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INVESTMENT ON FREEHOLD AND TRUST FARMS: THEORY WITH SOME EVIDENCE FROM KWAZULU

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Abstract

This paper outlines relationships between exclusive and secure property rights to land, land transfers, farm productivity, access to credit and on-farm investment. A survey of freehold and Trust farmers was conducted in the Madadeni district of KwaZulu to investigate these relationships. Despite the existence of title-deeds, it was found that many of the respondents did not have exclusive use rights to land. Non-exclusive use rights occurred where land was co-owned, mutually occupied by two or more members of a family or registered in the name of a deceased person. Land market activity was generally confined to rental transactions by individuals who had exclusive use of land. In the absence of zoning regulations, several landowners had leased plots to residential tenants, with some farms becoming entirely residential. Results of logit analysis indicate that investment in on-farm improvements is higher where tenure is private and secure. It is concluded that exclusive and secure property rights facilitate the land market, promoting efficiency in agriculture. Recommendations give due consideration to the equity implications of land sale and land rental markets and to the consequences of zoning.

Uittreksel

Beleggings op eenaar en Trust grond: Teorie met bewyse van KwaZulu

Hierdie studie skets die verwantskap tussen eksklusiewe en veilige eiendomsregte ten opsigte van grond, grondoordragte, produktiwiteit van plase, toegang tot krediet en beleggings op plase. 'n Opname is onder eenaar-boere en Trust-boere in die Madadeni distrik van KwaZulu gedoen om hierdie verwantskappe te ondersoek. Nieteenstaande die bestaan van titelaktes, is daar gevind dat baie van die respondente nie eksklusiewe gebruiksreg van die grond het nie. Nie-eksklusiewe gebruiksreg het bestaan waar die grond mede-eienaars het, onderlinge bewoning deur twee of meer lede van dieselfde familie, of indien dit in die naam van 'n afgestorwe persoon geregistreer is. Grondmark aktiwiteite was oor die algemeen beperk tot die verhuur deur individue wat eksklusiewe gebruik van die grond gehad het. Vanweë die afwesigheid van afbaknings regulasies, het sekere grondeienaars persele aan inwonende huurders verhuur, met die gevolg dat sekere plase totaal residensieel geword het. Resultate van logit analise dui aan dat beleggings in eie-grond verbeterings hoër is waar die eiendomsreg privaat en seker is. Daar is tot die gevolgtrekking gekom dat eksklusiewe en veilige eiendomsregte die grondmark vergemaklik en sodoende effektiwiteit in die landbou bevorder. Aanbevelings gee behoorlike oorweging aan die aandeel implikasies van grondverkope en grondverhuurings markte asook die nagevolge van sonering.

1. Introduction

Land use is efficient when rent is maximised. Economic theory suggests that exclusive and secure land rights improve land mobility, access to credit and efficiency of land use (Baber, 1991:16-28). They also strengthen incentives to adopt new technology, to invest in on-farm improvements and to conserve land and grazing resources. Land titling, backed by an effective and certain legal system, is considered by many to be a useful method of promoting exclusive and secure property rights to land.

Evidence from Thailand indicates that titled farmers have better access to credit, make more improvements and have higher productivity than non-titled farmers (Feder, 1987; Feder and Onchan, 1987). A number of authors have investigated the effect of introducing land titling in the African situation (e.g. Atwood, 1990; Barrows and Roth, 1990; Coldham, 1978; Haugerud, 1983; Migot-Adholla *et al*, 1991) with wide-ranging conclusions. In some cases, titling aggravated uncertainty regarding property rights, inhibiting land transfers and productivity in agriculture. The absence of an efficient land market eliminates many of the potential benefits of creating secure land rights (Thomson and Lyne, 1992). For a land market to be efficient transaction costs must be low.

The objective of this paper is to demonstrate that individual and secure tenure is necessary for an efficient land market and, together with the land market, promotes efficient and sustainable farming. Section 2 of this paper provides theoretical support for this argument while section 3 describes aspects of land tenure, on-farm investment, credit use and farm productivity observed in a sample of 95 farmers operating under freehold and Trust tenure systems (61 on freehold and 34 Trust tenants) in the Madadeni district of KwaZulu. The fourth section summarises results of a logit model estimated from the survey data to isolate the effect of exclusive and secure land rights on investment. Concluding comments are presented in section 5.

