimates in parenthesis have CV's greater than 20 per cent

Table 5.9 focuses on grazing rights in the Upper Tugela Catchment. Grazing land in these areas is typically open even though access is confined to the local community. Open access prevails because the communities are large (more than 400 potential users were identified in each sub-ward) and there are no rules controlling the number of livestock a household is allowed to graze. Observed stocking rates are high (Integrated Planning Services, 1991) because the private costs associated with keeping livestock are low. Veterinary and dipping services are provided by the Department of Agriculture, and where herds are tended, the task is allocated to children and pensioners with free time.

Table 5.9 Actual grazing rights and use of grazing resources, Upper Tugela Catchment, 1993/94

	Amangwane (n=80)	Amazizi (n=80)
	(%)	(%)
Grazing restricted to local community	61	72
Can exclude livestock during winter months	(1)	0
Can exclude livestock during summer months	88	94
Stock-owners who graze livestock on own land	57	54
Stock-owners who graze livestock on neighbours' unused land	76	61
Neighbours graze livestock on respondent's unused land	74	63

Notes: 1. Estimates in parenthesis have CV's greater than 20 per cent

Table 5.9 confirms that respondents are not allowed to exclude livestock owned by other households from their arable allotments during the winter months. Overall, almost 70 per cent of the respondents' reported that their unused land was grazed by their neighbours' livestock. It is therefore not surprising that crop farmers incur crop losses during summer months due to stray livestock (Thomson and Lyne, 1995).

5.2 Rental Markets in the Upper Tugela Catchment

This section presents evidence to support the view that the rental market for arable land was constrained in the Upper Tugela Catchment and examines the potential benefits of the market using data from the baseline survey. Results presented in Tables 5.10 and 5.11 were

computed using the anova technique. The F-value tests for significant differences between computed group means for:

1. **Lessees** - respondents who indicated they were renting land in at the time of the interview.
2. **Willing lessees** - respondents who wanted to lease in land, but had not done so.
3. **Willing lessors** - respondents who were willing to lease out their land out.
4. **Others** - respondents who showed no interest in participating in the rental market.

5.2.1 Evidence of a constrained land rental market in the Upper Tugela Catchment

Just six of the 158 household heads surveyed rented land in and none admitted to leasing land out (Table 5.10). While 78 indicated that they would like to hire additional land (willing lessees), only 9 conceded that they would like to lease land out (willing lessors). The remaining 65 (others) claimed that they did not want to rent land in or out, but the group averages suggest that some of these respondents would become lessors if renting out was less risky.

All willing lessors resided in the Betterment Planned ward of Amazizi where arable allotments are often located some distance from the household. This adds to the costs of farming and reduces the reservation rent. Nevertheless, this group did not lease out. One possible explanation is that many (40 per cent) of them considered their land rights to be insecure.

Table 5.10 Constraints to land rental in the Upper Tugela Catchment, 1993/94 (n=158)

	Lessees	Willing lessees	Willing lessors	Others	F-value	Sig F
Households (n)	6	78	9	65		
Households (%)	4	49	6	41		
Betterment Planned (%)	50	56	100	38	3.53	0.01
%Who perceive land rights to be insecure	0	19	40	32	0.74	0.57
Required tribal authority approval for:						
i) Intra-household transactions (%)	100	12	80	36	5.77	0.00
ii) Inter-household transactions (%)	100	69	80	89	1.35	0.26

In all six rental cases observed, the lessor was either a member of the family or a close friend. Only 31 per cent of the sample felt that they required the tribal authority's approval for rental transactions between family members. In contrast, 81 per cent of the sample indicated that approval is required for rental transactions with other households. Transfers between family members also carry lower transaction costs and less risk - especially with regard to land claims. Despite acknowledging the need for permission to engage in rental transactions, none of the lessees had consulted the tribal authority. Apparently they did not want to draw 'official' attention to their contracts.

5.2.2 Potential efficiency and equity advantages of land rental in the Upper Tugela Catchment

The estimates presented in Table 5.11 indicate that lessees and willing lessees tend to use their arable land more intensively than willing lessors. They leave less land fallow, apply more fertiliser per hectare, and spend more on contractor services than do willing lessors. They also invest more heavily in tractors and fixed improvements to land. Willing lessors

tend to be older, less liquid and, considering the relatively high proportion of widows in this group, less well endowed with family labour than willing lessees. The implication is that a more active rental market for arable land would improve allocative efficiency by transferring land to those households best able to make use of it.

Table 5.11 Potential efficiency and equity advantages of land rental, Upper Tugela Catchment, 1993/94 (n=158)

	Lessees	Willing lessees	Willing lessors	Others	F-value	Sig F
Households	6	78	9	65		
Farm Size (ha)	0.80	0.85	1.28	0.86	0.58	0.68
Area operated (ha)	2.05	0.85	1.28	0.86	3.28	0.01
Area left fallow (ha)	0.04	0.14	1.07	0.17	20.51	0.00
Fertiliser expenditure (R/ha)	128.82	165.76	63.62	133.61	1.96	0.10
Contractor expenditure (R)	179.18	122.98	72.86	124.27	0.73	0.57
Own tractors (%)	33	4	0	6	2.44	0.05
Invest in fixed improvements (%)	33	31	0	6	3.77	0.00
Non-farm income (R/mth)	647.67	538.07	315.53	336.33	1.52	0.20
Age of household head (yrs)	47	48	63	53	1.96	0.11
Widows (%)	0	21	33	31	1.90	0.11

The estimates also suggest that a more active rental market would improve equity. Land would transfer from larger to smaller farmers, equalising the areas operated. Conversely, households endowed with land but little else would earn rental income.

In conclusion, the results presented in Sections 5.2.1 and 5.2.2 supported the argument that:

- rental markets for arable land in KwaZulu are constrained by risk.
- voluntary rental transactions could improve both allocative efficiency of all resources and household equity.

The findings informed a decision to initiate institutional changes in the Upper Tugela Catchment. The adaptive strategies employed to promote rental transactions are described in Chapter 6.

5.3 Tugela Ferry

5.3.1 Household characteristics

Unlike other areas of KwaZulu where the majority of respondents are usually women, the majority of respondents were men and off-farm incomes were relatively low (Table 5.12). Family sizes are large, with an overall mean of ten members. This is consistent with estimates reported by Lyne and Ortmann (1991), who found that households tend to be larger in areas more distant from job centres.

Unemployment rates are high at approximately 60 per cent, and pensions account for almost one-half of off-farm income. The proportion of wage earnings remitted (25 per cent) is lower than estimates presented by Lyne and Ortmann (1991). Off-farm income is slightly higher in Block 7 (R454 vs R414) where households are larger and have more off-farm

workers. This block is adjacent to the village of Tugela Ferry, while Block 2 is situated approximately 10 kilometres away, reducing local employment opportunities

Table 5.12 Household composition and income, Tugela Ferry, 1995

	Block 2 (n=40)	Block 7 (n=40)
De facto female household head (%)	45	47
Age of *de facto* household head (yrs)	56	58
Widows (%)	40	35
Number of wage earners	0.80	1.15
Number of housekeepers	1.85	2.60
Number unemployed[1]	1.18	1.83
Number of pensioners	0.70	0.73
Number of dependents	3.93	5.13
Total household size	8.46	11.44
Monthly wage income (R)	165	180
Monthly pension income (R)	209	223
Monthly remitted income (R)	40	51
Wage plus pension income (R/mth)	414	454

Notes: 1. Family members who claimed they were unemployed. It was not ascertained whether they were actively seeking work or not.

5.3.2 Household cropping enterprises

Farm sizes are small relative to other areas in KwaZulu. Households are usually allocated only 0.2 hectares of irrigated land. The vast majority of respondents grow maize but vegetables and tomatoes are the main source of farm income (Table 5.13). Despite long

distances to major employment centres, off-farm earnings still account for the bulk of household income. Farm sizes are larger in Block 2. This explains the lower total crop income computed for households in Block 7.

Table 5.13 Mean household cropping enterprises and incomes, Tugela Ferry, 1995.

	Block 2 (n=40)	Block 7 (n=40)
Farm size (ha)	0.45	0.22
Households growing maize (%)	100	95
Households growing potatoes (%)	18	23
Households growing beans (%)	58	18
Households growing vegetables (%)	35	63
Households growing fruit (%)	50	35
Maize income (R)	173	12
Potato income (R)	87	2
Beans income (R)	5	0
Vegetable income (R)	369	386
Fruit income (R)	9	4
Gross crop income (R)	643	404
Gross crop income (R/ha)	1313	1322

5.3.3 Evidence of a constrained rental market in Tugela Ferry

More than half of the households interviewed wanted to hire additional land, yet only six per cent did so. The majority of potential lessees claimed that there was no land to rent, yet large areas of productive land within the schemes lay idle. This suggests that the rental market is constrained. The only lessor observed rented land to a close friend and was

reluctant to discuss the transaction. The only potential lessor observed stated that she would 'lend' land but only to a member of her church group. It was not clear why she was afraid to advertise her land openly, as only four per cent of the respondents perceived that they would be dispossessed if they rented land out.

Reasons for the constrained market are not clear. The market could be constrained by risk, but the results are anomalous. Households are reluctant to disclose rental transactions, yet the vast majority of respondents felt that they would not be dispossessed of their land if they rented it out. Other sources of risk may have been present but were not explicitly identified. Sixty per cent of respondents simply stated that they were not allowed to hire additional land. A second possibility is that insecure tenure could be a more binding constraint. Households, like those in the Upper Tugela Catchment, were unable to exclude livestock from their arable land. This problem is explored in Chapter 6.

5.4 Mvoti Valley

All irrigated land in this region is planted to sugar-cane under contract to the Glendale Sugar Mill. The majority of farmers are women as most men work in urban areas. In order to produce sugar-cane each grower incurs a debt of R10 000/hectare to finance irrigation equipment and to establish the cane crop. The average farm size is 1.6 hectares at Sinamfini and DakaDaka. Very little management is required during the growing period - two or three weedings - and the crop is harvested and transported by private contractors. Harvest time is not critical and cane losses due to pests and diseases are uncommon. Annual yields of

approximately 90 and 100 tons per hectare are obtained in the Sinamfini and DakaDaka study areas respectively.

Glendale Mill also provides an extension service to small growers. The Mill has a strong incentive to support small scale farmers as they supply approximately 40 per cent of the Mill's throughput. Extension officers encourage the growers to maintain infield haulage roads and firebreaks and, provide advice on soil fertility. The Mill is responsible for servicing the irrigation equipment but growers contribute R11 per ton of sugar-cane towards the cost of electricity and maintenance. In addition, growers pay an annual tribute to the tribal authority. Farmers provide very little management or labour and many work off the farm. The following is a list of management duties carried out by the Mill, Department of Agriculture and the growers.

Glendale Sugar Mill[1]	**Small-scale Growers**
Establishes cane	Move two sprinklers/ha twice daily
Maintains irrigation equipment - sprinklers and pumps	Weed for 3 months (this duty is often neglected, or contractors are hired)
Organises contractors to spray all irrigated cane with liquid fertiliser	Supervise harvesting of cane
Organises contractors to harvest and transport cane	
Department of Agriculture	
Bush clearing and contouring	
Establishment and maintenance of cane extraction roads	

Notes: 1. All costs incurred by the Mill are deducted from the Grower's annual cane receipts

5.4.1 Rental transactions

According to Newson (1995) there are no inter-household rental contracts within the irrigation schemes. This is to be expected as growers already have a reliable 'tenant' in the Mill. Farmers at Sinamfini realise an annual profit of nearly R4000 after repaying their loans, while those on the DakaDaka scheme net approximately R3611. Future earnings are expected to exceed R6800 per anum once loans have been repayed. The Mill is the ultimate lessee as it provides a large amount of the management and labour input, especially in establishing the cane. According to Newson (1995) the majority of small growers would stop producing if it were not for the extension and other services provided by the Mill. Under these conditions absentee farmers may prefer to lease their land to participating farmers.

Sugar quotas affect both security of tenure and transaction costs and are therefore expected to influence market activity. On the one hand quotas provide the lessor with tenure security as they are attached to a particular parcel of land. On the other hand they inflate transaction costs because all payments are made to the quota holder When engaging in a rental transaction the quota must either be transferred to the lessee, undermining the lessor's security of tenure, or the lessee must deal with the risk that the lessor will claim payment.

Of further interest is the impact of irrigation and a perennial crop on secondary rights to land. To establish the irrigation infrastructure, homesteads were relocated to higher lying unproductive areas. The introduction of irrigation brought uncleared land into permanent production reducing the supply of communal grazing, thatching grass and firewood. Households had to reduce herd sizes, import firewood and replace thatch with tin sheeting.

No direct compensation was paid to landless households who relied heavily on their secondary rights to communal resources. However, these households do benefit from community projects funded by the farmers on the schemes. The farmers contribute a set fee per ton towards a fund which is used to establish community halls and schools.

CHAPTER 6

RENTAL MARKET ACTIVITY AND INSTITUTIONAL CHANGE IN THE UPPER TUGELA CATCHMENT

The necessary conditions for an efficient land rental market are secure tenure and low transaction costs. The objective of field operations conducted in the Upper Tugela Catchment was to stimulate a rental market for arable farmland by improving tenure security and reducing transaction costs including risk. Initially it was assumed that the risk of losing land was the most important factor constraining rental transactions, and various institutional changes were initiated to address this problem.

6.1 Initial Institutional Changes

6.1.1 Tribal authority support

Permission to promote a rental market for arable land was gained from the chief, and tribal councillors in each tribal ward. The local magistrate was also consulted. Once full council permission had been gained, control and study sub-wards were defined in the respective tribal wards. The two tribal councils and secretaries were trained to draw up lease agreements. The legal implications of the lease agreements were discussed in detail with the tribal councils, with major emphasis placed on the rights of lessors and lessees in regard to leased land. It was important for councillors to have a clear understanding of the lease agreements,

as they would have to settle any land rental disputes. 'Action research' in the two study areas, Moyeni and Maphophameni commenced only when clear dispute procedures were established and proper administration processes were in place.

The rental market was sanctioned through a simple and well publicised tribal decree. This was done by calling a tribal *imbizo*, a mass meeting of the tribe called by the chief, in the relevant study sub-wards. At these meetings the chiefs publically approved a rental market. This reduced part of the risk in the rental market because the tribal councils openly supported the market. The *imbizo* also gave the communities an opportunity to pose questions.

6.1.2 Proforma lease agreements

The proforma lease agreements were simple one page documents signed in triplicate by lessor and lessee and approved by the tribal secretary on behalf of the chief and his councillors (Appendix A). Copies were kept by lessor and lessee and the original filed by the tribal secretary. Two types of lease agreements were catered for - cash lease and crop-share. The aim of the lease agreements was to provide security for both lessor and lessee. Unless the lessor was widowed, both spouses' signatures were required. This safeguard was included primarily to protect women whose social security could be undermined if their (migrant) husbands leased land out for their own benefit.

6.1.3 Field-work

Rental transactions were facilitated by identifying potential lessors and lessees. An extension officer was employed to organise voluntary meetings attended by small groups of households in the study areas. Progressive farmers (the most likely potential lessees) were identified with the help of local development committees and invited to meetings. A 'small group' approach was adopted to encourage participatory discussion about the advantages of a rental market in land, the rights and obligations of lessors and lessees and, the procedures to formalise written contracts and to settle disputes. The names of willing lessors and lessees were recorded after each meeting. This process revealed that many potential lessors were still reluctant to openly declare their willingness to lease out arable land.

Willing lessors and lessees were re-visited to confirm their availability and to clarify any remaining queries. The names of potential lessors were then revealed to potential lessees. Where members of the latter group showed interest in hiring land, the parties were introduced and encouraged to negotiate voluntary transactions. Negotiations were usually conducted at the sites where potential lessors wished to lease out land. Lessors and lessees negotiated their own terms. Extension staff were not involved in the negotiation process. If parties agreed to sign lease agreements, they were transported to the tribal court. The signed lease agreements were then stamped and authorised by the tribal secretary. Some contracting parties felt it was not necessary to sign lease agreements.

Four community workshops were held in Moyeni to promote the project. Radio Zulu was used to broadcast the dates of these meetings and to report back on their outcomes.

Prominent community leaders such as local *indunas* and tribal councillors were interviewed on radio.

6.2 Tenure Security and Rental Market Activity in the Upper Tugela Catchment

Initially, it was assumed that lessors carried most of the risk in a rental transaction as they stood to lose their land. Constraints faced by tenants were not considered to be a major problem as many households indicated they were willing to hire land (Table 5.10). Tenure security, mainly for the lessor, was improved by convincing the tribal authorities to support and uphold rental transactions in the tribal court, and by introducing legally binding written lease agreements. This did much to lower risk perceptions as many households indicated their willingness to lease out land at community meetings. However, contrary to expectations relatively few households actually agreed to lease in additional land - despite attempts to engage progressive farmers and local tractor owners.

When field work commenced in Moyeni during September 1994, a local farmer's association was targeted as the first group of potential lessees. Most of its 11 members invested substantially in agriculture and produced with the intent to sell. The majority of these farmers owned tractors, implements and motor vehicles. Some were already involved in informal lease agreements. However, they were not prepared to rent additional land as they perceived tenure in communal areas to be insecure. Reasons for these perceptions are explained in Section 6.2. Other potential lessees were unable to farm extra land due to liquidity and machinery constraints and many were concerned about the impending drought

due to poor spring rains. These problems aggravated incentives already weakened by tenure insecurity.

The main input constraints cited by the community were:

1. Liquidity constraints. Households claimed that they were unable to finance farming inputs and were therefore unwilling to lease in additional land. The KwaZulu Finance Corporation (KFC) had previously abandoned its credit programme in the area due to a high incidence of bad debts but agreed to resume their operation in the 1994/1995 planting season.

2. Contractor services. Farmers complained that tractor services were expensive and unreliable. Contractors claimed that they were unable to maintain their equipment properly because spare parts were costly and difficult to purchase locally.

Despite these claims, it was evident that some farmers were making good use of their land and their reluctance to hire additional land was caused by a more fundamental obstacle - tenure insecurity. It was therefore decided to focus the research and extension effort on adaptive strategies to improve tenure security in the hope that this would stimulate the rental market.