2. Economic Benefits of Exclusive and Secure Rights to Land

Exclusive and secure property rights promote efficient and sustainable use of land (Figure 1). They facilitate market transfers which permit land to be used as collateral for credit and shift land to its highest use. They also create incentives to invest in on-farm improvements and to conserve resources. Without an efficient land market both the incentive and ability of landowners to invest and conserve are reduced. These contentions are explained in sections 2.1 - 2.3.

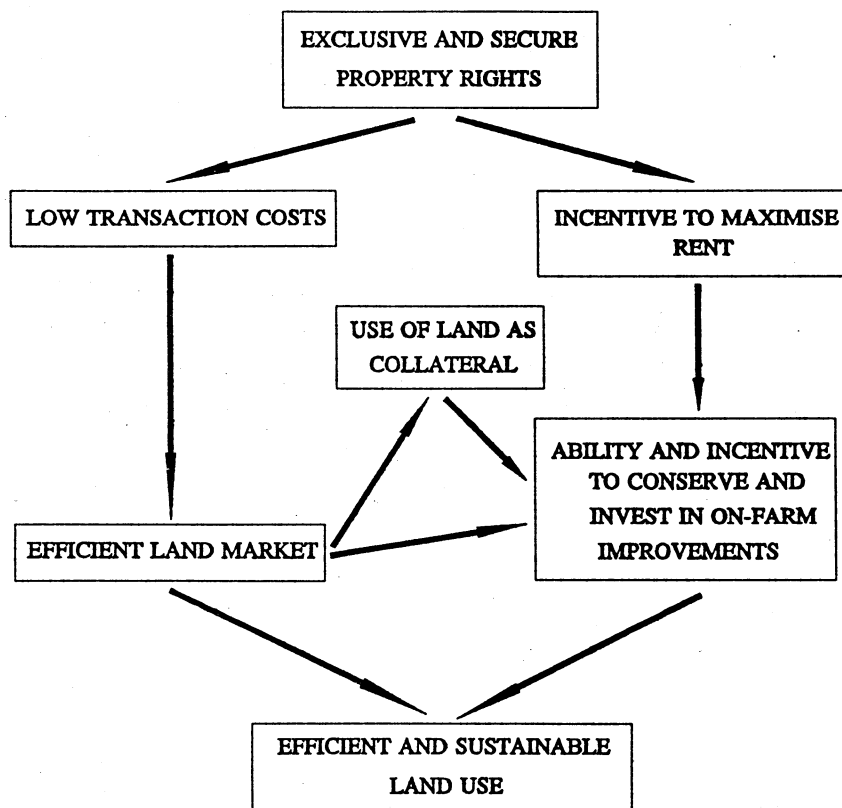


Figure 1: Flow diagram illustrating postulated linkages between property rights and efficient land use

2.1 Exclusive and secure property rights to land, land transfers and land use efficiency

When transfers of land occur through sale or leasing, the price of land and its rental value are known. A land market promotes efficient land use because an opportunity cost is imposed on the non-use of land (Nieuwoudt, 1990). A farmer who chooses to leave land idle when a land market exists loses income either through reduced farm profits or forgone rental payments. Provided that farmers are profit maximisers, the existence of an efficient land market will ensure that land transfers to its highest use (i.e. where rent is maximised) unless incentives are distorted. Examples of such distortions are legislation that allows financial losses incurred on farms to be deducted from non-farm taxable income, or which prevent farmers from subdividing and selling land that they cannot afford to develop to others that can. Society benefits from rent maximisation because, in aggregate, land is a scarce resource. Land may be left idle or under utilised when the land market is inefficient (e.g. high transaction costs relative to rent), when development costs exceed benefits (i.e. land is truly unproductive) or if farmers are not profit maximisers or their incentives are distorted.

For an efficient land market to function, property rights in land must be clearly defined and allocated with legal and tenure certainty, and transaction costs must be small (Johnson, 1972). The greater the uncertainty in property

rights, the higher the transaction costs in discovering the valid owner, in making and enforcing a rental or sale contract and the greater the uncertainty remaining after any given expenditure to determine ownership (Barrows and Roth, 1990). The marginal value of land depends upon its stream of expected net annual returns, and a more productive user will not acquire land when the marginal value to him, inclusive of transactions costs, falls below that of the current owner. Inefficient allocation of land results as a more productive user is prevented from obtaining land.

In homeland areas, most land is not privately owned but is administered by tribal authorities who allocate arable land to household heads and settle land disputes. Although households have exclusive rights to arable land, land cannot be sold as title is vested in the state. Land allocations provide usufruct rights and security of tenure is guaranteed provided tribal laws and customs are observed. It has been argued that inefficient use of arable land in KwaZulu stems from high transaction costs that inhibit land rental (Lyne and Nieuwoudt, 1991). Transaction costs associated with renting are inflated by risk as rental contracts are not legally binding owing to a conflict between customary and national law (Thomson and Lyne, 1992). Evidence presented by these authors indicates that potential lessors perceive dispossession, and hence the loss of economic benefits conferred by land rights, to be a very real threat. This stems from the fact that tribal authorities secure the allegiance of local

communities by their control over land and leasing to tenants (particularly those who do not align themselves with the tribal authority) could constitute a breach of customary law. In these circumstances, rural households that find wage employment more attractive than farming tend to underutilise their arable land as, in the absence of a land market, there is no opportunity cost to penalise inefficient land use. These households are denied rental income and emerging farmers are unable to rent or purchase land that lies idle.

Whereas arable land is underutilised in homeland areas, grazing land is overutilised because access to grazing is usually open and not exclusive (Lyne and Nieuwoudt, 1990). When access is unrestricted, the equilibrium stocking rate occurs where rents are zero (Gordon, 1954). There is no incentive for a stockowner to reduce his herd size as rents would accrue to other users. This implies overstocking in the economic sense as rents are not maximised. In the absence of exclusive property rights, users cannot enter into mutually beneficial exchanges regarding land because the cost of negotiating an agreement is infinite since the number of potential users is infinite (Baber, 1991:18). Even when access is restricted to a finite group, transaction costs may be high and land may not transfer to efficient users.

Land titling is often viewed as a means of securing individual tenure as private property rights are defined and allocated to specific owners. However, land titling *per se* is neither a sufficient nor a necessary condition for an efficient land market. Nevertheless, individual title-deeds that are widely recognised and supported by a legal system that is both certain and capable of enforcing property rights should reduce transaction costs, including risk, and facilitate land transfers. Where these conditions are not met, land titling will not necessarily increase the number of land transactions occurring. Evidence from Kenya (Atwood, 1990) suggests that customary law continued to play an important role in determining property rights after the introduction of land titling. Although customary rights to land were no longer officially recognised, judicial courts settled claims to registered land in favour of those with customary use rights (Coldham, 1978). Without legal support, registration of title-deeds served only to create confusion over property rights and reduced security of tenure. In addition, customary rules governing the transfer or inheritance of land continued to be observed *de facto*. According to Haugerud (1983), the cost and effort required to observe procedures required for registration of title-deeds did not encourage individuals to co-operate with the new system.

A possible consequence of a land market may be the transfer of wealth from poorer households, who are forced by financial hardship to sell their land, to those in a better economic position. Increased landlessness is one of the major criticisms levelled against the introduction of title-deeds. However, the landless class problem can be avoided if a land rental market, rather than a land sale market, is developed (Nieuwoudt, 1990). A rental market has both efficiency and equity benefits since land moves to its best use and renting is voluntary. Both parties gain from a rental agreement as the tenant is able to crop additional land, bringing underutilised land into production, and the lessor receives rental income without risking his or her property rights (and without having to find alternative residential accommodation).

By allowing accumulation of land, a land market may increase the intensity of production. Lyne (1989:127-129) argues that larger farmers have more incentive to adopt technology because fixed costs associated with informa-

tion and management inputs can be spread over larger volumes of output. On the other hand, it has been argued that if land is viewed as an investment with a high potential for appreciation or as a hedge against inflation rather than as a productive asset, permanent land transfers may lead to reduced productivity as land is held idle or used less intensively (Atwood, 1990). Evidence from Kenya suggests that influential and wealthy individuals used the registration process to accumulate land for speculative purposes, future sons' inheritance and to obtain loans using land as collateral rather than for agricultural production (Haugerud, 1983). However, this outcome could reflect the absence of an active market for land (i.e. the absence of an opportunity cost to penalise non-use of land). According to Collier (1983), there is no tradition of tenancy in Kenya as landowners perceive risks of permanent loss of property rights if they lease land out.

2.2 Exclusive and secure property rights to land and access to credit

In South African commercial agriculture, the rental rate of return to land, defined as cash rents of farm land divided by land value, is about five per cent (Nieuwoudt, 1987). This is low relative to current returns from other investments and makes credit an important source of capital for investment in on-farm improvements because land dominates the asset portfolio in agriculture.