6.3 Causes of Insecure Tenure in the Upper Tugela Catchment

It seems that the concept of tenure security in communal areas is poorly understood. Some authors contend that tenure institutions in Africa reflect social relationships that have arisen out of satisfactory agricultural and livestock production practices in African communities (van den Brink *et al*, 1994). However, these relationships are shaped by lobby groups, for example crop and livestock farmers, competing for the same agricultural land. Customary tenure is usually secure in the sense that individuals who comply with tribal rules can retain possession of their land. Anyone wishing to dispossess a household of their land must show very good cause for doing so (Low 1986:108). Land is normally held in perpetuity and can be bequeathed to an heir. The recently launched Green Paper on Land Reform (Department of Land Affairs, 1996) argues that households in communal areas can be given secure tenure through legislation ensuring permanent possession - implying that households cannot be evicted from their allotments.

The situation is, however, entirely different when tenure security is defined as the ability to internalise the benefits of investment in the land, or the ability to transact land. It is often argued that investment on agricultural land in communal areas is sub-optimal because property rights are not clearly defined (Johnson, 1972). This is an oversimplification. Property rights to land may be well defined under customary law but the breadth of rights is often limited. Further, some of these rights are difficult to enforce.

As defined in Section 2.2, tenure security depends upon perceived and actual rights to land. Included in this bundle of rights is the right to use the land on a continuous basis without fear

of dispossession or claims, and the right to reap any income generated from the land through use and investment, or upon transfer of the land. In essence, tenure security comprises three elements namely; breadth, duration and assurance. These are discussed separately in the following sections using case studies to establish whether or not they are satisfied in the Upper Tugela Catchment.

6.3.1 Breadth of rights

The breadth of rights refers to the bundle of rights assigned to an individual. The broad definition of tenure security includes rights to use, transfer and exclude others. When the project commenced it was assumed that lessors bore most of the risk in a rental transaction. In order to stimulate the rental market, the lessor's bundle of rights was 'increased' by encouraging tribal authorities to recognise rental transactions. The fact that many households were willing to lease out land suggests that the project had been successful in this regard.

However, tenure security was not improved for lessees as property rights to land were not fully exclusive. Under communal tenure, households have individual usufruct to arable land and communal usufruct to grazing land. Any arable land not under cultivation becomes communal grazing land. The only way to privatise arable land is to cultivate it. In winter all land becomes communal, and stock-owners are entitled to graze their livestock on the stover left by crop farmers.

Virtually all of the respondents in the follow-up survey stated that they could not exclude stock-owners from their cropland during winter (Section 5.1.5). Several farmers have

attempted to privatise their stover by fencing off their arable land. However, this action was forcefully resisted by members of the community. Stock-owners destroy and steal the fencing so that their livestock can have access to winter grazing. Some farmers have responded by employing guards to protect their property. In one case, a progressive farmer who attempted to harvest green stover from his land to feed his own livestock during winter was fined R200 by the tribal authority.

Another major problem encountered by emerging farmers is that livestock introduce weeds into their arable land. This increases the cost of weed control and reduces the value of investment in fertiliser. Crop yields are lower than those on neighbouring commercial farms in the former Natal Province despite very similar farming practices. To overcome these problems, progressive farmers have bought or rented land outside of the communal areas where they have exclusive rights to land.

The limited breadth of rights not only prevents farmers from internalising the benefits of their investment, but also restricts their freedom to make decisions regarding land use. According to customary law, the chief is supposed to announce a date after which farmers are allowed to start ploughing and planting operations. To attempt any of these operations before the specified dates could result in a fine of R1000. Although stock-owners are supposed to remove their cattle from arable areas, this law is not well enforced. As a result, planting operations are often delayed and yields are reduced. Stock-owners are unwilling to withdraw their cattle to the more distant summer grazing areas due to the risk of stocktheft.

The argument that increasing pressure on land inevitably leads to more exclusive land rights is not supported by evidence from the Upper Tugela Catchment. If anything, crop farmers are literally losing ground to cattle owners. Under these conditions the prospects for crop farming and a land rental market are bleak. If this situation is to be resolved, existing customary rules that assign exclusive land rights to crop farmers have to be enforced and preferably extended to include the winter months.

6.3.2 Duration and assurance

Duration refers to the length of time that a given property right is legally valid. For short-term investments tenure insecurity is less of an issue, but where substantial investment is made in fertilising soils, duration is important. Several farmers in the Upper Tugela Catchment indicated a preference for lease agreements longer than three years but were not convinced that long-term rental contracts would be upheld by tribal courts if lessors decided to terminate the contract early. Again, farmers perceived that they would be unable to realise the benefit of their investment.

Assurance implies that the right to use land is held with varying degrees of certainty, both in the present and the future. Tenure is insecure if legal procedures to settle land disputes are vague or their outcomes are uncertain. Several lessees mentioned previous cases where lessors had reclaimed their land after the tenant had improved its fertility. One case involved a progressive farmer who managed to negotiate a long-term lease. The lessor noted his high yields and reclaimed half of the rented land the following season. The contract was terminated and the land was withdrawn from production. The fact that the tenant did not

appeal to the tribal court could of indicated a common perception that rental contracts were not condoned in customary law. Two-thirds of the households interviewed in the Upper Tugela Catchment during the baseline survey believed that they would be dispossessed of their land if they did not farm it themselves.

In a second case, a lessor attempted to reclaim his land before the crop was harvested. The ensuing dispute was also settled out of the tribal court and the aggrieved tenant terminated the arrangement. These disputes set unfavourable precedents for potential lessees and may explain why most of the rental transactions observed in the baseline survey were confined to agreements between close friends and neighbours - to reduce moral hazard as well as transaction costs.

6.3.3 Technical innovation and tenure security

The fact that crop farmers are unable to protect their crops from livestock belonging to other people suggests that their limited rights of exclusion are difficult to enforce. Table 6.1 attempts to quantify the problem of tenure insecurity resulting from stray livestock. The table compares sample estimates from the Upper Tugela Catchment with those from Tugela Ferry, an area where technical innovation (irrigation) should have, according to the transaction costs theory, induced a shift towards more exclusive rights to arable land.

Most (58 per cent) of the respondents in the Upper Tugela Catchment reported stray livestock in their fields after planting and, in the vast majority of these cases (81 per cent), the livestock caused damage to crops. Of the respondents who suffered damages, only 22 per

cent received out of court compensation, while only 11 per cent reported the problem to the tribal authority. All reported cases were settled in favour of the crop farmer.

Table 6.1 Problems relating to stray livestock in the Upper Tugela Catchment and Tugela Ferry, 1995.

	Upper Tugela (n=36) (%)	Tugela Ferry (n=80) (%)
Households experiencing problems with stray livestock	58	74
Employed guards to police fields	5	10
Fenced in arable land	24	3
Households with crops damaged by livestock	81	90
Reported stray livestock to tribal authority	11	6
Stock-owner fined by tribal authority	11	6
Received out of court compensation	22	3

While the legal findings appear to confirm a farmer's right to exclude livestock from land cultivated during the summer months, it is obvious that crop farmers are reluctant to take cases to the tribal court and that stock-owners do not observe customary laws. There are three possible reasons for this:

1. Financial outcomes are unpredictable. Court fees are paid by the claimant and are determined by the tribal authority. These fees ranged from R10 to R180. Claimants also pay for the services of a tribal policeman who inspects the damage done to their crops. However, respondents were uncertain about their rights to claim for compensation. Cases were reported where the tribal authority had fined stock-owners but did not compensate the plaintiff.

2. Households do not have the right to impound livestock that damage their crops. Consequently, it is difficult to establish who the livestock belong to. In many cases the stock-owners work and reside in urban areas.

3. Because the distribution of cattle is skewed in favour of relatively wealthy men, some crop farmers (mostly women) are afraid to seek redress for crops damaged by stray livestock. A progressive farmer in the Upper Tugela Catchment refused to support a proposed crop farmer lobby as he feared for his safety.

Of those respondents who reported problems with stray livestock 24 per cent had erected fences, and five per cent had employed a guard to protect their crops. These costs discourage crop production. According to customary law, stock-owners must control their livestock during the summer months and should therefore bear these costs.

Despite its long history of subsidised irrigation services, the results from Tugela Ferry are similar to those reported for the Upper Tugela Catchment. In theory, plotholders at Tugela Ferry have the right to exclude other users from their land throughout the year and the irrigation scheme was fenced to protect crops from livestock. Nevertheless, 74 per cent of the respondents reported stray animals in their fields. Of these households, almost 90 per cent suffered damage to their crops. Ten per cent had employed guards to protect their crops. Few of the households that suffered damages lodged complaints with the tribal authority, and only three per cent received out of court compensation.

Discussions with farmers in Tugela Ferry revealed that households had little incentive to report damages to the tribal authority. In one case, a stock-owner fined by the tribal authority had refused to pay the fine and the tribal court did not enforce the penalty. Given this precedent it is hardly surprising that so few aggrieved farmers received out of court compensation. Again, the evidence suggests that the expected level of compensation for crop losses caused by stray livestock does not warrant the costs of seeking legal redress.

Comparisons can also be drawn between the Betterment Planned and unplanned areas of the Upper Tugela Catchment. Respondents in the unplanned ward, Amangwane, reported a greater incidence of problems with stray livestock than those in the planned ward, Amazizi (Table 6.2). This was expected as the incidence of livestock ownership is higher in Amangwane (60 per cent) than in Amazizi (49 per cent). Of importance is that 91 per cent of the respondents in Amazizi who reported problems with stray livestock suffered damages to their crops. In Amangwane the incidence of damage was much lower - 70 per cent. A possible reason for this difference is that arable allotments in Planned areas are often located some distance from the homestead and are therefore harder to protect. This also explains the much higher incidence of fencing and lower incidence of employed guards in Amangwane as households can police their fences and crops themselves.

Table 6.2 Problems with stray livestock in Betterment Planned and unplanned wards, Upper Tugela Catchment, 1995.

	Planned (%) (n=22)	Unplanned (%) (n=14)
Households experiencing problems with stray livestock	50	71
Households with crops damaged by stray livestock	91	70
Employed guards to police fields	9	0
Fenced in arable land	9	40

6.3.4 Land disputes

Roth (1993:316) argues that land disputes are a good indicator of tenure insecurity because inadequate property rights result in conflicts over land. Following this logic, an inverse relationship is expected between the breadth of rights and land disputes. However, evidence from the Upper Tugela Catchment did not support this argument. All disputes reported by respondents related to arable land. No disputes were recorded for communal grazing land where the bundle of individual rights is relatively small.

Survey respondents were asked if they had ever been involved in a land dispute and what type of land dispute occurred most frequently in the study area. The results are presented in Table 6.3. Only nine per cent of the respondents reported having had a land dispute. Conflicts over boundaries separating arable lands were rated as the most frequent type of dispute by 43 per cent of the respondents. Twenty-two per cent felt that most disputes involved claims to arable land. However, the vast majority of respondents stated that land

disputes were not a serious problem, and only 15 per cent claimed that the situation had worsened over time.

Table 6.3 Land disputes in Amangwane, 1996 (n=68).

	(%)
Households involved in a dispute	9
Most frequent land disputes:	
Boundaries separating arable lands	43
Claims to arable land	22
Perceived if: land disputes more serious than in the past	15
land disputes not as serious as in the past	29
land disputes not a problem	56
Respondent knows of a family that was dispossessed of its land after a dispute	10

Although none of the respondents involved in a land dispute were dispossessed of any land, precedents set by the tribal court appear to have undermined perceptions of tenure security. Almost 10 per cent of respondents knew of a household that had been dispossessed of land. Two-thirds of the households interviewed during the baseline survey believed that they would be dispossessed of idle arable land. A survey conducted by Jordan (1983:6) in the former Transkei homeland revealed that many rural households plough their land to maintain their property rights.

In summary, tenure requires, broad, durable and assured property rights. The absence of disputes may only reflect the fact that individuals have few property rights to land, and is therefore not regarded as a reliable indicator of secure tenure. Similarly, legal precedents

that confirm an individual's exclusive rights to land are necessary, but not a sufficient condition for secure tenure because the costs of legal enforcement may be prohibitive.

6.4 Transaction Costs

Low transaction costs have been identified as a necessary condition for an efficient land market. The following section attempts to quantify the transaction costs for 47 rental transactions observed in the Upper Tugela Catchment. A total of 30 transactions were observed during 1995/96, and 17 during the follow-up survey. Although the rental transactions observed in both surveys were combined for the analysis, changes in private transaction costs following attempts to identify and match contracted parties were not overlooked.

The estimates presented in Table 6.4 indicate that rental contracts are usually negotiated by parties who know each other well. Lessors and lessees were introduced to each other by family members or friends in 81 per cent of all cases. This is consistent with the findings by Currie (1981:100) in England. Recommendations provided by family and friends are often invaluable guides to the competence and integrity of prospective tenants. Transaction costs are lowered because negotiation costs and moral hazard are reduced. The impact of extension efforts to identify and match contractual parties is reflected in the fact that almost one-third of the rental transactions observed during 1995/96 were negotiated between relative strangers. It is clear that 'outside' agents, like government extension officers, could do much to reduce private transaction costs.

Lessees were approached by lessors in 32 per cent of the transactions, while in 60 per cent of cases lessees approached lessors for land to rent. Prior to 1994, lessees had to actively seek out lessors as the latter were often reluctant to 'advertise' their land available for leasing. These search costs no doubt contributed to the absence of contracts between strangers prior to 1994. On average, parties met 2.3 times to negotiate rental contracts, and each visit entailed a trip, usually a walk, of 1.6 kilometres.

Table 6.4 Indicators of transaction costs, Upper Tugela Catchment, 1995/96, (n = 47 rental transactions)

	Means
Lessor and lessee related (%)	28
Lessor and lessee associate together (%)	89
Lessor/lessee employed a member of the lessee/lessor's family (%)	21
Family introduced lessor and lessee (%)	43
Friend introduced lessor and lessee (%)	38
Agent introduced lessor and lessee (%)	19
Lessor approached lessee to lease land (%)	32
Lessee approached lessor to rent land (%)	60
Distance between lessor and lessee homesteads (km)[1]	1.62
Lessor/lessee walked to visit lessee/lessor when negotiating contract (%)	83
Number of visits needed to conclude contract	2.29

Notes: 1. In some cases, the distance is only an estimated distance as it was not possible to measure the distance between homesteads.

The implied transaction costs are largely independent of the area rented. On the other hand, rental incomes and farm earnings are directly related to the area of land rented. The operation of a rental market is therefore expected to be extremely sensitive to transaction

costs in regions characterised by very small farms. While outside agents may have some impact on private transaction costs, efficient rental markets will require greater investment in roads and telecommunications.

6.5 Adaptive Strategies to Change Grazing Institutions in the Upper Tugela Catchment

In Section 6.3 it was argued that crop farmers do not have secure tenure because they are unable to protect their crops from livestock belonging to other people. This problem was particularly severe in the Betterment Planned ward (Maphophameni) where very few willing lessees were identified in the 1995/96 season. With deadlines approaching a decision was taken to focus attention on the unplanned ward (Moyeni) - partly because there were more willing lessors to monitor, but largely because only 69 of KwaZulu's 246 tribal wards were 'Bettered' (Cunningham, cited by Lyne, 1989). The importance of tenure security and the problems caused by stray livestock were discussed with the Amangwane Tribal Council. The councillors agreed to enforce new grazing rules provided that the rules were established by the community.

A series of four community workshops were held in Moyeni to try and resolve this issue during May and June 1995. Radio Zulu was used to 'advertise' the dates of the workshops with great success - over 200 people attended the first meeting including senior tribal council members and prominent community leaders. The participants identified and ranked the following constraints to crop production:

- Poorly enforced grazing rules and the need to fence off arable and communal grazing lands
- Imperfect credit market
- Poor and unreliable contractor services

During the second workshop, community participants were split into four groups. Each group was asked to discuss a set of questions and record their responses with the assistance of group facilitators. Local extension officers from the Department of Agriculture, Natal Parks Board and the KwaZulu Department of Nature Conservation served as facilitators. When groups reported their answers to other participants it became clear that there was confusion over customary land rights. Planting dates - the date when livestock have to be removed from arable allotments - were unknown or unenforced. Participants could not reach consensus on their rights to fence off arable land, to impound stray livestock, or to claim compensation for crops damaged by stray livestock. Dispute procedures and compensation rates for damaged crops were unknown. The participants recommended that the government should fence off a summer grazing commonage.

The third workshop was used to explore the issue of fencing off a designated commonage. Participants conceded that a fence would address the symptoms, not the cause, of the problem and a fourth workshop was called to elect a committee that would investigate and establish livestock grazing rules. The committee comprised of nine community delegates representing the two interest groups - crop farmers and stock-owners. Government and non-government organisations were also represented in an advisory capacity.

Progress made at each workshop was broadcast on Radio Zulu. This generated keen interest and the neighbouring community of Dukuza sent six delegates to join the 'Grazing Rules Committee'. Clearly, the problem of stray livestock was not confined to Moyeni. The Grazing Rules Committee called a series of public meetings to discuss and establish new grazing rules. The following rules were recommended to the Amangwane Tribal Council and have since been applied to the whole of Amangwane:

- Ploughing commences on 1 October every year. After this date **all** livestock must be removed from arable allotments.

- Households are able to claim compensation for crops damaged by stray livestock after 1 October. If parties are unable to settle out of court, the dispute can be taken to the tribal authority. If found guilty, the stock-owner will be fined R10/plant damaged and pay a R20 court fee. The crop farmer will receive R10/plant damaged as compensation.

The committee was encouraged to reduce the fine to R5/plant as this was considered to be closer to the market value of a maize plant. However, the committee argued that stock-owners would ignore the rules if penalties were not severe.

These rules were aimed at creating certainty and restoring property rights originally upheld by customary law. The 'Rules Committee' did not feel that it was necessary for households to be given the right to impound livestock. The rules were broadcast on Radio Zulu and advertised on posters in the study area. In addition, more than 600 pamphlets were

distributed through local schools to advertise the rules. The radio broadcasts had a tremendous impact on neighbouring communities. Representatives from these communities approached field staff requesting that the project be expanded to include them.

Enforcement of these rules is expected to increase the private cost of keeping cattle and to encourage lower stocking rates in an area badly affected by overgrazing. Of interest is that the other problems identified at the first workshop - imperfect credit market and poor contractor services - were not raised in subsequent discussions, suggesting that these constraints were less important than tenure security.