If the bundle of use rights to land includes the right to transfer ownership, land can be pledged as collateral for loans and, if use rights are exclusive, the lender is assured that there are no challenging claims to ownership (Feder *et al*, 1988:45). Even when land is not offered as collateral, exclusive landowners may have, *ceteris paribus*, better access to credit because they are regarded as having higher credit worthiness by virtue of their land which is implicitly regarded as collateral (Feder *et al*, 1988:49). Collateral reduces the lender's cost of information regarding the borrower's credit worthiness and risk of default. By lowering the risks and information costs faced by lenders, collateral can increase the number of profitable lending opportunities and therefore the volume of agricultural credit, increasing landowners' ability to invest in agriculture.

Titled land is considered to be an ideal collateral form because it is easy for the lender to appropriate in case of default, is subject to few risks owing to its physical characteristics, and the value of the land to the borrower does not diminish as rents accrue to him (Binswanger and Rosenzweig, 1986). Evidence from Thailand indicates that titled land provided significant advantages in obtaining credit (Feder *et al*, 1988:67). In Kenya, preferential access was also given to title holders, especially larger farmers (Barrows and Roth, 1990). Owing to fixed administration costs, the minimum size of loans offered by banks may exceed the capital needs of small farmers.

Where land can be rented, the absence of a land sale market does not necessarily preclude the use of land rights as collateral. By law, a lessee, with the consent of the lessor, is entitled to assign the rights and obligations of a lease to a third party (Kerr, 1984:290-291). In view of this, it may be possible to include a clause in the lease agreement permitting a lessee to use a long-term lease as collateral for a loan. In the event of foreclosure, the creditor could sell the lease at its present value.

However, the use of land as collateral depends very much on the legal and social environment within which it is used. Titled land will not be accepted as collateral in areas where social custom or political pressure make

it impossible for lending institutions to foreclose on land in the event of loan default or where there is not an active land market to dispose of land which has been foreclosed on (Atwood, 1990). The greater and more effective are restrictions on land sales, the lower the value to a lender of land offered as security and, where land sales are completely restricted, the value of land as collateral is zero.

Atwood (1990) claims that informal lending in Africa is seldom if ever secured by land but rather by other property or by a combination of social custom and goodwill. This observation could indicate external credit rationing where land is not accepted as collateral. Evidence from Kenya suggests that lenders give preference to farmers with off-farm income sources if they anticipate problems repossessing land in the event of default (Barrows and Roth, 1990).

2.3 Exclusive and secure property rights to land and on-farm investment and conservation

Secure use rights are expected to encourage greater on-farm investment by enhancing the incentive to invest and by improving access to credit (Feder, 1987). The less certain property rights are, the higher the discount rate for future returns, the lower the value of all investments on the land and the smaller the volume of investments undertaken. The duration of any investments on land will be biased towards shorter term projects because the higher the discount rate, the higher the present value of expected short-run income streams relative to expected long-run income streams. Diminished uncertainty about future access to land positively influences a farmer's decision to invest time, effort and capital into long-term improvements on the farm which may enhance the productive capacity of land (e.g. fencing, irrigation and improved pastures) or maintain present productive capacity (e.g. conservation measures).

Investment also requires exclusive use rights otherwise the benefits of any investment in the land are not internalised. Despite relatively high herd mortality and low calving rates in KwaZulu, there is very little evidence of improved pastures. Lyne and Nieuwoudt (1990) attribute this to inclusive use rights on grazing land that prevent an investor from excluding other users (free-riders) from reaping the benefits of his efforts. The actions of free-riders discourage the individual from making investments to improve pasture and herd quality, even when grazing is restricted to a well defined group. Collective investment by the entire group will be constrained by those members with less incentive or ability to contribute (Lyne and Nieuwoudt, 1990). Establishing exclusive land rights to grazing would internalise the benefits of improvements and promote investment.

Secure and exclusive use rights are also necessary conditions for a land market (Section 2.1) and land markets have important implications for investment and conservation. Firstly, income streams from investments in land can be captured by sale or lease and if the transfer of land is restricted, then so is the transfer of fixed assets on the land. In situations where a farmer cannot sell land, the value to the farmer of an investment declines due to a rise in the discount rate from the loss in liquidity (Barrows and Roth, 1990). The greater and more effective the restrictions on land transfers, the lower the value of investments on land and the lower the volume of investment occurring.

Secondly, transferable property rights encourage investment even when the owner has a short planning horizon because the benefits will either accrue to his heirs or can

be captured at any time by selling the land at its present value on the market. A land market forces an owner, regardless of his or her age, to consider the preferences of future generations when making investment and conservation decisions because current market values reflect future expected income streams (Pasour, 1990:204).

Thirdly, the land market promotes sustainable land use by creating an opportunity for individuals with a high rate of time preference (RTP) to conserve their land resources. It is sometimes argued that a farmer with a relatively high RTP will forgo future income in order to obtain income in the present time period and may be inclined to exploit resources with little regard for conservation and future use. However, if property rights are marketable, an individual with a high time preference could obtain immediate income by borrowing, using the property as collateral, or by selling the property at its present value and allowing a future owner, with lower RTP, to use the property (Pasour, 1990:202).

The notion that conservation and investment cease when privately owned land is rented out is also false as the market value of land (rent or selling price) depends upon its expected productivity. Consequently, a lessor does have an incentive to invest in fixed improvements and to police the actions of his tenants. However, lessors may have a lower level of investment compared to owner-operators because they bear increased risk, owing to moral hazard, and therefore apply a higher discount rate. Investment levels of long-term tenants may also be lower compared to owner-operators as contracts that facilitate long-term investment incur transaction costs. For these reasons a rental market for land is second best to a sale market in terms of investment incentive.

Where ownership is not exclusive, no single individual can claim to have absolute property rights and ownership is ill-defined. Co-ownership lends itself to disputes because every co-owner, as owner of the land in its entirety, must be consulted if legal acts are intended with the land (van der Merwe, 1987:188). Problems can also arise when individuals fail to register land transfers through inheritance. Under South African law, an heir becomes owner of land only after it has been registered in his name (van der Merwe, 1987:187). If several heirs remain on land registered to a deceased parent, the individuals' land rights are neither exclusive nor secure. Under co-ownership, investment levels may be constrained by free riders and the opportunity cost of inefficient land use diminishes as transaction costs increase. Transaction costs increase because all valid owners must be discovered and, with more parties entering the negotiating process, the probability of a satisfactory contract being formulated is reduced. Creditors will not accept co-owned land as collateral if it becomes difficult to foreclose and dispose of land in the event of default. In South Africa, a creditor cannot sell common property unless judgement has been obtained against all co-owners (van der Merwe, 1987:188-190).

The following section relates the situation observed in Madadeni to the principles discussed in sections 2.1 - 2.3.

3. Land tenure and farm characteristics in Madadeni

In Madadeni district near Newcastle, Natal, Trust tenancy and freehold title are prevalent forms of land tenure. Two samples were drawn for this study. The first was a simple random sample of 65 registered landowners drawn from a list of 440 names obtained from the Deeds Registry Office in Pietermaritzburg. The second was a

simple random sample of 35 Trust tenants drawn from a list of 50 names compiled by local agricultural officers and a prominent farmer. In the former case, current occupants were interviewed where registered owners were absent or deceased. A total of 95 farmers responded, 61 on freehold land and 34 on Trust land.

3.1 Farmers on Trust Land

Land held under Trust tenure is owned by the state and administered by the South African Development Trust (SADT). Trust farms are divided into residential, arable and communal grazing sections. Tenants are allocated one field averaging 3,4 to 4,3 hectares in size and have exclusive rights to this land. Subdivision, leasing out and sharecropping arrangements are officially forbidden (De Wet, 1987). A small nominal rent is payable annually to the SADT and arable land may be forfeited if it remains unused for a year or more, is not cultivated in the way prescribed by the agricultural officer, or if the user fails to pay his rent (Letsoalo, 1987). In more recent years, incoming tenants have not been allocated arable land owing to shortages created by population pressure, but are permitted to keep cattle on the grazing land. Grazing land is common property and is fenced into rotational camps under the control of a local official. Access to grazing is restricted to residents of the Trust farm. The number of cattle owned by each household is restricted and small stock are not permitted. However, the official restrictions applying to arable and grazing land are seldom enforced (Cross, 1991:79).

Of the 34 Trust tenants interviewed, 23 indicated that they would like to hire additional land but only 12 did so. Three of these respondents had not been allocated arable land of their own. The average area rented in was 5,6 hectares with some farmers renting in over 13 hectares each. Three tenants leased their arable land out claiming that they were too old to farm or did not have the means to farm (mostly widows). Rental arrangements were verbal agreements with payment comprising either a variable share of the crop depending on yields, or provision of land preparation services in return for use rights to part of the land.