Evidence from Swaziland reveals that these types of institutional changes are not only accepted in rural communities, but that these changes are sustainable. Research by Ngubane (1981) among farmers in Swaziland who constantly produced a surplus of maize and other food crops revealed the following common characteristics:

1. Stock-owners controlled their livestock during the summer months.

2. Farmers fenced off their arable lands to protect them from stray livestock. Fencing facilitated farmers in excluding livestock from their arable lands after the winter months. This allowed farmers to start planting early.

3. Stover was removed from arable lands after harvesting by the crop farmers for livestock feed and compost.

These rules have been generally accepted despite being regarded as departures from traditional practice.

6.6 Impact of Institutional Changes on Tenure Security in the Upper Tugela Catchment

It was hypothesised that clear and predictable grazing laws and dispute procedures would improve crop farmers' tenure security. This section compares relevant measures of tenure security before and after the new grazing rules were introduced in Moyeni.

The 1995 estimates in Table 6.5 relate to households that participated in rental transactions before the grazing rules were introduced, while the 1996 estimates represent households that were engaged in rental transactions after the grazing rules were introduced. Seven of the 16 cases participated in rental transactions in both years.

The results suggest an improvement in tenure security for crop farmers as evidenced by the lower incidence of stray cattle invading arable lands. In addition, more participants exercised their rights to exclude livestock by fencing off arable lands and by employing guards to protect their crops. Some 76 per cent of the participants interviewed in 1996 knew of the correct planting date as did 71 per cent of the 68 households re-visited in Moyeni during the follow-up of the original baseline survey.

Table 6.5 Problems with stray livestock in Moyeni, 1995 and 1996.

	1995 (%)	1996 (%)	t-value
Households having problems with stray livestock	71	31	2.32**
Employed guard for fields	0	6	1.00
Fenced in arable land	29	50	1.19
Households with crops damaged by livestock	70	80	0.40
Report stray livestock to tribal authority	10	20	0.45
Stock-owner fined by tribal authority	10	20	0.45
Received out of court compensation	20	0	1.50

Nearly one-half of the aggrieved respondents who took no action against stock-owners were unable to identify the guilty party because they were not allowed to impound the stray livestock. The others took no action because the damage was minimal. This highlights the value of an approach based on small incremental changes to customary institutions. Adaptive strategies facilitate an on-going process of recommendations based on observed problems.

6.7 Communal Range Management

Further institutional changes that attempt to privatise arable land are likely to meet with increasing resistance from stock-owners because land brought into crop production would ultimately be lost as a source of communal grazing. Stock-owners tend to be more influential members of the community capable of lobbying for their own interests at the expense of crop farmers. Alternative means of 'managing' the commons need to be explored so that stock-owners are 'compensated' for any future losses caused by the gradual enclosure of arable lands. To some extent, stock-owners would be compensated by institutional changes that

strengthen exclusive rights to arable land because increased returns to investment in crop farming may offer an attractive alternative to livestock. Average herd sizes have dropped dramatically in the sugar-belt of KwaZulu where households have exclusive rights to their arable land throughout the year. Nevertheless, other adaptive strategies must be considered to weaken the 'livestock lobby' in a voluntary way. A useful starting point is to consider the existing property rights to grazing land.

Vink and van Zyl (1990) argue that evidence of overgrazing - in the biological sense - is a test of open access. In areas where there is no overgrazing, open access is not considered a problem. Evidence from a government investigation in the Upper Tugela Catchment, found that grazing resources are over-utilised, resulting in soil erosion within the Tugela River catchment area (Integrated Planning Services, 1991). Lyne (1995) argues that an unambiguous test for open access grazing can be made by checking for the presence of transparent procedures to penalise people who break rules. Evidence presented earlier in this chapter suggests that dispute procedures and financial outcomes were poorly defined in the Upper Tugela Catchment and that penalties were not imposed on stock-owners who violated exclusive rights assigned to crop farmers. In addition, there was no *de facto* evidence of rules restricting the number of livestock that individuals could graze on unallocated land. In short, grazing constituted an open access resource.

Vink and van Zyl (1990:190) correctly argue that common property institutions are part of the solution to open access grazing in communal areas because they are more cost effective than solutions proposed in the past. Three possible solutions have been proposed to reduce the level of open access to communal grazing in the past; (a) privatising land, (b) cattle taxes

and (c) quota restrictions on the number of cattle permitted on the common. However, when user groups are large, cattle taxes and quota restrictions are unlikely to provide stable solutions to overstocking as there are strong incentives for individual users to break the rules (Runge, 1981; Lyne and Nieuwoudt, 1990). Lyne and Nieuwoudt (1990) suggest that privatising the commons provides the only stable solution to economic overstocking. This would internalise the cost of resource degradation, thereby reducing stocking rates. The low incentive to invest in grazing resources would also be overcome, as the benefits of investment in herd and pasture quality would be internalised.

However, it is not feasible to privatise grazing land by splitting up and reallocating the commons to individuals. Apart from the massive logistical and information problems associated with the assignment of individual property rights to unallocated grazing lands, it would not be economically viable for beneficiaries to fence off and raise livestock on such small areas of poor quality land. This lends support to the pragmatic view that to address the over-stocking and incentive problems created by open access the first step should be to induce a shift towards common property. However, the traditional argument that common property should be administered by members of a user group (including all people with grazing rights - regardless of whether they own livestock or not) also poses practical problems.

Characteristics of successful common property user groups were identified in Section 3.2. User groups are more likely to succeed where a small, well defined and homogeneous group has restricted access to a compact common property resource with well defined boundaries.

Unfortunately user groups are unlikely to succeed in KwaZulu, because the groups would have to be large relative to the size of any designated grazing area. When groups are large and the benefits of compliance are shared more or less equally by members, the costs of negotiating and enforcing rules may wipe out any rents gained from stinting on the common (Olson 1971:34). Even if these transaction costs could be lowered through institutional support, individual benefits from collective action would be low and members would have little incentive to negotiate and enforce laws. To increase the benefits, investment is needed to improve the quality of pastures and livestock, but it would be extremely difficult for a large user group to devise rules that distribute the benefits of collective investment in the same proportion as members share costs. Transaction costs and free-riding would increase rapidly if some members are unwilling or unable to share costs. High transaction costs would also preclude a market for grazing resources. More effective farmers would not be able to acquire additional grazing, as potential buyers or lessees would have to identify and negotiate with all users (Lyne, 1995).

A possible solution would be to 'privatise' the user group by members surrendering their grazing rights to an elected management committee. Provided that the net benefits of forming a non-user group outweigh those of open access grazing, members will have an incentive to accept decisions made by the management committee (Wynne and Lyne, 1995). This arrangement is not plagued by high transaction costs as decisions are taken by a small number of people regardless of group size. This does not imply support for institutions such as cooperatives, which entrench free-rider problems by sharing dividends and voting power equally regardless of the individual contributions made by members. Rather, it is based on organisations such as trusts and incorporations that operate like private companies. Research

conducted in New Zealand revealed that elected management committees have promoted efficient use of group-owned Maori land without threatening the social security afforded by inclusive use rights (Lyne, 1995). Clearly this is a topic that requires substantial research in KwaZulu.

CHAPTER 7

IMPACT OF LAND RENTAL IN THE UPPER TUGELA CATCHMENT

7.1 Institutional Change and Rental Market Activity in the Upper Tugela Catchment

This section examines rental market activity in the Upper Tugela Catchment before and after the institutional changes described in Chapter 6 were initiated. Strategies to reduce risk and transaction costs were applied in both study areas, Moyeni and Maphophameni, during 1994 but efforts to promote exclusive rights to arable land were confined to Moyeni from 1995 (Section 6.5).

Two basic indicators were employed to gauge the impact of institutional change on rental market activity. The first measured growth in the total number of rental transactions detected in Moyeni. Ideally, this indicator should have accounted for growth measured in the control area of Dukuza. Unfortunately, the control fell away when the community at Dukuza decided to apply the rules established in Moyeni (Section 6.5). The second indicator was precipitated by this unanticipated event. By extending the institutional changes to Dukuza it was possible to measure growth in the number of rental transactions reported by all 80 households sampled in the Amangwane Tribal Ward for the baseline survey.

In addition, this section quantifies efficiency and equity aspects of the rental market for arable land, and reports changes in the types of lease agreements observed.

7.1.1 Rental transactions detected in Moyeni

A total of 14 rental transactions were detected by field staff in Moyeni during the 1994/95 growing season and 20 during the 1995/96 growing season (Table 7.1). Only four rental contracts - all cash lease - were signed during the first season after the baseline survey. However, ten unfacilitated contracts were observed, with one lessee engaged in five transactions. The types of agreements entered into are discussed in more detail in Section 7.5.

Table 7.1 Observed rental transactions, Upper Tugela Catchment, 1994/95 and 1995/96

	1994/95	1995/96		
Moyeni:	New	Renegotiated	New	Total
Facilitated	4	2	6	8
Unfacilitated	10	7	5	12
TOTAL	14			20

A total of six facilitated and five unfacilitated rental contracts were new agreements negotiated during 1995. The number of facilitated contracts doubled from four to eight. Two facilitated and seven unfacilitated transactions were renegotiated from the previous season. Only one party insisted on signing a rental contract. In all other cases, including

participants that renegotiated contracts signed the previous season, the parties felt that a verbal agreement was sufficiently binding.

7.1.2 Rental transactions reported by sample households in Amangwane

Only three of the 80 respondents interviewed for the baseline survey in Amangwane Tribal Ward declared that they were engaged in rental transactions. All three were located in the study area of Moyeni (Table 7.2).

Table 7.2 Number of rental transactions observed in Amangwane, 1993/94 (n=80) and 1995/96 (n=64)

	Baseline survey 1994/94	Follow-up survey 1995/96	t-value[1]
Moyeni	3	9	1.67*
Dukuza	-	8	3.19***
TOTAL	3	17	3.33***

Notes: 1. * denotes statistical significance at the 10 per cent level, and *** at the 1 per cent level of probability.

The follow-up survey which involved 64 of the original 80 respondents, revealed that seven households in Moyeni were engaged in nine rental transactions - one lessor had negotiated three contracts. In Dukuza, eight households were involved in eight rental transactions. Overall there had been a significant increase in the number of rental transactions reported.

More than half of the participants observed in Moyeni during the follow-up survey concluded their transactions after the institutional changes were initiated (Table 7.3). Most growth

occurred after 1994 when institutional changes reinforcing exclusive rights to arable land were introduced and widely advertised.

Table 7.3 Number of households engaged in rental transactions in Amangwane, 1993/94 (n=80) and 1995/96 (n=64)

	Moyeni	Dukuza
1993/94 Baseline survey	3	0
1995/96 Follow-up survey	7	8
Year of first rental transaction:		
1993/94[1]	3	4
1994/95	1	-
1995/96	3	4

Notes: 1. Transactions renegotiated since 1993/94 may have been negotiated prior to 1993/94.

In the course of the follow-up survey, four respondents in Dukuza claimed that they had been engaged in rental arrangements during 1993/94 but did not declare the transactions in the baseline survey. Apparently rental transactions were perceived to be illegal before the institutional changes were introduced and households were therefore reluctant to declare them.

7.1.3 Conclusion

The results presented in Tables 7.2 and 7.3 show substantial growth in the number of rental transactions. Even if the claims regarding undeclared transactions are accepted, the sample estimates suggest a doubling in the incidence of rental transactions in Amangwane. The sample estimates may well provide a better assessment of actual growth than the 'population'

estimates presented in Table 7.2. The latter relate only to Moyeni and implicitly assume that all transactions in the sub-ward were detected.

It seems reasonable to conclude that a major part of the observed growth in rental market activity can be attributed to:

1. The lowering of risk perceptions by securing the support of the tribal council.
2. The lowering of transaction costs by facilitating rental transactions.
3. An improvement in crop farmer tenure security by reinforcing grazing rules.

Unfortunately, transactions could only be observed over a two year period. Institutional change is a long term process and more time and data are needed to establish the full extent of institutional changes. Nevertheless, the results are encouraging, at least for the unplanned wards of KwaZulu.

7.2 Efficiency and Equity Advantages of Land Rental in the Upper Tugela Catchment

In Section 5.2 it was concluded that an active rental market for arable land in the Upper Tugela Catchment could yield both efficiency and equity advantages. This section seeks to quantify the outcome of observed rental transactions.

Approximately 0.64 hectares of land were leased out by lessors in Moyeni, while lessees rented in approximately 0.63 hectares during 1994 - Table 7.4. Unfortunately very little of

this land was farmed due to drought. The average rainfall for the 1994 growing season - from October through December - was 105mm. The long term average for the region is 257mm for the same period. During November 1994, a crucial planting period, the region received only 9mm of rain (CCWR, 1995).

Table 7.4 Average areas of land leased out or rented in, Amangwane 1994/95 and 1995/96

	94/95	95/96	t-value
Land leased out (ha)	0.64	1.15	1.23
Land rented in (ha)	0.63	1.71	1.58

The average areas of land transacted increased during 1995. Leased land, left idle during the drought in 1994, was fully utilised in the 1995/96 growing season. Unfortunately field operations terminated in February 1996 before yields could be measured.

Table 7.5 presents indicators of the efficiency and equity gains from land rental. The data show that lessees farmed their land more intensively than lessors. Lessees applied variable inputs at more than five times the rate that lessors did. Relative to lessors, lessees grossed much higher crop incomes per hectare. The incidence of investments in farm implements, tractors and fencing was also substantially higher amongst lessees. Lessors spent more on contractor services than lessees - this is to be expected as half of the lessees owned tractors.

Table 7.5 Efficiency and equity advantages of land rental, Upper Tugela Catchment, 1994/95 and 1995/96

	Lessees	Lessors	t-value
Households	36	24	
Farm size (ha)	0.85	2.11	3.73***
Area operated (ha)	2.02	1.21	1.99**
Input expenditure (R/ha)	606	113	3.93***
Contractor expenditure	141	190	1.37
Crop income (R/ha)	494	105	2.02**
Rental income (R/ha)	-	80	-
Own tractors (%)	50	0	4.92***
Implements (#)	1.22	0.17	5.05***
Invest in fencing (%)	61	25	2.95***
Livestock (#)	5.33	2.42	2.72***
Self-employed (%)	61	25	2.95***
Off-farm income (R/mth)	861	764	0.28
Pensioned widows (%)	0	17	2.14**
Age of household head (yrs)	47	56	2.70***

Notes: 1. ** denotes statistical significance at the 5 per cent level, and *** at the 1 per cent level of probability.

Lyne and Roth (1994) suggest the following estimate of productivity gains (PG) when the plots rented out were previously unutilised:

$$PG = IA_r(AO_r - FS_r)$$

where,
IA = crop income per hectare
AO = area operated (ha)
FS = farm size (ha)
r = lessees

The estimated productivity gain is approximately R578 per hectare transferred.

The fact that lessees farmed land more intensively than lessors shows that voluntary rental transactions improved allocative efficiency. It also improved the allocative efficiency of other resources (Section 7.4).

From an equity perspective, households that negotiated cash lease agreements received a mean annual rental income of R80 per hectare from previously idle land. Rental transactions tended to equalise farm sizes - land was transferred from land 'wealthy' to land 'poor' households. On the other hand, income was transferred from households wealthy in cash and non-land assets to households strapped for cash and land assets. Lessees tend to own more livestock, a good indication of household wealth, than lessors. Although lessors and lessees appear to have similar off-farm incomes, the sample estimate for lessees (R861) was biased downward. Almost 61 per cent of the lessees were self-employed and did not declare household incomes. Overall, the results confirm Bell's (1990) view that renting gives people who have land but little else (eg. widows and elderly household heads) an opportunity to generate income.

7.3 Discriminant Analysis and Results

Discriminant analysis was used to identify and rank the partial effects of variables that distinguish lessors from lessees. This provides a more rigorous test of the market's consequences than one based on univariate comparisons of group means. Data were drawn from all lessors and lessees identified in Amangwane during 1995/96.

7.3.1 Discriminant analysis

Discriminant analysis is used to statistically distinguish between two or more groups of cases, based on several variables. The goal of discriminant analysis is to classify cases into one of severally mutually exclusive groups, based on their values for a set of predictor variables (Manley, 1986:13). Groups are forced to be as statistically distinct as possible by forming a weighted linear combination of the discriminating variables (Klecka, 1975:435). In this study the object is to distinguish between lessors and lessees.

A discriminant function can be represented by the following:

$$D_i = d_{i1}Z_1 + d_{i2}Z_2 + \ldots + d_{ip}Z_p$$

where, D_i is i^{th} score of the discriminant function
d_{ip} are the weighted coefficients
Z_p are the standardised values of the discriminating variables

Groups can be well separated using D_i if the mean value is significantly different between groups, and similar within groups. The coefficients or weights attached to each variable in the function are selected to maximise the F-ratio for a one-way analysis of variance (Manley, 1986:88). The standardised weighting coefficients (d_{ip}) reflect the relative importance of the discriminating variables (Z_p). Variables with relatively larger d_{ip} contribute more to the discrimination between groups.

The standardised discriminant scores (D_i) for all cases have a mean of zero and a standard deviation of one. Any single score represents the number of standard deviations that case is away from the mean of all cases for the given discriminant function (Klecka, 1975:443). Only one discriminant function can be extracted when there are just two groups.

Discriminant analysis assumes that the within-groups covariance matrix is the same for all groups. If this is not true, tests of significance may be considered unreliable. Also, tests of significance require that the discriminating variables follow the multivariate normal distribution. However, the technique is very robust and tests of significance are usually considered to be reliable if the estimated discriminant scores are univariately normally distributed for each group (Truett *et al*, 1967:521; Manley, 1986:90).

Two statistics are commonly used to gauge the importance of a discriminant function. The first is the canonical correlation coefficient which is a measure of association between the discriminant function and a dummy variable which defines the group membership. The squared value of this coefficient can be interpreted as the proportion of variance in the discriminant function explained by the groups. The second is Wilk's Lambda which is an inverse measure of the function's discriminating power and follows the F-distribution. Wilk's Lambda can be expressed as follows; $1/(1+B)$, where B is the eigen value extracted from the matrix of F-ratios computed for the discriminating variables. The smaller the value of Wilk's Lambda, the better the discriminating power of the function.

7.3.2 Variables considered in the discriminant model

The following model was proposed to discriminate between lessors and lessees:

$$D = -\beta_1 * LSZE + \beta_2 * LABOUR + \beta_3 * IMPL + \beta_4 * INV + \beta_5 * WAGE$$

where

D	=	0 for lessors and 1 for lessees
LSZE	=	log of own farm size excluding land hired or rented out (ha)
LABOUR	=	number of adults in the family available for on-farm work
IMPL	=	number of farm implements owned
INV	=	dummy variable scoring 1 if the household fenced off their arable land, and 0 otherwise
WAGE	=	proxy for non-farm income - number of household members engaged in wage employment or self-employed

The model hypothesised that lessees would have smaller farms, more family farm labour, a higher incidence of investment in moveable assets and fixed improvements, and greater liquidity than lessors.

7.3.3 Discriminant function results

The signs of coefficients estimated for variables conformed to *a priori* expectations (Table 7.6). The results lend support to the efficiency and equity advantages postulated for land rental in communal areas. From an efficiency perspective, land is transferred from households short of cash and family labour, to households better endowed with the resources needed to farm it. The relatively high incidence of investment in tractors, implements and fixed improvements among lessees also demonstrates their commitment to farming. Equity

is also improved as land rental tends to equalise farm sizes, while households endowed with land but little else gain income or food produced on their land.

Table 7.6 Standardised discriminant function distinguishing between lessors and lessees

Discriminating variable	Standardised Coefficient	Group means		Univariate F-Value
		Lessors	Lessees	
LSZE	-1.19***	0.39	-0.68	11.54***
WAGE	0.68**	1.5	2.16	0.99
IMPL	0.67**	0.42	1.58	6.33**
INV	0.18	0.33	0.58	1.76
LABOUR	0.09	2.67	4.42	2.02
Number of cases		12	19	

Wilk's lambda	0.38
Canonical correlation	0.78

Note: *** denotes statistical significance at the 1 per cent level of probability.
** denotes statistical significance at the 5 per cent level of probability.

The most important variable distinguishing lessors from lessees is farm size (coefficient = -1.19). The second most important variable is non-farm income (liquidity) followed by the ownership of tractors and implements (coefficient = 0.67), investment in fixed improvements and available family labour. Histograms showing the distribution of discriminant scores computed for lessors and lessees are presented in Appendix E. Both groups display approximately normal distributions suggesting that the significance tests can be accepted with reasonable confidence.

Wilk's lambda (0.38) and the canonical correlation coefficient (0.78) suggest that some discriminatory information has not been extracted by the explanatory variables. The models explanatory power was checked by comparing its predicted group membership with actual group membership (Table 7.7).

Table 7.7 Classification of lessors and lessees

	Actual		
	Lessors	Lessees	Row total
Predicted Lessors	9 (75%)	2 (10.5%)	11
Lessees	3 (25%)	17 (89.5%)	20
Column total	12	19	31

Note: Figures in parentheses are column percentages.

The model classified almost 75 per cent of lessors correctly and 90 per cent of lessees correctly. A lower rate of correct predictions was anticipated for lessees as certain households did not have access to land prior to renting and therefore had not made any major investments in moveable assets or fixed improvements. Although the classification is good, the model was not intended to be a predictive tool, but rather to provide a more rigorous test of the rental market's outcome.

7.4 Lease Arrangements

Table 7.8 summarises the different types of rental transactions observed during 1994 and 1995. There was a noticeable shift from cash lease arrangements in 1994 to crop-share arrangements in 1995. The severe drought experienced in 1994 may have prompted lessees to negotiate risk-sharing contracts in 1995. Alternatively, the drought may have aggravated liquidity problems that prevented lessees from negotiating cash rental contracts.

Table 7.8 Types of rental transactions, Upper Tugela Catchment, 1994/95 and 1995/96.

	1994/95	1995/96
Cash lease	2	0
Crop share	0	7
Inter-linked	7	10
Borrowed	5	3
Total	14	20

All of the inter-linked contracts reported in Table 7.8 refer to transactions where tractor owners hired land in exchange for ploughing services. Inter-linked transactions often reflect missing or imperfect factor markets (Section 2.7). In this case, inter-linking would appear to suggest imperfections in the land and credit markets as the market for contractor services is very active in the Upper Tugela Catchment. Contractor charges account for almost one-half of household expenditure on farm inputs (Table 5.4).

Land borrowing arrangements usually involve transactions between family members. Although lessors do not earn a cash rental or crop-share, the lending arrangement helps them to secure their property rights by demonstrating (own) use of the land. In Moyeni, a lessor who negotiated two 'lending' arrangements conceded that his objective was to secure future use rights. His main concern was that the lessees should plough his land.

Imperfections in the credit market could explain both the high incidence of inter-linked contracts and the switch from cash lease to crop-sharing arrangements in 1995. Table 7.9 presents information relating to the use of short-term agricultural credit during the 1995/96 season. Almost one-half of the lessees wanted to access credit, but only 10 per cent had used credit. All of the credit used to finance seasonal farm inputs was sourced from family members.

Table 7.9 Credit use, Amangwane, 1995/96.

	Lessors (n=15)	Lessees (n=21)
	(%)	(%)
Used credit	-	10
Source of credit:		
Formal lender	-	-
Family	-	10
Would like to use credit	40	48
Reason for not using credit:		
No information	40	43
Credit too risky	-	5
Purchased household goods on credit (e.g. furniture)	27	57

The absence of formal loans to finance agricultural inputs contrasts starkly with the observation that many respondents wanted agricultural credit, did not perceive borrowing to be risky, and used formal sources of credit to finance non-farm assets. The implication is that formal institutions do not offer agricultural credit to small farmers. Indeed, the vast majority of respondents who wanted agricultural credit claimed that they had no knowledge of formal sources. Of relevance to this study is that crop-share and inter-linked rental contracts help farmers to cope with liquidity problems.

CHAPTER 8

RECOMMENDATIONS

The main objective of this study was to establish guidelines to promote the rental market for arable farmland in regions of KwaZulu-Natal characterised by customary land tenure. In section 7.1 it was demonstrated that efforts to reinforce customary rules of exclusion and to clarify enforcement procedures improved the response to other initiatives aimed at reducing transaction costs and risk in the rental market. The number of rental transactions increased significantly following the institutional changes. Based on the success of these institutional changes and experience gained during the course of this study, this section attempts to formalise steps that should be considered when attempting to activate rental markets for arable land in communal areas.

8.1 Guidelines to Establish a Rental Market for Arable Land in Communal Areas

The recommendations for establishing a rental market can be broken down into four sequential phases: tribal authority support, research, institutional change and extension. However, the components of this sequence are not independent and will have to be repeated in order to produce the small incremental changes to existing institutions required to support an efficient rental market for arable land. Rules and constraints vary between tribal wards.

It is therefore emphasised that these recommendations be treated only as guidelines to establish a land rental market.

8.1.1 Tribal authority support

The first and most important step before conducting research into factors constraining land rental transactions is to secure the support of tribal authorities and local magistrates. To secure approval, it is advisable to introduce the concept of a rental market by expounding its potential equity and efficiency advantages. However, care must be taken to explain the conditions needed to support a market - especially those relating to tenure security - and to emphasise the proactive role which the tribal authorities are expected to play in the adaptive approach to institutional change. If the tribal authority is undecided, the prospect of taxing rental transactions may help to secure his approval and participation.

8.1.2 Research phase

Assuming that the tribal authority agrees to support rental transactions, a baseline survey should be conducted to identify factors constraining the market. The survey should concentrate on establishing whether insecure tenure, risk perceptions, or a combination of these factors are constraints to land rental. In hindsight, the problem of enforcing exclusive rights to cropland in the Upper Tugela Catchment should have been identified at the outset because tenure security is a prerequisite for land rental.

In this study information was gathered by sample survey but participatory rural appraisal (PRA) exercises might well be more cost effective. In particular, group discussions with members of farmers' associations and garden clubs are recommended. These individuals often have firsthand experience with constraints to crop farming and land rental.

8.1.3 Improving crop farmer tenure security

If tenure is not secure, particularly in terms of enforcing exclusive rights to arable land, the following actions may help to alleviate this binding constraint:

1. Disseminate information about existing customary rules that grant powers of exclusion to crop farmers. In this study, radio announcements and pamphlets were used to advertise a planting date fixed by the tribal authority after negotiations with the Rules Committee - an organisation comprising largely of members elected by the community and sanctioned by the tribal authority. Results the following season were encouraging as the incidence of households reporting crops damaged by livestock declined from 71 to 31 per cent.

2. Propose rules that strengthen exclusive rights to arable land. For example, tribal authorities may accept recommendations to extend the duration of exclusive property rights to include the winter months by allowing crop farmers to fence off their arable lands and to impound stray livestock. Tribal authorities would have to clarify local procedures for disputes, compensation and penalties relating to the legal enforcement of exclusive property rights.

In Amangwane, claimants had to compensate the tribal police - a cost that is not borne privately by individuals in those parts of South Africa subject to national law. Clearly a strong case can be argued for the State to correct this imbalance. Enforcement might be facilitated by erecting livestock pounds, and employing people to administer them and to assess crop damages. If stock-owners refuse to pay compensation promptly, impounded livestock could be auctioned off with the stock-owner receiving whatever remains after deductions have been made for compensation and court fees.

Stock-owners and tribal authorities may be more willing to accept proposals aimed at privatising arable land if the recommendations are complemented with proposals for non-user groups capable of increasing returns to livestock raised on common property grazing resources (Section 6.6). Government should seriously consider the importance of developing constitutions that are acceptable to group organisations, and which create strong incentives for investment when ranking its research priorities.

If tenure is not secure, acceptance of the recommendations to improve tenure security must be checked before efforts are made to reduce risks and transaction costs in rental transactions. In this study, the initial response was demonstrated by increased awareness of the planting date and the formalisation of procedures to settle disputes over crops damaged by stray livestock.

8.1.4 Reducing risk perceptions in rental transactions

If tenure security is evidenced by the presence of willing lessees who are unable to hire idle land, then - and only then - should attempts be focused on other constraints identified in the baseline study. In this case, potential lessors were reluctant to lease land out for fear of losing it permanently. Potential lessees expressed concern that they might lose crops on hired land.

Risk perceptions can be reduced by taking the following actions:

1. Endorsing written lease agreements that specify contractual details, the rights and obligations of participants, and the procedures for settling disputes. In this study, proforma lease agreements were lodged with the tribal secretary. Her willingness to assist contractual parties also served to reduce their transaction costs.

2. Clarifying dispute procedures with tribal councillors and the local magistrate. These individuals - particularly the tribal council - must be familiar with the rights of lessors and lessees, and the interpretation of lease agreements. Training at this level is critical because legal precedents that undermine a lessor's security of tenure could collapse the rental market.

3. Identifying and training an official - for example the tribal secretary - to facilitate negotiations between lessors and lessees, to endorse contracts and to maintain a record of transactions.

8.1.5 Extension, education and transaction costs

Institutional changes approved by the tribal authority should not be disseminated until dispute procedures are in place and tribal councillors and secretaries are fully aware of their roles. Two methods of disseminating information were employed in this study:

1. The chief called a mass meeting of the tribe where institutional changes were openly supported by tribal councillors and explained to the community.

2. Reporters from a popular radio station conducted interviews with the chief and prominent community members who explained and supported the concept of a rental market. The interviews were broadcast several times, and at different times during the day, in order to reach a wide audience in the local community.

A rigorous education campaign is required to promote acceptance of the institutional changes. In this study information about property rights, rental agreements and procedures was disseminated through community meetings, radio broadcasts and posters. Community meetings were advertised on radio and posters. The outcome of these meetings was also broadcast to keep the community informed of developments.

The Department of Agriculture could render a valuable service in disseminating information. Extension staff could also facilitate transactions during their daily work routines, and reduce private transaction costs by identifying, recording and distributing the names of willing lessors and lessees. This does not imply that extension officers should be involved in the

negotiation process. Lists of willing lessors and lessees should be forwarded to the tribal secretary and displayed.

8.1.6 Institutional support

Institutional changes accepted by the community must be supported and their effects monitored over time. Tribal councillors may need professional advice when settling precedent-setting disputes. Institutional change is a delicate process that could be upset by vested interest groups. It would therefore be prudent to monitor disputes, precedents and perceptions generated by the rental market in order to establish which community groups are likely to resist its growth. Research should be conducted to quantify these externalities and to suggest practical ways of 'compensating' losers. Problems and proposed solutions must be discussed with the tribal authority. Clearly the State has some obligation to provide these public goods.

The flow chart in Figure 8.1 summarises institutional changes recommended to establish a rental market for arable land in communal areas:

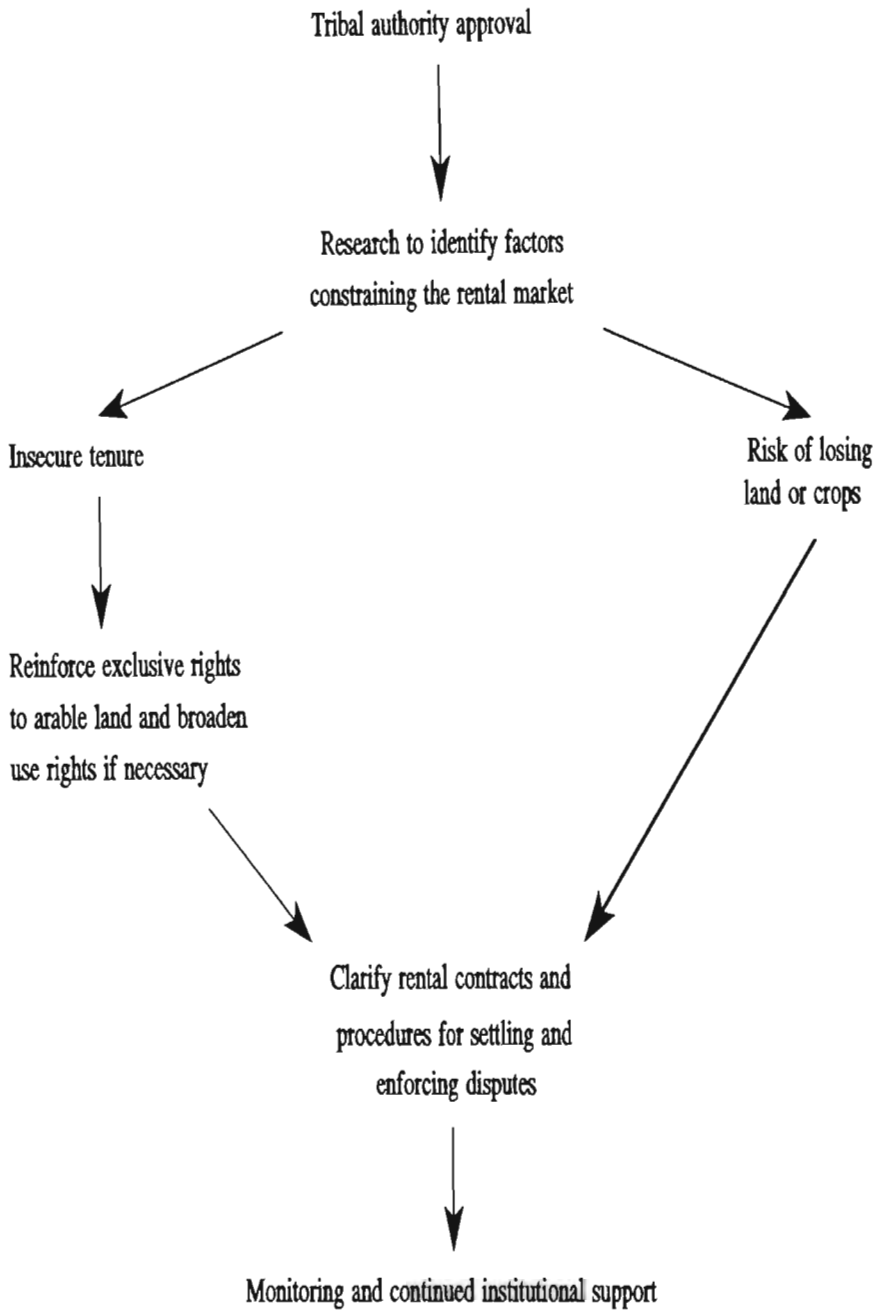


Figure 8.1 Institutional changes recommended for a land rental market

8.2 Strengthening the Land Rental Market

Although the goal is to secure permanently exclusive rights to arable land, the steps required to achieve this cannot be stated with precision because the process of institutional change is adaptive rather than prescriptive. Negotiations to extend the period of exclusivity will most likely emerge from those dealing with more immediate problems such as the enforcement of contracts and penalties.

Continued institutional support was canvassed from provincial and national departments of Agriculture, the Development Bank of Southern Africa (DBSA), KwaZulu Finance Corporation (KFC) and other non-government organisations. While these parties welcomed the recommendations there was little evidence of continued support for the process at the time of going to press.

CONCLUSIONS

This study shows that rental markets for arable land are constrained in the communal areas of KwaZulu-Natal, that these constraints can be alleviated, and that the rental market improves both allocative efficiency and equity. From an efficiency perspective, it was found that renting transferred land from households short of cash and family labour to households better endowed with resources to farm it. The relatively high incidence of investment in moveable farm assets and fixed improvements among lessees also demonstrates their commitment to farming. Equity improved as rental transactions tended to equalise farm sizes, while households endowed with land and little else gained income or food produced on their land. These benefits were gained without creating a landless class.

Land rental markets are constrained in KwaZulu because property rights to arable land are insecure and transaction costs are high. These problems stem largely from two sources; either the user does not have exclusive rights to arable land, or the risk of losing land as a result of a rental transaction is too high. Contrary to popular belief, it was established that tenure is not secure in KwaZulu. This became apparent when the criteria of breadth, duration and assurance of property rights were applied to arable land in the study areas. Although property rights are well defined in customary law, the breadth of rights is inadequate and rights of exclusion are not well enforced. The government could, and should, help to ensure that local precedents and national laws reinforce a household's security of tenure. In theory titling could resolve these problems but, even if its consequences were acceptable, it faces mammoth information and logistical obstacles that tend to undermine its

worth as a measure of improving tenure security. Instead, recent proposals recommend strategies that encourage an endogenous shift toward exclusive land rights.

Strategies based on the Coasian 'transaction cost' model stress the importance of support programmes - for example, subsidised credit, information, rural infrastructure and new technology - that will induce farmers to pressure for exclusive land rights. But these strategies ignore problems of collective action and the presence of groups opposed to the enclosure of land. Resistance is likely where households are very dependent upon secondary rights to land that primary users wish to enclose. As a result, the outcome of 'induced innovation' is unpredictable, and could be highly undesirable. If the policy 'succeeds' it could produce distress sales and land grabbing. Conversely, failure implies a constrained land rental market and allocative problems that limit response to farmer support programmes. The results of this study do not support the view that technical innovation alone will necessarily induce appropriate institutional change.