Over 90 per cent of Trust tenants interviewed were cattle owners and 47 per cent owned smallstock. Most cattle owners were aware of restrictions on stocking rates yet 47 per cent had cattle in excess of the prescribed limit. Official stocking rates varied between farms as did enforcement procedures. Some stockowners claimed that they would be taxed on their extra cattle, or that they would be forced to sell surplus cattle, while others claimed that there were no penalties for exceeding the official limit.

Trust tenure is very insecure as tenants have highly conditional leases. Whilst it might be argued that Trust tenure is not insecure because the conditions of tenancy are seldom fully enforced, changes in administration or government policy have always been a distinct possibility and represent another source of uncertainty. Although Trust tenants are entitled to remove their improvements in the event of termination or suspension of use rights, and may claim compensation under certain circumstances (Vink, 1986:34), the SADT is not required to recognise inheritance of land by an occupant's heirs. Improvements made by respondents were limited to residential housing. All observed investments in fencing, dams, dipping facilities and boreholes had been made by the SADT. This outcome is consistent with insecure tenancy, inclusive rights to grazing and limited transferability of use rights.

3.2 Farmers on Freehold Land

Freehold refers to land owned by an individual or family. In Madadeni, freehold land is often held jointly, either legally or *de facto*, as a result of farms being inherited by multiple heirs or purchased by a syndicate of family members. In addition, many title-deeds are registered to deceased persons as heirs failed to register the change of ownership, possibly due to the expense and effort involved. The frequency of 'ownership' combinations observed in the sample is reported in Table 1. It is striking that only 27 per cent of freehold respondents were owner-operators. Thirty-two per cent of 'owners' had non-exclusive property rights because the land was registered to a group of individuals, and 41 per cent did not have secure property rights because the farm was registered to a deceased person.

Black rural areas are not subject to zoning and, in areas where the residential value of land exceeds its agricultural value, 'shack farming' is prevalent. In Madadeni, freehold farms were more often a combination of productive and residential farms. Of the 59 freehold 'owners' interviewed, approximately 50 per cent had residential tenants on their land and some farms were entirely residential.

Zoning is often implemented when the market allocates high quality agricultural land to urban uses. Of course, land which is productive in agriculture may be even more productive in alternative uses, and society may lose as a result of zoning. Furthermore, there is no guarantee that government action will succeed in allocating land more efficiently than a market given the information and incentive problems of the political process (Pasour, 1990:210-211). However, it may be unjust to future generations if fertile land is taken out of agricultural production forever (Baber, 1991:112). Increases in food prices, as a result of reduced agricultural production, can be viewed as an externality and reason for keeping land in agriculture (Nieuwoudt, 1990).

Formal sales of freehold land in black rural areas are few and inheritance is the usual form of transfer (Cross, 1990:86). Of the 59 'owner' respondents, seven had purchased their farms and 52 had inherited land. The sample included only two tenant farmers on freehold land although 20 'owners' indicated that they would like to rent in additional land. Investment in on-farm improvements included housing, boreholes, fencing, watering holes, and dipping facilities for cattle. Fencing had been erected by 58 per cent of the 'owner' respondents, and by both tenant farmers. Fences were generally in a poor state of repair as theft of materials is a major problem. Watering holes for livestock had been constructed on 20 per cent of the freehold farms, but only two farmers had built cattle dips at their own expense. Most other farmers accessed public dips on Trust land or dips funded by the local community.

Of the 59 'owner' respondents, only three had used their land as collateral and only one had used the credit to finance agricultural investments. All three farmers were owner-operators (i.e. possessed a title-deed registered in their name only). Credit had been used by just nine per cent of respondents to purchase tractors and implements using the assets, bank deposits and cattle as collateral. These loans are less risky to lenders as equipment can be repossessed and easily sold.

Table 1: 'Ownership' combinations observed in the sample of freehold respondents¹, Madadeni, 1992.

	Single 'ownership' ²	Multiple 'ownership'	Total
Titleholder alive ³	16 (27%)	7 (12%)	23 (39%)
Titleholder deceased	24 (41%)	12 (20%)	36 (61%)
Total	40 (68%)	19 (32%)	59

1. Excludes two tenant farmers on freehold land ($n = 59 + 2 = 61$ cases).
2. Ownership refers to the individual(s) who presently possess the land, regardless of title.
3. Titleholder refers to the individual(s) whose name is on the title-deed.