Instead, this study initiated adaptive strategies intended to make changes in customary tenure more predictable. These strategies improved tenure security and reduced transaction costs and risk in the rental market. Subsequent growth in rental market activity has generated better information about property rights and the market value of arable land. In addition, the process has created a capacity within the local community to manage future institutional change.

The study produced a set of guidelines for government and non-government agents to consider when designing and implementing farmer support programmes. Adaptive strategies that promote rental market activity will not only help these agents in identifying emerging farmers, but should also improve the response to traditional farmer support programmes. Response is expected to improve because the rental market requires exclusive land rights that allow farmers to internalise the benefits of their effort and because the market enables small farmers to increase the scale of their operations.

Whilst it would be naive to conclude that the institutional changes 'supplied' by this study will sustain rental transactions, it is clear that a well-directed extension and monitoring programme could do much to promote an efficient rental market for arable land. Although the changes initiated in the study area benefitted crop farmers, service providers and households that could not farm all of their land, it is possible that other groups may of been disadvantaged by the privatisation of arable land. It is therefore necessary to monitor progress in order to identify potential sources of resistance to institutional change, to address problems encountered in dispute settlement and to initiate negotiations for permanently exclusive rights to arable land. Future research needs to focus on ways of compensating the losers.

SUMMARY

The main objective of this study was to establish guidelines to promote a rental market for arable farmland in regions characterised by customary land tenure. According to economic theory, an active rental market should improve both equity and efficiency in farming. A rental market promotes allocative efficiency by imposing an opportunity cost on land that is under-utilised. Equity improves because voluntary rental contracts generate rental income for households that cannot, or prefer not to farm, while providing those households short of arable land, but relatively well endowed with other resources, access to additional land. In addition renting does not create a landless class.

The assignment was conducted in three study areas - Upper Tugela Catchment, Tugela Ferry and Mvoti Valley. Action research was conducted in two tribal wards in the Upper Tugela Catchment, namely the unplanned ward of Amangwane and the Betterment Planned ward of Amazizi. Here, the aim was to identify, and to facilitate, the institutional changes needed to support a rental market. At Tugela Ferry and Mvoti Valley, the aim was to establish whether technical innovation (irrigation) had encouraged such institutional change.

Previous research suggested that the rental market for arable land was constrained by high transaction costs and uncertainty. It was argued that a household could easily lose land that it leased out. Based on this view, a series of institutional changes were introduced in the Upper Tugela Catchment during September 1993. Risk was reduced by getting tribal authorities to support and endorse lease agreements that defined the rights of lessors and

lessees. Tribal councils and the local magistrate agreed to settle disputes by confirming the lessor's tenure security. Transaction costs were reduced by bringing potential lessors and lessees together and facilitating their negotiations.

A series of household surveys was conducted across regions and over time to monitor growth in the rental market and to test the initial hypothesis. Results presented in this report were estimated from four household surveys conducted in the Upper Tugela Catchment, plus a stratified random sample survey conducted in Tugela Ferry. The surveys had two purposes. Firstly, socio-economic data were gathered to measure the impact of institutional changes on land rental, household welfare and the allocation of farm resources. Secondly, data relating to property rights were collected in order to gauge household perceptions about tenure security. Additional information was obtained during meetings with tribal authorities and agricultural extension officers in the study areas.

Evidence from the first baseline survey conducted in the Upper Tugela Catchment during December 1993 and January 1994 showed that the rental market for arable land was indeed constrained. Almost half of the 160 respondents indicated that they wanted to rent in additional land, yet only four per cent engaged in rental transactions. Few respondents were willing to lease out their land. In all of the rental transactions observed, the lessor was either a relative or a close friend. Similar results were obtained from a survey conducted in Tugela Ferry during February 1995 where 48 out of 80 respondents wanted more land to farm but only five rented land in. The only potential lessor identified in the survey claimed that she would not lease her land to a person outside of her church group.

Interviews conducted with extension staff and some leading farmers in the Mvoti Valley also revealed a virtual absence of inter-household rental transactions. Instead, households were 'leasing' their land to Glendale Sugar Mill. The Mill manages the crop and most small-scale growers are absentee landlords.

Efforts to reduce risk and transaction costs in the Upper Tugela Catchment encouraged many households to offer their arable land to tenant farmers. However, few households were willing to farm additional land because they were unable to exercise their exclusive rights to arable land.

Efficient land markets are characterised by secure tenure and low transaction costs. From an economic perspective, tenure security comprises three elements; breadth, duration and assurance of property rights. If any of these elements is lacking or inadequate, tenure is insecure. The surveys revealed deficiencies in the bundle of property rights allocated to crop farmers. In KwaZulu customary tenure assigns exclusive rights to arable land and inclusive rights to grazing land. Arable land that is not cultivated is treated as grazing. In winter all land becomes communal, and stock-owners are allowed to graze their livestock on the stover left by farmers.

As a result, fencing is strongly resisted by stock-owners. According to custom, stock-owners are supposed to withdraw their livestock from arable allotments on a date announced by the chief to mark the onset of planting. However, respondents in the Upper Tugela Catchment were not aware of such problems - a general problem that undermines exclusive rights to arable land, delays planting and reduces crop yields. Crop damage caused by stray livestock

was reported to be a major deterrent to investment. Investment in fertiliser was further discounted because livestock introduce weeds into arable lands during the winter. These problems were also experienced by households with irrigated plots at Tugela Ferry. No evidence was found to support the argument that technical innovation results in more exclusive property rights.

Approximately 58 per cent of respondents in the Upper Tugela Catchment reported problems with stray livestock in their arable lands after planting. Of these households, 81 per cent suffered crop damage. The results were similar at Tugela Ferry where 74 per cent of the respondents reported stray livestock in their irrigation plots. Of these households, 90 per cent suffered crop damage.

Follow-up surveys revealed that crop farmers seldom seek legal redress for damage caused by stray livestock because: (a) financial outcomes are unpredictable as plaintiffs are not guaranteed compensation even if stock-owners are fined by the tribal court, (b) customary law does not give individuals the right to impound stray livestock. This makes it difficult to establish liability, and (c) crop farmers (mainly women) are intimidated by stock-owners (mainly men).

Betterment Planning aggravated tenure security because arable and residential allotments were spatially separated making it difficult for households to police against stray livestock. The incidence of crop damage amongst respondents who reported problems with stray livestock was higher in the planned ward (91 per cent) than in the unplanned ward (70 per cent).

Conversely, the incidence of fencing was lower in the planned ward because households could not police their fences.

Insecure tenure was identified as a major constraint to land rental in the Upper Tugela Catchment. Attempts to address this issue were confined to the unplanned ward where there was a better response to extension efforts. Institutional change was initiated by establishing a broadly accepted and representative 'Rules Committee' to make recommendations to the tribal authority. The following rules were accepted by the tribal authority:

- Ploughing commences on 1 October every year. After this date all livestock must be removed from arable lands.
- Households may claim compensation for crops damaged after 1 October. If parties are unable to settle out of court, the dispute can be taken to the tribal authority. If found guilty, the stock-owner will be fined R10/plant damaged and pay a R20 court fee. The crop farmer will receive R10/plant damaged as compensation.

Surveys conducted a season later showed a significant reduction in respondents affected by stray cattle. The incidence fell from 71 to 31 per cent, and 75 per cent of respondents were aware of the correct ploughing date.

The total number of rental transactions observed in the baseline survey increased from three to 17. These rental transactions transferred idle land to farmers, who relative to lessors, applied inputs more intensively, and who invested more in tractors, implements and fencing.

From an equity perspective, the observed rental transactions tended to equalise farm sizes. Land was transferred from larger to smaller farmers and income was transferred from wealthier to poorer households. In general, the results showed that renting gives people who have land but little else - widows for example - an opportunity to generate income.

The survey results supported the view that rental markets for arable land are constrained in the communal areas of KwaZulu-Natal, and that an active rental market would help to improve both equity and allocative efficiency. However, attempts to activate the market by reducing risk perceptions and transaction costs revealed a more binding constraint - tenure insecurity. In particular, the demand for arable land was constrained by the fact that crop farmers were unable to exercise exclusive rights to it.

Efforts to reinforce customary rules of exclusion and to clarify enforcement procedures improved the response to other initiatives aimed at reducing transaction costs and risks in the rental market. The number of rental transactions increased significantly following the institutional changes. However, institutional change is a long term process that requires continued support and direction. The results of this study do not support the view that technical innovation alone will induce appropriate institutional change. Whilst it would be naive to conclude that the institutional changes 'supplied' by this study will sustain rental transactions, it is clear that a well-directed extension and monitoring programme could do much to promote an efficient rental market for arable land. Experience gained during the course of this investigation suggests that the following steps should be considered when attempting to activate rental markets for arable land in communal areas:

1. Discuss the concept and advantages of rental transactions with the local tribal authority.

2. If the tribal authority supports the proposal, conduct a baseline survey to identify factors constraining the rental market. The survey should focus on perceptions of risk and tenure security.

3. If tenure is not secure, particularly in terms of exclusive rights to arable land, the following actions may help to alleviate this binding constraint:

   3.1 Disseminate information about existing customary rules that grant powers of exclusion to crop farmers. In this study, radio announcements and pamphlets were used to advertise a planting date fixed by the tribal authority after negotiations with the rules committee - an organisation comprising largely members elected by the community and sanctioned by the tribal authority.

   3.2 Propose rules that strengthen exclusive rights to arable land. For example, tribal councillors may accept recommendations to extend the duration of exclusive property rights to include the winter months, to allow crop farmers to fence off their arable lands and to impound stray livestock, and to clarify local procedures for disputes, compensation and penalties relating to the legal enforcement of exclusive property rights.

4. If tenure is not secure, acceptance of the recommendations to improve tenure security must be checked before efforts are made to reduce risks and transaction costs in rental transactions. In this study, the response was demonstrated by increased awareness of the planting date and the formalisation of procedures to settle disputes over crops damaged by stray livestock.

5. If tenure security is evidenced by the presence of willing lessees who are unable to hire idle land, then - and only then - should attempts be focused on other constraints identified in the baseline study. In this case, potential lessors were reluctant to lease land out for fear of losing it permanently. Potential lessees expressed concern that they might lose crops produced on hired land.

6. These risk perceptions can be reduced by taking the following actions:

   6.1 Endorsing written lease agreements that specify contractual details, the rights and obligations of participants, and the procedures for settling disputes. In this study, proforma lease agreements were lodged with the tribal secretary. Her willingness to assist contractual parties also served to reduce their transaction costs.

   6.2 Clarifying dispute procedures with tribal councillors and the local magistrate. These individuals must be familiar with the rights of lessors and lessees, and the interpretation of lease agreements. Training at this level is critical because

legal precedents that undermine a lessor's security of tenure could collapse the rental market.

6.3 Identifying and training an official - for example the tribal secretary - to facilitate negotiations between lessors and lessees, to endorse contracts and to maintain a record of transactions.

7 The process of institutional change must be introduced to the community at large. Two approaches were adopted in this study:

7.1 The chief called a mass meeting of the tribe where institutional changes were explained to the community and openly supported by tribal councillors.

7.2 Reporters from a popular radio station conducted interviews with the chief and prominent community members who explained and supported the concept of a rental market.

8. A rigorous education campaign is required to disseminate information about institutional changes. The Department of Agriculture could render a valuable service in this regard. Extension staff could also facilitate transactions during their daily work routines, and reduce private transaction costs by identifying, recording and distributing the names of willing lessors and lessees.

9. Institutional changes accepted by the community must be supported and their effects monitored over time. Institutional changes introduced thus far have only benefited crop farmers, households with surplus arable land and service providers. Therefore, it is necessary to continue monitoring the rental market in order to establish which community groups, such as wealthy households grazing livestock or poor households dependent on secondary rights to communal resources, are likely to resist any further institutional changes that 'privatise' arable land. Research should be conducted to quantify these externalities and to assess how they are likely to impact on future institutional changes.

The flow chart in Figure S1 summarises institutional changes recommended to establish a rental market for arable land in communal areas:

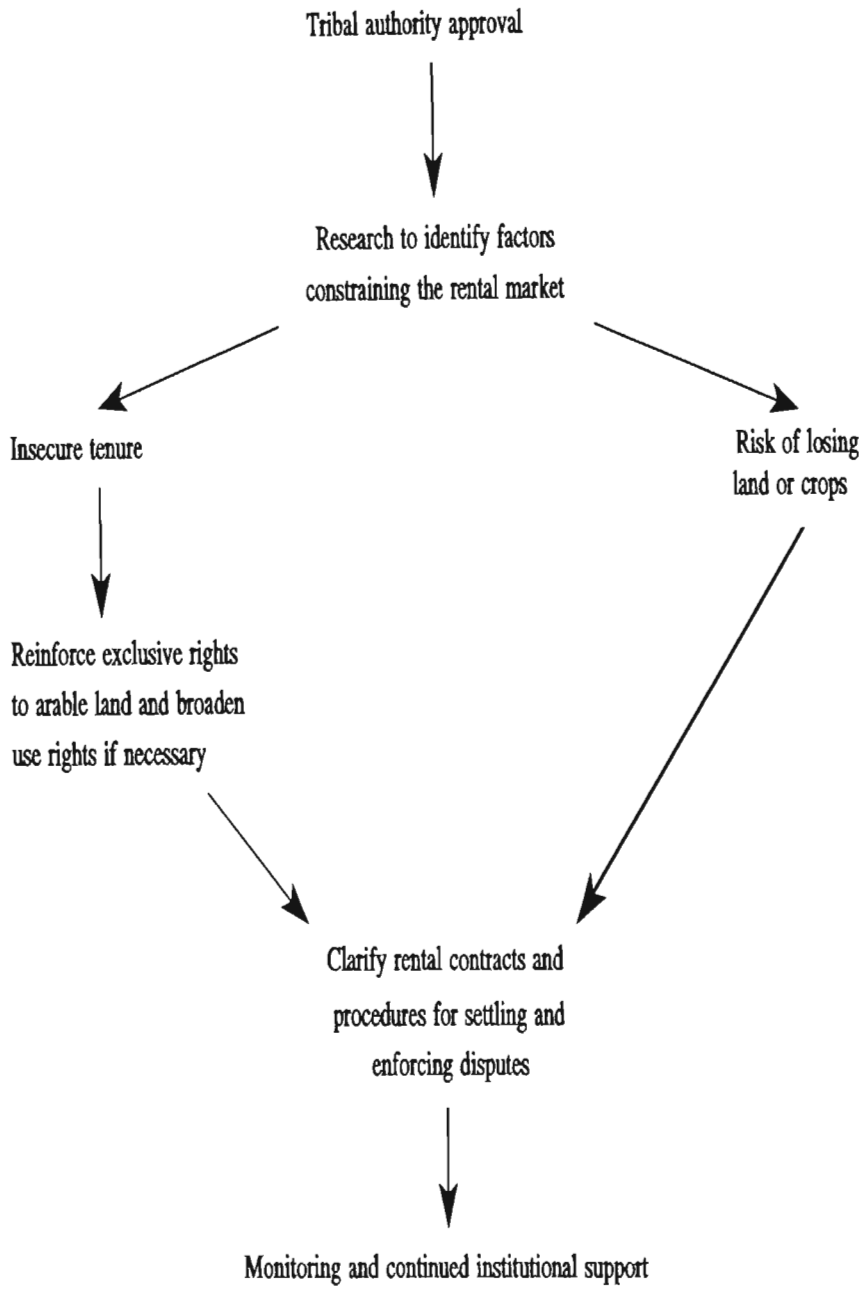


Figure S1 Institutional changes recommended for a land rental market

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APPENDIX A - Proforma Lease Agreement Forms

Cash Lease Agreement

It is hereby agreed that ..... (the Lessor) agrees to lease to ..... (the Tenant) who agrees to take on hire the land herein described. (Brief description of the land) .....
.....
.....

The period of the lease being from ..... to ..... . The lessee agrees to pay the lessor the sum of R..... per anum as rental. The rental shall be renegotiated each year, with the agreed rental not exceeding 15 per cent of the previous year's rental

It is therefore agreed that:

1. The lessor will allow the lessee full access to the agreed plot.
2. The lessee engage in acceptable farming practices that do not lead to soil loss or damage, and is able to grow crop/s of his/her choice.
3. This agreement is binding upon the contracted parties heirs and assigns.
4. Any improvements carried out by either party during the lease period must be mutually agreed upon by both parties.
5. This lease agreement pertains to arable land only, and not residential allotments.
6. All disputes relating to this contract are to be heard at the tribal court and contestable in the magistrates court.

Lessor's I.D. Number:

.....	.....	.....
Lessor's signature	Wife's signature if lessor married	Date
.....	.....	.....
Witness signature	Witness name	Date

Lessee's I.D. Number:

.....		.....
Lessee's signature		Date
.....	.....	.....
Witness signature	Witness name	Date

.....	.....
Tribal authority signature	Date

Cropshare Lease Agreement

It is hereby agreed that.....(the Lessor) agrees to enter into a cropshare agreement with.....(the Tenant) as described below. It is mutually agreed that the Lessor provides .....
.....
....., in return the Tenant agrees to provide .....
.....
.....
As payment both parties agree that the Lessor shall receive .....
.....
....., while the Tenant shall receive .....
.....
The contract shall be renegotiated each season, with the lessor's share not increasing by more than 10 per cent of the current share.

It is therefore agreed that:

1. The lessor will allow the lessee full access to the agreed plot.
2. The lessee engage in acceptable farming practices that do not lead to soil loss or damage, and is able to grow crop/s of his/her choice.
3. This agreement is binding upon the contracted parties heirs and assigns.
4. Any improvements carried out by either party during the lease period must be mutually agreed upon by both parties.
5. This lease agreement pertains to arable land only, and not residential allotments.
6. All disputes relating to this contract are to be heard at the tribal court and contestable in the magistrates court.

Lessor's I.D. Number:

.....	.....	.....
Lessor's signature	Wife's signature if lessor married	Date
.....	.....	.....
Witness signature	Witness name	Date

Lessee's I.D. Number:

.....		.....
Lessee's signature		Date
.....	.....	.....
Witness signature	Witness name	Date

.....	.....
Tribal authority signature	Date

APPENDIX B - Household Questionnaire

Ward:_____ **Interviewers Name:**_____

The information obtained in this questionnaire is strictly confidential and will be used for research purposes by Lima staff in designing programmes aimed at improving farming efficiency and household welfare. Respondents do not have to answer questions, answers are voluntary. The respondent should be a male or female household head.

Respondent's Name_____

1. FARM CHARACTERISTICS

1.1 Is the farm in a Betterment Planned area? _____

1.2 (**Office use only** Farm size (to be measured) _____ ha)

1.3 (**Office use only** Unused arable land (to be measured) _____ ha)

1.4 Do you have more than one parcel of land? _____

1.5 Have your farm boundaries changed since you acquired it? _____

If **Yes**, is your farm **larger** or **smaller** than before? _____

*****

2. HOUSEHOLD COMPOSITION

2.1 **Household head**: Sex _____ Age _____

Widowed _____ Occupation[1] _____

[1]Occupation should be categorised as: Wage Employed (**E**); Self-employed (**SE** - eg. farmer, taxi etc); Housekeeper (**H**); Pensioner (**P**) if in receipt of pension; Unemployed (**U**) if seeking work; or vagrant (**O**).

2.2 **Family composition:**

Number of housekeepers _____ Number of employed ___

Number of pensioners _____ Number of unemployed ___

Number of scholars _____ Number of infants ___

How many family members work on the farm? _____

2.3 **Off-farm income:**

Wage remittances R_____

Total pension income R_____

Total remitted income R_____

2.4 Does the family have a bank account? _____

3. LIVESTOCK

	No. Possessed	No. sold during past year	Gross income (Rands)
Oxen			
Bulls			
Female cattle			
Goats			
Sheep			
Pigs			
Chickens			

*****

4. CROPS GROWN DURING PAST YEAR

Crop	Grown during past year (Yes or No)	Sold during past year (Yes or No)	Gross income (Rands)
Maize			
Potatoes			
Beans			
Vegetables			
Fruit			

4.1 Has the household planted all of its own arable land this season? _____
If **NO**, list (in order that respondent mentions them) the main reasons for not cultivating all of the arable land (eg. risk of drought, lack of cash to buy inputs, no ploughing services in the area, cattle damage crops etc).

_____

_____

_____

_____

*****

5. FARMING EXPENSES

Purchased input	Used (Y or N)	Quantity used last season (specify unit)	Total cost (Rands)	How much was bought using credit? (Rands)
Fertiliser				
Seed				
Hired: Contractor		**********		
Draught animals		**********		
Farm equipment		**********		
Farm labour		**********		
Chemicals				
Vetinary services				

*****

6. ASSETS

Does the household own any of the following? (tick where appropriate):

Motor vehicle	_____	Tractor	_____
Plough	_____	Knapsack sprayer	_____
Planter	_____	Maize mill	_____
Generator	_____	Fridge/freezer	_____
Television	_____	Other (specify)	_____

*****

7. ON-FARM INVESTMENT

Has the household invested in any of the following? (tick where appropriate):

Irrigation	_____	Pastures	_____
Fencing	_____	Storage silo	_____
Water troughs	_____	Other (specify)	_____

*****

8. LAND TRANSACTIONS

Ask the respondent if they are lessors or lessees. Fill in the relevant sections for lessors and lessees.

8.1 Is this the first rental transaction the household has engaged in? _____

If **NO**, with whom was the household previously engaged in a rental transaction with? (tick where appropriate):

Present lessor/lessee	_____	Family member	_____
Neighbour	_____	Nkosi	_____
Other households	_____		

8.2 Has the household signed a lease agreement? _____

*****

8.3 Lessors

8.3.1 Has the household leased out **ALL** or **PART** of its land? _____

8.3.2 How many contracts has the household negotiated this season? _____

8.3.3 Rental contract

	Used (Y or N)	Area (specify units)	Cost	To whom	Length of lease agreement
Cash lease					
Share-cropped					
Lent out					

8.3.4 Why did you enter into a lease agreement? (tick where appropriate):

Not using the land	_____	Too old to farm	_____
Work in town	_____	Spread farming risk	_____
Labour shortage	_____	Other (specify)	_____

*****

8.4 Lessees

8.4.1 How many contracts has the household negotiated this season? _____

8.4.2 Rental contract

	Used (Y or N)	Area (specify units)	Cost	From whom	Length of lease agreement
Cash lease					
Share-cropped					
Lent out					

8.4.3 Why did you rent additional land? (tick where appropriate):

Landless _____ Farm is too small _____

Grow wider variety of crops _____

Land is unsuitable for ploughing _____

(eg. waterlogging)

*****

Ask the following questions to ALL respondents.

8.5 Do you require family approval for rental transactions? _____

8.6 Were you more willing to engage in a rental transaction because of (tick where appropriate):

Nkosi's approval _____

Lease agreement _____

8.7 Are you going to renegotiate your contract next season? _____

If **NO**, why not? (give reasons):

_____

_____

_____

*****

8.8 Transaction costs

	Transactions		
Are the lessor and lessee related?			
Do the lessor and lessee associate together? (eg. attend same church, family friends)			
Has any member of the lessor's family worked for the lessee?			
Has any member of the lessee's family worked for the lessor?			
Who introduced the lessor and lessee to each other? (eg. family, friend, agent)			
How did the lessor 'advertise' the leased land? (eg. word of mouth, approached by lessee)			
How did the lessee get to know of the leased land? (eg. word of mouth, approached by lessor)			
How far does the lessor live from the lessee?			
How did he/she get there? (eg. walk, taxi, etc)			
How many times did the lessee visit the lessor to negotiate the contract?			

9. LAND TENURE SECURITY

9.1 How did you acquire your land? (tick where appropriate):

Inheritance _____ Tribal allocation _____

Rent/borrowed _____ Purchased _____

9.2 Do you have any written proof of ownership or rental contract? _____

9.3 Who owns the land? (tick where appropriate):

Family _____ Government _____

Nkosi _____ Other (specify) _____

9.4 How many years have you farmed/used the land? _____ years

9.5 Would you like a certificate of ownership for your land? _____

9.6

Land Rights	Land types (**Yes, No** or **DK**)		
	Arable	Grazing	Residential
Can the household sell this land?			
Do you need tribal authority permission?			
Do you need family permission?			
Can the household lease this land out?			
Do you need tribal authority permission?			
Do you need family permission?			
Can the household bequeath this land?			
Do you need tribal authority permission?			
Do you need family permission?			
Can the household use this land throughout the year?			
Can the household choose what crops it wants to grow?			
Can the household fence off this land?			
Can you make permanent improvements on your land? (eg. establish irrigation, build etc)			
Can the rest of the community use your unused land? (eg. for planting or gathering thatch and firewood)			
Can the household gather natural resources (eg. thatch and firewood) on unused land in the community?			
Are there any rules controlling this?			
Can the household exclude other peoples livestock from grazing on their land during: **Summer**			
Winter			
Are you able to claim compensation for crops damaged by livestock?			
Are there rules prohibiting people outside of the community using resources (eg. grazing)?			

9.7 After which date are cattle allowed to graze on your arable land? _____

After which date do cattle have to be removed from your arable land? _____

9.8 Did livestock stray into your arable land after you planted it this season? _____

If **YES**, what did you do with them?

Leave them _____ Chase them _____

Impound them _____ Report them to the tribal court _____

9.9 Did the stray livestock damage your crops? _____

If **YES**, what happened? (tick where appropriate):

Stock owner was fined by tribal authority _____

How much compensation did you receive? _____

Stock owner paid you compensation (settled out of court) _____

How much compensation did you receive? _____

Took no action against stock owner _____

9.10 Have you ever fenced in your arable allotment to protect it from stray livestock? _____

If **NO**, why not? (tick where appropriate):

Fencing too expensive _____ No need to fence _____

Community steals fencing _____

If **YES**, has the fence ever been damaged or destroyed? _____

By whom? (eg. stock owners) _____

9.11 Did you employ someone to protect your arable allotment against stock damage and theft this season? _____

9.12 Do indunas enforce customary laws? _____

(eg. ensuring cattle are removed from arable areas at planting)

9.13 Did you listen to Radio Zulu broadcasts advertising the cattle rules? _____

*****

10. LAND DISPUTES

10.1 Have you or any member of your family ever had a dispute over land ownership or boundaries in the past 5 years? _____

If **YES**, who was involved in resolving the dispute? (tick where appropriate):

Resolved ourselves	_____	Religious leader	_____
Tribal authority	_____	Witnesses	_____
Magistrate	_____	Other (specify)	_____

Was the dispute between the **FAMILY**, or between the family and **OTHER** households in the community? _____

10.2 Are land disputes: (tick where appropriate):

More serious now than in the past _____
Not as serious as in the past _____
Not a problem _____

10.3 What are the most frequent types of land disputes farmers face in the area?

_____
_____
_____

10.4 Do you know of a household that has been dispossessed of its land after a land dispute? _____

11. EXTENSION AND INFORMATION

11.1 What is the name of your local agricultural extension officer? _____

11.2 Has any member of your family attended the following:

Agricultural field days _____
Agricultural training courses _____

11.3 Does any member of your family purchase farming books or magazines? (eg. Farmers Weekly) _____

12. CREDIT AVAILIBILITY

12.1 Has this household **used** credit for agricultural inputs in the past two years? _____

If **YES** from whom did they get the credit? (tick where appropriate):

KFC	_____	Bank	_____
Co-op	_____	Informal lender (eg. shopkeeper)	_____
Relative	_____	Friend/neighbour	_____

12.2 Has the household **applied** for agricultural credit in the past two years? _____

If **YES**, to whom did they apply for credit? (tick where appropriate):

KFC	_____	Bank	_____
Co-op	_____	Informal lender (eg. shopkeeper)	_____
Relative	_____	Friend/neighbour	_____

Was the application approved? _____

If application was rejected give reasons:

_____

_____

_____

12.3 If the household **does not** use credit for agricultural inputs, would it like to? _____

If **YES**, what has prevented the household from using credit?
(tick where appropriate):

Not credit worthy	_____	Credit is too expensive	_____
Cannot use land as collateral	_____		
Credit is too risky	_____		

12.4 Have any household items (eg. furniture, fridges, TV's etc) been bought on credit in the past two years? _____

If **YES**, from whom did they get the credit?

KFC	_____	Bank	_____
Co-op	_____	Informal lender (eg. shopkeeper)	_____
Relative	_____	Friend/neighbour	_____
Store where item was purchased	_____		

APPENDIX C - List of Variables

Variable	Variable description
BP	= 1 if respondent is in a Betterment Planned ward, 0 otherwise
FSZE	Size of respondent's arable land allocation (ha)
FLLW	Area of land left fallow (ha)
H2O	Area of land waterlogged (ha)
PARC	Number of parcels of arable land allocated to respondent
LRGR	= 1 if farm has become larger, 0 otherwise
SMLR	= 1 if farm has become smaller, 0 otherwise
HHD	= 1 if respondnet is female, 0 otherwise
AGE	Age of respondent (years)
WDW	= 1 if respondent widowed, 0 otherwise
EMP	= 1 if respondent is wage employed
SE	= 1 if respondent is self-employed, 0 otherwise
HKPR	= 1 if respondent is housekeeper, 0 otherwise
PEN	= 1 if respondent is in receipt of a pension income, 0 otherwise
UNEM	= 1 if respondent is unemployed, 0 otherwise
NHKP	Number of housekeepers
WGENRS	Number of wage earners
NPEN	Number of pensioners
NUNEM	Number of unemployed
SCHLR	Number of scholars
INF	Number of infants
FLAB	Number of family labourers
WREM	Monthly wage remittances (R)
PENI	Monthly pension receipts (R)
REMI	Monthly income remittances (R)
BAC	= 1 if family has bank account, 0 otherwise
OX	Number of oxen possessed
OXI	Gross income from oxen sold in past year (R)

Variable	Variable description
BLL	Number of bulls possessed
BLLI	Gross income earned from bulls sold in past year (R)
COW	Number of female cattle possessed
COWI	Gross income earned from female cattle sold in past year (R)
SSTCK	Number of small-stock possessed
SSTCKI	Gross income earned from small-stock sold in past year (R)
CHCK	Number of chickens possessed
CHCKI	Gross income earned from chickens sold during past year (R)
STOCKI	Gross livestock income (R)
MZE	= 1 if maize grown, 0 otherwise
MZEI	Gross income earned from maize sales during past year (R)
POT	= 1 if potatoes grown, 0 otherwise
POTI	Gross income earned from potatoe sales during past year (R)
BNS	= 1 if beans grown, 0 otherwise
BNSI	Gross income earned from bean sales during past year (R)
VEG	= 1 if vegetables are grown, 0 otherwise
VEGI	Gross income earned from vegetable sales during past year (R)
FRT	= 1 if fruit is grown, 0 otherwise
FRTI	Gross income earned from fruit sales during past year (R)
CROPI	Gross crop income earned during past year (R)
FARMI	Gross farm income earned during past year (R)
PALL	= 1 if household farmed all of its arable land, 0 otherwise
FERT	= 1 if respondent used fertiliser, 0 otherwise
FERTP	Cost of fertiliser during past season (R)
SEED	= 1 if respondent purchased seed, 0 otherwise
SEEDP	Cost of purchased seed (R)
CNTR	Contractor charges during past season (R)
DRFT	Cost of hiring draft animals during past season (R)
EQP	Cost of hiring farm equipment during past season (R)
LAB	Cost of hiring labour during past season (R)

Variable	Variable description
CHEM	Expenditure on chemicals during past season (R)
VET	Vetinary expenses during past season (R)
CAR	= 1 if household owns a motor vehicle, 0 otherwise
TRCTR	= 1 if household owns a tractor, 0 otherwise
PLOW	= 1 if household owns a plough, 0 otherwise
SPRY	= 1 if household owns a knapsack sprayer, 0 otherwise
PLNTR	= 1 if household owns a planter, 0 otherwise
MMLL	= 1 if household owns a maize mill, 0 otherwise
ELEC	= 1 if household owns an electrical appliance, 0 otherwise
IRRIG	= 1 if household has invested in irrigation, 0 otherwise
PAS	= 1 if household has invested in pastures, 0 otherwise
FNCNG	= 1 if household has invested in fencing, 0 otherwise
SSLO	= 1 if household has invested in a storage silo, 0 otherwise
RFST	= 1 if first rental transaction household has engaged in, 0 otherwise
PLSS	= 1 if with present lessor/lessee, 0 otherwise
PFAM	= 1 if with present family member, 0 otherwise
PNHBR	= 1 if with present neighbour, 0 otherwise
POH	= 1 if with other households, 0 otherwise
UNFAC	= 1 if unfacilitated rental transaction
LSSR	= 1 if respondent lessor, 0 otherwise
LSSE	= 1 if respondent lessee, 0 otherwise
LALL	= 1 if household leased out all its land, 0 otherwise
LPRT	= 1 if household leased out part of its land, 0 otherwise
NCON	Number of rental contracts negotiated by lessor
ACLS	Area cash leased (ha)
PCLS	Rental income (R)
LSNHB	=1 if leased land to neighbour, 0 otherwise
LSFAM	= 1 if leased land to family, 0 otherwise
LSOTH	= 1 if leased land to other households, 0 otherwise
LCLS	Length of lease agreement (years)

Variable	Variable description
ACRP	Area share-cropped (ha)
PCRP	Lessor's crop-share (%)
CNHB	= 1 if share-cropped with neighbour, 0 otherwise
CFAM	= 1 if share-cropped with family member, 0 otherwise
COTH	= 1 if share-cropped with other households, 0 otherwise
LCRP	Length of share-crop agreement (years)
ALNT	Area lent out (ha)
PLNT	Rental income (R)
LNHB	= 1 if lent land to neighbour, 0 otherwise
LFAM	= 1 if lent to family member, 0 otherwise
LOTH	= 1 if lent to other household, 0 otherwise
LLNT	Length of lending agreement (years)
NUSE	= 1 if leased out unused land, 0 otherwise
OLD	= 1 if respondent too old to farm, 0 otherwise
TWN	= 1 if respondent works in town, 0 otherwise
RSK	= 1 if perceives farming to be risky, 0 otherwise
SLAB	= 1 if shortage of family labour, 0 otherwise
INCAP	= 1 if insufficient capital to farm, 0 otherwise
LRIN	= 1 if interlinking contract, 0 otherwise
LECON	Number of contracts negotiated by lessee
ARNT	Area of land rented in (ha)
PRNT	Rental paid (R)
RNHB	= 1 if rented from neighbour, 0 otherwise
RFAM	= 1 if rented from family member, 0 otherwise
ROTH	= 1 if rented from other household, 0 otherwise
LRNT	Length of lease agreement (years)
ASCRP	Area share-cropped (ha)
PSCRP	Lessees crop-share (%)
SCNHB	= 1 if share-cropped with neighbour, 0 otherwise
SCFAM	= 1 if share-cropped with family member, 0 otherwise

Variable	Variable description
SCOTH	= 1 if share-cropped with other households, 0 otherwise
LSCRP	Length of share-crop agreement (years)
ABRW	Area of land borrowed (ha)
PBRW	Rental paid (R)
BNHB	= 1 if land borrowed from neighbour, 0 otherwise
BFAM	= 1 if land borrowed from family, 0 otherwise
BOTH	= 1 if land borrowed from other households, 0 otherwise
LBRW	Length of borrowing agreement (years)
LNLS	= 1 household landless, 0 otherwise
SMLL	= 1 if farm is too small, 0 otherwise
GWVC	= 1 if household wants to grow wider variety of crops, 0 otherwsie
UNSUT	= 1 if land unsuitable for ploughing, 0 otherwise
LEIN	= 1 if interlinking contract, 0 otherwise
FAMAP	= 1 if require family approval for rental contracts, 0 otherwise
NKAP	= 1 if entered into a contract because of nkosi's approval, 0 otherwise
LA	= 1 if entered into a contract because written lease agreement, 0 otherwise
RENEG	= 1 if renegotiate contract next season, otherwise
LREL	= 1 if lessor and lessee related, 0 otherwise
ASSOC	= 1 if lessor and lessee associate together, 0 otherwise
FEMP	= 1 if any member of lessor/lessees family has worked for lesee/lessor, 0 otherwise
FAMIN	= 1 if family introduced lessor and lessee, 0 otherwise
FRIN	= 1 if friend introduced lessor and lessee, 0 otherwise
AGIN	= 1 if agent introduced lessor and lessee, 0 otherwise
APLS	= 1 if lessor approached lessee, 0 otherwise
APLSE	= 1 if lessee approached lessor, 0 otherwise
FAR	Distance lessor and lessee live from each other (km)
TAXI	= 1 if lessor/lessee used taxi or motor vehicle as transport, 0 otherwise
WALK	= 1 if lessor/lessee walked to negotiate contract, 0 otherwise