The same cannot be said of loans secured by land that is co-owned or registered to a deceased owner. It would appear that non-exclusive and insecure rights to freehold land in Madadeni have inhibited the land market, restricted the use of land as collateral and discouraged investment in agriculture.

3.3 Farm sizes, incomes and input expenditure

Agricultural production in Madadeni varied widely across farms from subsistence to small-scale commercial production. Maize is the major crop of the area with more commercial farmers also growing groundnuts. Surplus products are sold on local markets or to market agents. Statistics describing farm characteristics are presented in Table 2.

For interest sake, statistics relating to a sample of farmers operating under tribal tenure in various parts of KwaZulu (Lyne and Ortmann, 1992) are also included. Crop income and 'normal' area planted reflect respondents' estimates for an average rainfall year. Input expenses and area planted were based on the 1991/92 growing season and may underestimate average expenditure owing to the effects of drought during that growing season.

Individual owners cultivate a larger percentage of their farms (24 per cent) compared to other 'owners' (nine per cent). Farm income accounted for 40 per cent of total income on freehold farms with exclusive ownership, 31 per cent on freehold farms with insecure or non-exclusive property rights, and 40 per cent on Trust farms. On tribal farms, farm income accounts for only three per cent of total household income. Crop income and expenditure per hectare were noticeably higher where rights to arable land are unambiguously exclusive (i.e. on Trust farms and land that is individually owned). Although herd sizes were larger on exclusively owned farms, cattle sales were considerably higher than on other freehold farms and Trust land. This is to be expected since grazing is common property in the latter cases and there is little incentive for users to keep cattle for purposes other than as a store of wealth.

4. Empirical results

An empirical analysis, using data obtained from the survey, was undertaken to isolate the effect of exclusive and secure land rights on investment in on-farm improvements. Improvements enhance the productive capacity of land or maintain its productive capacity by preventing degradation of resources. The most common on-farm improvement in Madadeni was fencing. Watering holes and dipping facilities for cattle were also provided by some farmers. Fencing enables a farmer to control access to his land, allowing better management of grazing and reducing crop loss by trespassing livestock. Dipping and watering facilities enable a farmer to maintain livestock condition, particularly in drought years. These improve-

ments require capital outlay for materials and labour. The model assumes that non-exclusive and insecure land rights will restrict access to credit and reduce a manager's incentive to invest. An index (TITLE) measuring the strength of a respondent's property right to land was constructed from the following variables using Principal Component Analysis (PCA):

- ▶ A dummy variable (R) that scored one if the respondent was a tenant, and zero otherwise.
- ▶ A dummy variable (S) that scored one if the respondent was a freehold farmer with exclusive but not necessarily secure property rights to land (i.e. owner-operators and heirs of owner-operators that had individual holdings but did not possess title-deeds), and zero otherwise.
- ▶ A dummy variable (T) that scored one if the present occupant was a registered titleholder, and zero otherwise.

Owner-operators scored highest on the estimated index (Kille and Lyne, 1992). Consequently, the variable TITLE was expected to impact positively on investment in on-farm improvements. Other personal and farm characteristics likely to influence investment decisions were also included in the model. The following control variables were considered:

- ▶ Gross farm income (GFI) - an index constructed using Principal Component Analysis measuring farm size. This variable controls for differences in farm size and is expected to bear positively on investment because the potential benefits of on-farm improvements are higher on larger farms. Farmers with larger net incomes also enjoy a better liquidity position.
- ▶ Formal education (ED) - a measure of human capital. Better educated farmers are expected to have lower information costs and better knowledge of the benefits of on-farm improvements. According to Feder *et al* (1981:17), education plays a positive role in determining adoption rates of new technology in developing agriculture. However, more skilled individuals can command higher incomes in off-farm employment and may leave agriculture (Lyne, 1989). The estimated effect of education on investment may therefore be negative if ED is negatively correlated with on-farm employment.
- ▶ Non-farm income (LQD) - non-farm income (e.g. pensions and wages remitted by family members, rental income and income from other business enterprises) is an important source of liquidity in rural areas (McKenzie and Coetzee, 1988) which may be used to finance on-farm improvements.