Variable	Variable description
NVIS	Number of visits taken to conclude the contract
INH	= 1 if acquired land through inheritance, 0 otherwise
TA	= 1 if acquired land through tribal allocation, 0 otherwise
PROOF	= 1 if have proof of ownership, 0 otherwise
FAM	= 1 if perceives family owns land, 0 otherwise
CHF	= 1 if perceives nkosi owns the land, 0 otherwise
YOWN	Number of years family has farmed the land
CERT	= 1 if respondent would like a certificate of ownership, 0 otherwise
SELLA	= 1 if perceives can sell arable land, 0 otherwise
SELLG	= 1 if perceives can sell grazing land, 0 otherwise
SELLR	= 1 if perceives can sell residential land, 0 otherwise
TASA	= 1 if perceives a need for tribal authority permission to sell arable land, 0 otherwise
TASG	= 1 if perceives a need for tribal authority permission to sell grazing land, 0 otherwise
TASR	= 1 if perceives a need for tribal authority permission to sell residential land, 0 otherwise
FPSA	= 1 if perceives a need for family permission to sell arable land, 0 otherwise
FPSG	= 1 if perceives a need for family permission to sell grazing land, 0 otherwise
FPSR	= 1 if perceives a need for family permission to sell residential land, 0 otherwise
RNTA	= 1 if perceives can lease out arable land, 0 otherwise
RNTG	= 1 if perceives can lease out grazing land, 0 otherwise
RNTR	= 1 if perceives can lease out residential land, 0 otherwise
TARA	= 1 if perceives a need for tribal authority permission to lease out land, 0 otherwise
TARG	= 1 if perceives a need for tribal authority permission to lease out land, 0 otherwise

Variable	Variable description
TARR	= 1 if perceives a need for tribal authority permission to lease out land, 0 otherwise
FPRA	= 1 if perceives a need for family permission to lease out arable land, 0 otherwise
FPRG	= 1 if perceives a need for family permission to lease out grazing land, 0 otherwise
FPRR	= 1 if perceives a need for family permission to lease out residential land, 0 otherwise
BQA	= 1 if perceives can bequeath arable land, 0 otherwise
BQG	= 1 if perceives can bequeath grazing land, 0 otherwise
BQR	= 1 if perceives can bequeath residential land, 0 otherwise
TAQA	= 1 if perceives a need for tribal authority permission to bequeath arable land, 0 otherwise
TAQG	= 1 if perceives a need for tribal authority permission to bequeath grazing land, 0 otherwise
TAQR	= 1 if perceives a need for tribal authority permission to bequeath residential land, 0 otherwise
FPQA	= 1 if perceives a need for family permission to bequeath arable land, 0 otherwise
FPQG	= 1 if perceives a need for family permission to bequeath grazing land, 0 otherwise
FPQR	= 1 if perceives a need for family permission to bequeath residential land, 0 otherwise
USEA	= 1 if perceives able to use arable land throughout the year, 0 otherwise
USEG	= 1 if perceives able to use grazing land throughout the year, 0 otherwise
USER	= 1 if perceives able to use residential land throughout the year, 0 otherwise

Variable	Variable description
CHSA	= 1 if household is able to choose what crops it wants to grow
FENA	= 1 if perceives can fence off arable land, 0 otherwise
FENG	= 1 if perceives can fence off grazing land, 0 otherwise
FENR	= 1 if perceives can fence off residential land, 0 otherwise
IMPA	= 1 if perceives can make permanent improvements on arable land, 0 otherwise
IMPG	= 1 if perceives can make permanent improvements on grazing land, 0 otherwise
IMPR	= 1 if perceives can make permanent improvements on residential land, 0 otherwise
COMA	= 1 if perceives community can use unused arable land, 0 otherwise
COMG	= 1 if perceives community can use unused grazing land, 0 otherwise
COMR	= 1 if perceives community can use unused residential land, 0 otherwise
NATA	= 1 if respondent perceives right to gather natural resources on unused arable land in the community, 0 otherwise
NATG	= 1 if respondent perceives right to gather natural resources on unused grazing land in the community, 0 otherwise
RULA	= 1 if perceives rules controlling gathering of natural resources on arable land in the community, 0 otherwise
RULG	= 1 if perceives rules controlling gathering of natural resources on grazing land in the community, 0 otherwise
SUMA	= 1 if perceives the right to exclude livestock grazing on arable land during the summer, 0 otherwise
SUMG	= 1 if perceives the right to exclude livestock grazing on grazing land during the summer, 0 otherwise
SUMR	= 1 if perceives the right to exclude livestock grazing on residential land during the summer, 0 otherwise
WINA	= 1 if perceives the right to exclude livestock grazing on arable land during the winter, 0 otherwise

Variable	Variable description
WING	= 1 if perceives the right to exclude livestock grazing on grazing land during the winter, 0 otherwise
WINR	= 1 if perceives the right to exclude livestock grazing on residential land during the winter, 0 otherwise
COMPA	= 1 if perceives the right to claim compensation for crops damaged by livestock on arable land, 0 otherwise
COMPG	= 1 if perceives the right to claim compensation for crops damaged by livestock on grazing land, 0 otherwise
COMPR	= 1 if perceives the right to claim compensation for crops damaged by livestock on arable land, 0 otherwise
RULEA	= 1 if perceives rules prohibiting people outside of community using arable land, 0 otherwise
RULEG	= 1 if perceives rules prohibiting people outside of community using grazing land, 0 otherwise
SUMA	= 1 if respondent can exclude livestock from grazing on arable land during the summer, 0 otherwise
SUMG	= 1 if respondent can exclude livestock from grazing on grazing land during the summer, 0 otherwise
SUMR	= 1 if respondent can exclude livestock from grazing on residential allotment during the summer, 0 otherwise
WINA	= 1 if respondent can exclude livestock from grazing on arable land during the winter, 0 otherwise
WING	= 1 if respondent can exclude livestock from grazing on grazing land during the winter, 0 otherwise
WINR	= 1 if respondent can exclude livestock from grazing on residential allotment during the winter, 0 otherwise
COMPA	= 1 if respondent can claim compensation for crops damaged by stray livestock on arable land, 0 otherwise
COMPG	= 1 if respondent can claim compensation for crops damaged by stray livestock on grazing land, 0 otherwise

Variable	Variable description
COMPR	= 1 if respondent can claim compensation for crops damaged by stray livestock on residential allotment, 0 otherwise
RULEA	= 1 if respondent perceives there are rules prohibiting people outside of the community using unused arable land, 0 otherwise
RULEG	= 1 if respondent perceives there are rules prohibiting people outside of the community using unused grazing land, 0 otherwise
RULER	= 1 if respondent perceives there are rules prohibiting people outside of the community using unused residential land, 0 otherwise
DPLOW	= 1 if respondent knew correct ploughing date, 0 otherwise
STRAY	= 1 if respondent had stray livestock in arable lands after planting, 0 otherwise
CHSE	= 1 if respondent chased stray livestock, 0 otherwise
IMPC	= 1 if respondent impounded stray livestock, 0 otherwise
RTA	= 1 if respondent reported stray livestock to the tribal authority, 0 otherwise
CDAM	= 1 if respondent's crops were damaged by stray livestock, 0 otherwise
FTA	= 1 if stock-owner was fined by tribal authority, 0 otherwise
TAC	Compensation received from the tribal authority (R)
SOC	= 1 if dispute was settled out of court, 0 otherwise
CSOC	Out of court compensation (R)
NOAC	= 1 if respondent took no action against the stock-owner, 0 otherwise
IDEN	= 1 if respondent couldn't identify stock-owner, 0 otherwise
FENA	= 1 if respondent fenced off arable land to protect it against stock damage or theft, 0 otherwise
FEXP	= 1 if respondent felt fencing was too expensive, 0 otherwise
NND	= 1 if respondent feeld there is no need to fence arable lands, 0 otherwise
STEAL	= 1 if community steals fencing, 0 otherwise
FDAM	= 1 if respondent's fence has ever been damaged, 0 otherwise
DCOM	= 1 if fence damaged by community, 0 otherwise

Variable	Variable description
DCTL	= 1 if respondent's fence was damaged by cattle, 0 otherwise
PROTA	= 1 if respondent had employed someone to protect their crops against theft and damage, 0 otherwise
INDNA	= 1 id respondent perceives that indunas enforce customary rules, 0 otherwise
RZ	= 1 if respondent listened to the Radio Zulu broadcasts adevertising the cattle rules, 0 otherwise
DISP	= 1 if respondent or family has ever had a dispute over land ownership or boundaries in the psat 5 years, 0 otherwise
RO	= 1 if dispute was resolved by respondent, 0 otherwise
RL	= 1 if dispute was settled by a religious leader, 0 otherwise
TA	= 1 if dispute was resolved by the tribal authority, 0 otherwise
DFMLY	= 1 if dispute was between family, 0 otherwise
DOTH	= 1 if dispute was between family and other households in the community, 0 otherwise
MS	= 1 if respondent perceives that land disputes are more serious than in the past, 0 otherwise
NS	= 1 if respondent perceives that land disputes are not as serious as in the past, 0 otherwise
NP	= 1 if respondent perceives that land disputes are not a problem, 0 otherwise
BNDRY	= 1 if respondent perceives most frequent disputes are over boundaries, 0 otherwise
OSHP	= 1 if respondent perceives most frequent disputes are over the ownership of land, 0 otherwise
LTRAN	= 1 if respondent perceives most frequent disputes are over rental transactions, 0 otherwise
LDIS	= 1 if respondent knows of a household that lost its land after a land dispute, 0 otherwise

Variable	Variable description
AONM	= 1 if respondent was aware of the agricultural extension officer's name, 0 otherwise
ATC	= 1 if respondent attended any agricultural training courses or field days, 0 otherwise
FMAG	= 1 if respondent purchases farming related magazines, 0 otherwise
CR	= 1 if respondent used agricultural credit in past two years, 0 otherwise
CFORM	= 1 if respondent obtained credit from a formal lender, 0 otherwise
INLEN	= 1 if respondent obtained credit from an informal lender, 0 otherwise
CREL	= 1 if respondent obtained credit from a relative, 0 otherwise
CREJ	= 1 if respondent ever had a credit application rejected, 0 otherwise
CRUSE	= 1 if respondent would like to use agricultural credit, 0 otherwise
INFO	= 1 if respondent did not have enough information about credit, 0 otherwise
CRISK	= 1 if respondent perceived credit to be risky, 0 otherwise
FSTRE	= 1 if respondent purchased household items on credit offered by furniture stores in the past two years, 0 otherwise

APPENDIX D - Rental Data Set

This appendix presents data for households engaged in rental transactions observed in the study areas, and those obseved during the 1995/96 baseline survey. Variables are listed in columns across the pages and cases (transactions) are listed in rows down the page. Households are identified by **HNUM** - some households engaged in more than one rental transaction. For example, Household no.1 enegaged in four rental transactions (the first four rows of every page), and Household no.2 engaged in one transaction (row 5).

BP	STDY	HNUM	FSZE	FLLW	H2O	PARC	LRGR	SMLR	HHD	AGE	WDW	EMP	SE	HKPR	PEN	UNEM	NHKP	WGENRS	NPEN	NUNEM	SCHLR	INF	FLAB	WREM	PENI	REMI
0	1	1	0.3	0	0	1	1	0	0	36	0	0	1	0	0	0	1	1	1	2	4	1	1	0	410	5000
0	1	1	0.3	0	0	1	1	0	0	36	0	0	1	0	0	0	1	1	1	2	4	1	1	0	410	5000
0	1	1	0.3	0	0	1	1	0	0	36	0	0	1	0	0	0	1	1	1	2	4	1	1	0	410	5000
0	1	1	0.3	0	0	1	1	0	0	36	0	0	1	0	0	0	1	1	1	2	4	1	1	0	410	5000
0	1	2	0.55	0	0	1	0	0	0	51	0	0	1	0	0	0	1	1	0	1	3	0	1	-1	0	100
0	1	3	0.18	0	0	0	0	0	1	35	0	0	0	1	0	0	1	1	0	1	4	1	1	0	0	1200
0	1	4	1.52	0	0	0	0	0	1	76	0	0	1	0	0	0	2	1	2	2	3	0	8	0	820	-1
0	1	5	2.52	0	0	0	0	1	1	38	1	0	1	0	0	0	1	0	0	1	2	0	3	-1	0	0
0	1	6	0.3	0	0	0	0	0	0	37	0	0	0	0	1	0	5	1	2	5	5	0	1	0	820	-1
0	1	7	0.92	0	0	1	1	0	0	41	0	0	1	0	0	0	1	1	0	1	4	2	1	120	0	0
0	1	7	0.92	0	0	1	1	0	0	41	0	0	1	0	0	0	1	1	0	1	4	2	1	120	0	0
0	1	8	5.14	1.49	0	1	0	0	0	68	0	0	0	0	1	0	0	4	2	0	3	0	2	0	820	600
0	1	9	0.27	0	0	0	0	0	1	35	0	0	0	1	0	0	1	1	0	1	4	2	5	400	0	0
0	1	10	2.92	0	1.74	1	0	1	0	64	0	0	1	0	0	0	5	1	1	7	4	0	1	85	410	0
0	1	11	3.06	0.4	0	1	0	0	0	44	0	0	1	0	0	0	1	2	0	1	3	2	2	400	0	-1
0	1	12	0.42	0	0.7	0	0	0	1	50	0	0	1	0	0	0	3	0	0	1	5	1	4	-1	0	0
0	1	13	1.85	0	0	1	0	1	1	65	0	0	0	1	0	0	2	1	1	2	2	0	4	0	410	0
0	1	14	0.49	0	0	0	0	0	1	56	1	0	0	1	0	0	6	1	0	0	2	0	2	0	0	350
0	1	15	1.34	0	0.3	1	1	0	0	49	0	0	1	0	0	3	2	1	1	3	5	4	8	0	410	0
0	1	15	1.34	0	0.3	1	1	0	0	49	0	0	1	0	0	3	2	1	1	3	5	4	8	0	410	0
0	1	15	1.34	0	0.3	1	1	0	0	49	0	0	1	0	0	3	2	1	1	3	5	4	8	0	410	0
0	1	15	1.34	0	0.3	1	1	0	0	49	0	0	1	0	0	3	2	1	1	3	5	4	8	0	410	0
0	1	15	1.34	0	0.3	1	1	0	0	49	0	0	1	0	0	3	2	1	1	3	5	4	8	0	410	0
0	1	15	1.34	0	0.3	1	1	0	0	49	0	0	1	0	0	3	2	1	1	3	5	4	8	0	410	0
0	1	16	0.35	0	0	0	0	1	1	56	0	0	0	1	0	0	1	1	0	1	2	0	1	-1	0	0
1	1	17	0.79	0	0	1	0	0	1	52	1	1	0	0	0	0	1	1	1	1	4	1	1	500	410	0
1	1	18	1.15	0.98	0	1	0	1	1	74	1	0	0	0	1	0	1	2	1	1	6	2	2	0	410	200
1	1	19	1.5	0	0.25	1	0	0	0	71	0	0	0	0	1	0	2	4	2	2	5	1	3	0	820	0
1	1	20	0.75	0	0	1	0	0	1	75	1	0	0	0	1	0	3	1	1	1	3	1	3	-1	410	0
1	1	21	0.25	0	0.67	0	0	0	0	61	0	1	0	0	0	0	1	1	1	1	4	0	1	30	410	0
0	0	22	1.24	0	0	0	0	0	1	69	1	0	0	0	1	0	1	1	1	1	1	0	1	-1	410	0
0	0	23	0.71	0.33	0	1	0	0	0	30	0	0	0	0	0	1	1	1	0	2	1	1	4	-1	0	0
0	0	24	0.33	0	0	0	0	1	1	52	0	0	0	1	0	0	1	0	1	0	2	4	1	0	386	0
0	0	25	2.7	0	0	1	0	1	0	48	0	1	0	0	0	0	0	4	2	0	2	0	1	0	820	100
0	0	26	0.15	0	0.2	1	0	0	1	67	0	0	1	0	0	0	2	0	0	14	13	3	2	200	0	0
0	0	27	0.84	0	0	0	0	1	0	-1	0	0	0	0	1	0	2	3	2	3	5	1	5	0	820	-1
0	0	28	3.2	0	0	1	0	0	0	57	0	0	0	0	0	1	1	0	1	2	3	3	2	0	410	0
0	0	29	1.15	0	0	1	0	0	1	82	1	0	0	0	1	0	1	2	1	2	1	0	2	0	0	300
0	0	30	1.33	-1	0	1	0	0	1	82	1	0	0	0	1	0	2	0	2	1	5	0	3	0	770	0
0	0	31	1.22	0.25	0	0	0	1	1	62	1	0	0	1	0	0	1	0	0	1	5	2	1	0	0	0
0	0	32	0.18	0	0	0	0	0	1	40	0	0	0	1	0	0	1	1	0	1	3	1	1	0	0	150
0	0	33	1.06	0	1.06	0	0	0	1	56	0	0	0	1	0	0	1	0	1	1	7	0	1	0	410	0
0	0	33	1.06	0	1.06	0	0	0	1	56	0	0	0	1	0	0	1	0	1	1	7	0	1	0	410	0
0	0	33	1.06	0	1.06	0	0	0	1	56	0	0	0	1	0	0	1	0	1	1	7	0	1	0	410	0
0	0	34	0.23	0	0	0	0	0	0	52	0	0	0	0	0	1	1	0	0	3	2	1	1	0	0	0
0	0	35	0.5	0	0	0	0	0	1	33	0	0	0	1	0	0	1	0	0	2	4	1	6	0	0	0
0	0	36	0.31	0	0	0	0	1	0	39	0	0	1	0	0	0	6	1	1	0	3	1	4	0	410	0

BAC	OX	OXI	BULL	BULLI	COW	COWI	SSTCK	SSTCKI	CHCKI	STOCKI	MZE	MZEI	POT	POTI	BNS	BNSI	VEG	VEGI	FRT	FRTI	CROPI	FARMI	PALL	FERT	FERTP	SEED	SEEDP
1	0	0	0	0	0	0	29	12750	0	12750	1	2500	0	0	1	700	0	0	1	0	3200	15950	0	1	1580	1	0
1	0	0	0	0	0	0	29	12750	0	12750	1	2500	0	0	1	700	0	0	1	0	3200	15950	0	1	1580	1	0
1	0	0	0	0	0	0	29	12750	0	12750	1	2500	0	0	1	700	0	0	1	0	3200	15950	0	1	1580	1	0
1	0	0	0	0	0	0	29	12750	0	12750	1	2500	0	0	1	700	0	0	1	0	3200	15950	0	1	1580	1	0
0	0	0	0	0	0	0	2	0	20	20	1	0	0	0	1	0	0	0	1	0	0	20	1	1	136	1	10
1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	1	54	1	0
0	0	0	1	0	8	0	6	0	0	0	1	2500	0	0	1	0	0	0	0	0	2500	2500	1	1	1200	1	100
0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	1	420	1	21
0	0	0	1	0	2	0	1	0	0	0	1	0	0	0	1	0	1	160	1	0	160	160	1	1	456	1	80
0	0	0	3	0	2	0	28	0	660	660	1	0	0	0	1	6000	1	0	1	0	6000	6660	1	1	742	1	51
0	0	0	3	0	2	0	28	0	660	660	1	0	0	0	1	6000	1	0	1	0	6000	6660	1	1	742	1	51
0	0	0	0	0	0	0	0	0	0	0	1	1750	1	1000	1	260	1	450	1	0	3460	3460	0	1	-1	1	175
0	0	0	0	0	1	0	3	0	180	180	1	0	1	0	0	0	1	0	0	0	0	180	0	1	57	1	6
0	5	1500	7	0	3	0	14	0	0	1500	1	0	0	0	0	0	0	0	1	0	0	1500	0	1	960	1	47
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	142	1	0
1	0	0	4	0	3	0	7	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	1	-1	1	-1
0	0	0	5	0	4	0	9	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	1	140	1	0
0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	134	1	10
1	0	0	0	0	15	1400	21	0	0	1400	1	1689	0	0	1	1200	0	0	0	0	2889	4289	0	1	2166	1	360
1	0	0	0	0	15	1400	21	0	0	1400	1	1689	0	0	1	1200	0	0	0	0	2889	4289	0	1	2166	1	360
1	0	0	0	0	15	1400	21	0	0	1400	1	1689	0	0	1	1200	0	0	0	0	2889	4289	0	1	2166	1	360
1	0	0	0	0	15	1400	21	0	0	1400	1	1689	0	0	1	1200	0	0	0	0	2889	4289	0	1	2166	1	360
1	0	0	0	0	15	1400	21	0	0	1400	1	1689	0	0	1	1200	0	0	0	0	2889	4289	0	1	2166	1	360
1	0	0	0	0	15	1400	21	0	0	1400	1	1689	0	0	1	1200	0	0	0	0	2889	4289	0	1	2166	1	360
1	0	0	2	2600	2	0	10	0	80	2680	1	0	1	0	1	0	0	0	1	0	0	2680	1	1	210	1	20
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	1	0	1	15
0	0	0	3	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	-1	1	0
0	0	0	7	0	5	0	16	0	0	0	1	0	0	0	1	0	1	0	1	0	0	0	0	1	-1	1	0
0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1	30	1	0
0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	160	1	0
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1	134	1	0
0	0	0	2	0	2	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	481	1	54
1	0	0	1	0	3	0	5	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1	131	1	0
0	0	0	5	0	3	0	17	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1	1020	1	210
0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	50
0	2	0	2	0	4	0	9	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1	520	1	0
1	0	0	0	0	3	0	2	0	0	0	1	800	1	0	1	0	0	0	1	0	800	800	0	1	150	1	0
0	0	0	0	0	0	0	3	0	0	0	1	-1	0	0	1	-1	0	0	0	0	-1	-1	1	1	204	1	0
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	54	1	0
0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	67	1	20
1	0	0	0	0	0	0	8	0	700	700	1	0	0	0	0	0	0	0	1	0	0	700	1	1	108	1	80
1	0	0	0	0	2	0	4	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	1	680	1	75
1	0	0	0	0	2	0	4	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	1	680	1	75
1	0	0	0	0	2	0	4	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	1	680	1	75
0	0	0	0	0	17	3000	39	0	0	3000	1	50	1	0	0	0	0	0	1	0	50	3050	1	1	350	1	50
0	0	0	0	0	4	0	13	1290	0	1290	1	0	0	0	0	0	0	0	1	0	0	1290	1	1	120	1	0
0	0	0	2	0	3	0	11	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	224	1	0

CNTR	DRFT	LAB	CHEM	VET	CAR	TRCTR	PLOW	PLNTR	MMLL	ELEC	PAS	FNCNG	SSLO	RFEN	RFST	PLSS	PFAM	PNHBR	POH	UNFAC	LSSR	LSSE	LALL	LPRT	NCON	ACLS	PCLS
0	0	0	0	400	1	1	1	1	1	1	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0
0	0	0	0	400	1	1	1	1	1	1	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0
0	0	0	0	400	1	1	1	1	1	1	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0
0	0	0	0	400	1	1	1	1	1	1	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0
210	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	1	0	0
210	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	1	1	1	1	1	0	1	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0
220	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	1	0	0
335	0	0	52	28	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
0	0	0	10	0	0	1	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
0	0	0	10	0	0	1	1	1	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0
364	0	0	200	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	1	1	0	0
51	0	50	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
400	0	350	0	137	1	0	1	1	0	1	0	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0
203	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	1	0	0	0	0	1	0	0	1	1	0	0
316	0	0	161	0	1	0	0	0	0	1	0	1	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0
0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	1	1	0	0
189	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	1	0	0	1	1	0	0
0	0	240	0	0	0	2	2	1	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
0	0	240	0	0	0	2	2	1	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0
0	0	240	0	0	0	2	2	1	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0
0	0	240	0	0	0	2	2	1	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0
0	0	240	0	0	0	2	2	1	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0
0	0	240	0	0	0	2	2	1	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0
250	0	0	0	50	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0
130	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	1	0	0	1	1	0	0
0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	1	0	0	1	1	0	0
150	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	1	0	0	1	1	0.44	175
30	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	1	1	0	0
171	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	1	0	0	1	1	0	0	1	1	0	0
110	0	80	0	9	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0
0	0	0	0	140	1	1	1	1	0	1	0	1	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0
50	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0
100	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0
0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	1	1	0	0	1	1	0.7	100
300	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	1	0	0	1	1	0.49	50
450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	1	1	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	1	1	0.68	60
120	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0
0	0	0	0	0	1	1	1	0	0	1	0	0	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0
0	0	0	0	0	1	1	1	0	0	1	0	0	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0
0	0	0	0	0	1	1	1	0	0	1	0	0	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0
800	0	28	0	70	0	0	1	1	0	0	0	1	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0
215	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0
0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0

LSNHB	LSFAM	LSOTH	LCLS	ACRP	PCRP	CNHB	CFAM	COTH	LCRP	ALNT	PLNT	LNHB	LFAM	LOTH	LLNT	NUSE	OLD	TWN	RSK	SLAB	INCAP	LRIN	LECON	ARNT	PRNT	RNHB
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0.55	50	0	1	0	-1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	2.46	50	1	0	0	-1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	1.48	0	1	0	0	5	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	1.1	0	0	0	1	2	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0.88	50	1	0	0	-1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0.43	50	1	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	1
0	0	0	0	0.54	50	0	1	0	-1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0.14	0	1	0	0	3	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.44	175	0
0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0.49	0	1	0	0	-1	0	0	0	0	0	1	1	0	0	0	0
0	0	0	0	-1	50	0	1	0	-1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0.3	0	1	0	0	-1	0	0	0	0	1	0	1	0	0	0	0
0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-1	54	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-1	100	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

RFAM	ROTH	LRNT	ASCRP	PSCRP	SCNHB	SCFAM	SCOTH	LSCRP	ABRW	PBRW	BNHB	BFAM	BOTH	LBRW	LNLS	SMLL	GWVC	UNSUT	LEIN	FAMAP	NKAP	LA	RENEG	LREL	ASSOC
0	0	0	0	0	0	0	0	0	0.6	0	0	1	0	-1	0	1	0	0	1	0	0	1	1	1	1
0	0	0	0	0	0	0	0	0	0.8	0	1	0	0	-1	0	1	0	0	1	0	0	1	1	0	1
0	0	0	0	0	0	0	0	0	0.8	0	0	0	1	-1	0	1	0	0	1	0	0	1	1	0	1
0	0	0	0	0	0	0	0	0	0.8	0	0	1	0	-1	0	1	0	0	1	0	0	1	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
0	0	0	0.55	50	0	1	0	-1	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	1	1
0	0	0	-1	75	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
0	0	0	0.48	50	1	0	0	3	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	0	1
0	0	0	0	0	0	0	0	0	1.48	0	1	0	0	5	0	1	1	0	0	1	0	1	1	0	1
0	0	0	0	0	0	0	0	0	0.7	0	1	0	0	-1	0	1	1	0	1	1	0	1	1	0	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
0	0	0	0	0	0	0	0	0	0.17	0	1	0	0	1	0	1	0	0	0	1	0	1	1	1	1
0	0	0	0	0	0	0	0	0	1.1	0	0	0	1	2	0	1	0	0	0	0	0	1	1	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	-1	0	0
0	0	0	0.7	50	1	0	0	-1	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	0	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
0	0	0	2.46	50	1	0	0	-1	0	0	0	0	0	0	0	1	1	0	0	1	1	0	1	0	1
0	0	0	0	0	0	0	0	0	-1	0	1	0	0	-1	0	1	1	0	1	1	1	0	1	0	1
0	0	0	0	0	0	0	0	0	-1	0	1	0	0	-1	0	1	1	0	1	1	1	0	1	0	1
0	0	0	0	0	0	0	0	0	0.5	0	1	0	0	-1	0	1	1	0	1	1	1	0	1	0	1
0	0	0	0	0	0	0	0	0	-1	0	1	0	0	-1	0	1	1	0	1	1	1	0	1	0	1
0	0	0	0	0	0	0	0	0	-1	0	1	0	0	-1	0	1	1	0	1	1	1	0	1	0	1
0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	0	1
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FEMP	FAMIN	FRIN	AGIN	APLS	APLSE	FAR	TAXI	WALK	NVIS	INH	TA	PROOF	FAM	CHF	YOWN	CERT	SELLA	SELLG	SELLR	TASA	TASG	TASR	FPSA	FPSG	FPSR	RNTA
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RNTG	RNTR	TARA	TARG	TARR	FPRA	FPRG	FPRR	BQA	BQG	BQR	TAQA	TAQG	TAQR	FPQA	FPQG	FPQR	USEA	USEG	USER	CHSA	FENA	FENG	FENR	IMPA	IMPG	IMPR
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COMA	COMG	COMR	NATA	NATG	RULA	RULG	SUMA	SUMG	SUMR	WINA	WING	WINR	COMPA	COMPG	COMPR	RULEA	RULEG	RULER	DPLOW	STRAY	CHSE	IMPC	RTA	CDAM	FTA
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0	0	0	0	1	1	1	1	0	1	1	0	1	1	0	1	1	1	1	0	0	0	0	0	0	0
0	1	0	0	0	1	1	1	0	1	1	0	1	1	0	1	1	1	1	1	1	1	0	0	1	0
0	0	0	0	0	1	1	1	0	1	0	0	0	1	0	1	1	0	1	1	0	0	0	0	0	0
0	0	0	0	0	1	1	1	0	1	0	0	1	1	0	1	1	1	1	0	1	1	0	0	1	0
0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0
0	0	0	0	0	1	1	1	0	1	0	0	1	1	0	1	0	0	1	1	0	0	0	0	0	0
0	0	0	0	0	1	1	1	0	1	0	0	1	1	0	1	1	1	1	0	1	1	0	0	0	0
0	0	0	0	0	1	1	1	0	1	0	0	0	1	0	1	1	1	1	1	0	0	0	0	0	0
0	0	0	0	0	1	1	1	0	1	0	0	1	1	0	1	1	1	1	0	0	0	0	0	0	0
0	0	0	0	0	1	1	1	0	1	0	0	0	1	0	1	1	1	1	1	0	0	0	0	0	0
0	0	0	0	0	1	1	1	0	1	0	0	1	1	0	1	1	1	1	0	1	1	0	0	1	0
0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	0	0	0	0	1	1	1	0	1	0	0	1	1	0	1	1	1	1	0	0	0	0	0	0	0
0	0	0	0	0	1	1	1	0	1	0	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0
0	0	0	0	0	1	1	1	0	1	0	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0
0	0	0	0	0	1	1	1	0	1	0	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0
0	0	0	0	0	1	1	1	0	1	0	0	1	1	0	1	1	1	1	1	0	0	0	0	0	0
0	0	0	0	0	1	1	1	0	1	0	0	1	1	0	1	1	1	1	1	1	1	0	0	1	0
0	1	0	0	0	1	1	1	0	1	0	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0

TAC	SOC	CSOC	NOAC	IDEN	FENA	FEXP	NND	STEAL	FDAM	DCOM	DCTL	PROTA	INDNA	RZ	DISP	RO	RL	TA	DFMLY	DOTH	MS	NS	NP	BNDRY	OSHP	LTRAN
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	1	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	1	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	1	0
0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0
0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0
0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	1	0	0
150	0	0	0	0	1	0	0	0	1	0	1	0	1	1	0	0	0	0	0	0	1	0	0	1	0	1
150	0	0	0	0	1	0	0	0	1	0	1	0	1	1	0	0	0	0	0	0	1	0	0	1	0	1
0	0	0	0	0	1	0	0	0	1	1	1	0	1	1	1	0	0	1	1	0	0	0	1	1	0	0
0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0
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0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	1	0	1
0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	1	0
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	1	0
0	0	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	1	0	0	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	1	0	1	0
0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
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0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0
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0	0	0	1	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0
0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0
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0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	1	1	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0
0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0

LDIS	AONM	ATC	FMAG	CR	CFORM	INLEN	CREL	CREJ	CRUSE	INFO	CRISK	FSTRE
1	1	1	1	0	0	0	0	0	1	1	0	1
1	1	1	1	0	0	0	0	0	1	1	0	1
1	1	1	1	0	0	0	0	0	1	1	0	1
1	1	1	1	0	0	0	0	0	1	1	0	1
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	0	1
0	0	1	0	0	0	0	0	0	0	0	0	1
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	1	1	0	0
1	0	0	0	0	0	0	0	0	1	1	0	0
1	0	0	0	0	0	0	0	0	1	1	0	0
0	1	0	1	0	0	0	0	0	1	1	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0	1	1	0	1
0	0	1	0	0	0	0	0	0	1	1	0	1
0	1	1	0	0	0	0	0	0	0	0	0	1
0	1	1	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	1	0	0	0	0	1
0	1	0	0	0	0	0	0	0	1	1	0	1
0	1	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	1	1	0	0
0	0	0	0	0	0	0	0	0	0	0	0	1
0	1	0	0	0	0	0	0	0	1	1	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	0	1
0	1	0	0	0	0	0	0	0	0	0	0	1
0	1	0	0	0	0	0	0	0	1	1	0	1
0	1	0	0	0	0	0	0	0	1	1	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	1	1	0	0
0	1	0	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	1	1	0	0
0	0	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	1
0	1	1	0	0	0	0	0	0	1	0	1	1
0	1	1	0	0	0	0	0	0	1	0	1	1
0	1	1	0	0	0	0	0	0	1	0	1	1
0	0	0	0	1	0	0	1	0	0	0	0	1
1	0	0	0	0	0	0	0	0	0	0	0	1
0	0	1	0	0	0	0	0	0	0	0	0	0

Appendix E Discriminant Analysis Histograms

Table E1 Discriminant scores estimated for lessors, 1996

Code	Score	Frequency
1	-3.00 to -2.51	2
2	-2.50 to -2.01	3
3	-2.00 to -1.51	2
4	-1.50 to -1.01	0
5	-1.00 to -0.51	2
6	-0.50 to -0.01	2
7	0 to 0.50	1
		12

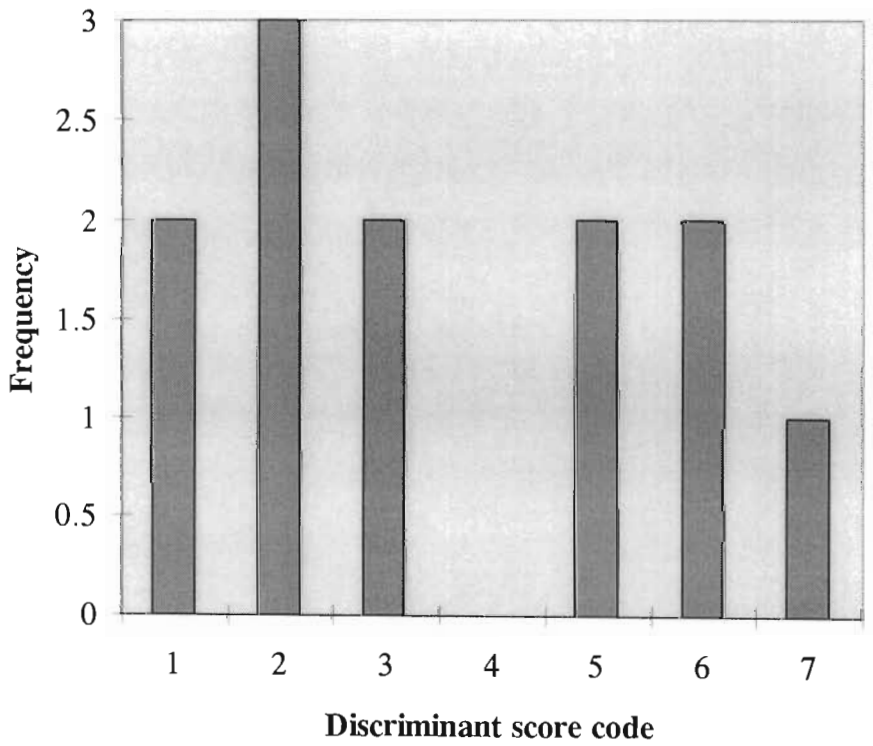

Table E2 Discriminant scores estimated for lessees, 1996

Code	Score			Frequency
1	-1.00	to	-0.51	2
2	-0.50	to	-0.01	1
3	0	to	0.50	2
4	0.51	to	1.00	7
5	1.01	to	1.50	2
6	1.51	to	2.00	2
7	2.01	to	2.50	1
8	2.51	to	3.00	2
				19