Table 2: Mean characteristics for freehold and Trust Farmers in Madedeni and tribal farmers in KwaZulu (1990 = 100)

Characteristic	Freehold tenure		Trust tenure (n=34)	Tribal tenure* (n=183)
	Secure and exclusive ownership (n=16)	Insecure or non-exclusive 'ownership' (n=34)		
Size of holding (ha)	38,47	59,72	4,21**	1,27***
Area planted (ha)	7,46	2,44	3,49	-
Normal area planted#	9,11	5,19	4,33	-
Herd size (cattle)	12,38	8,65	8,71	3,97
Income sources (R/annum):				
Crop sales#	5426,98	2415,05	3897,66	92,03
Cattle sales	1077,08	189,60	222,95	89,12
Small stock sales	348,22	119,81	142,34	46,91
Farm income	6888,28	2724,66	4274,02	228,06
Rental income	349,09	398,72	-	-
Pension	1993,71	3098,75	2231,52	1752,00
Non-farm income##	8451,86	2592,63	4162,54	9312,00
Total Income	17682,95	8814,56	10756,71	11292,06
Input expenses (R/annum):				
Fertiliser	1012,87	276,45	710,36	132,55
Seed	354,04	76,95	176,62	33,29
Chemicals	108,20	35,88	103,82	2,81
Contractor charges	983,65	309,68	470,71	64,33
Veterinary	18,32	24,41	27,86	2,29
Other###	771,14	1,51	87,99	3,55
Total expenses	3248,22	724,88	1577,40	238,80

- Information unavailable

* Source: Lyne and Ortmann, 1992.

** Arable land allotment plus rental land.

*** Arable land only.

Based on the farmer's estimate of a drought free year.

For example, wages earned/remitted, income from own business, etc.

For example, hay bales, stock feed, equipment/draft animal hire, etc.

► On-farm resident (RES) - a dummy variable that scored one if the respondent lived on the farm, and zero if employed off the farm. Resident landholders are expected to have more incentive to make improvements because farm income comprises a more important part of their total income, *ceteris paribus*.

► Age (AGE) - a measure of work experience as age is highly correlated with experience (Feder, 1987). More experienced managers would have had more time to accumulate capital and may be in a better financial position to make improvements.

► Time on land (TIME) - as improvements are accomplished over time, the longer the time spent on the land the greater the probability of investment occurring.

Investment in on-farm improvements by farmers was recorded as a dummy variable (IFA) that scored one if the respondent had invested in improvements, and zero otherwise. Owing to the dichotomous nature of the dependent variable (IFA), the model was estimated as a logit function using the maximum likelihood technique (Aldrich and Nelson, 1984:26).

Table 3: Estimated coefficients and classification rates for the logit model of on-farm investment

Explanatory variables						
	Title	GFI	ED	LQD	RES	Constant
Coefficients	0,8990	0,3997	-0.1110	$4,0 \times 10^{-5}$	0.5010	-0,4375
t-value	4,5880**	2,7022**	-2,0764*	1.6602	1,1733	-0,9278
Classification rates			Investors (IFA=1)		Non-investors (IFA=0)	
% of cases correctly classified			83,64		69,23	
Number of cases				94		
Goodness of fit χ^2				75,497		
Degrees of freedom				88		
Probability				0,826		

** Denotes statistical significance at the 1 per cent level.

* Denotes statistical significance at the 5 per cent level.

Applying Ordinary Least Squares (OLS) to such a model presumes that the probability of investment is linearly related to the explanatory variables, and may result in nonnormality of the error term, heteroscedasticity, and estimated probabilities lying outside the zero-one range (Gujarati, 1988:499).

Results of the logit analysis are presented in Table 3. The variables AGE and TIME were excluded because their estimated coefficients had *t*-values less than unity. ED has a negative coefficient suggesting some collinearity with RES. Otherwise the signs of the estimated coefficients are all consistent with *a priori* expectations. The model 'fits' the data reasonably well as evidenced by a significant R^2 statistic and high rates of correct classification within each group.

The results show that exclusive and secure ownership (TITLE) and farm size (GFI) are significant determinants of on-farm investment in the study area. The probability of investment is also higher amongst resident farmers and those with larger non-farm incomes, although the variables RES and LQD are not statistically significant at the five per cent level of probability. The significance of RES may be understated as ED appears to have captured the effects of off-farm employment.

5. Conclusions

Economic theory suggests a positive relationship between exclusive and secure land rights and investment in fixed improvements. This outcome reflects causal relationships between property rights to land, land transfers, efficiency of land use, access to credit, and the incentive to conserve and improve land.

A land market promotes efficient land use by creating an opportunity cost that penalises farmers who do not maximise rent. If transaction costs are high land does not transfer to the best managers. Exclusive and secure property rights help to reduce transaction costs. In this study, private lease arrangements were confined to respondents that had exclusive land rights.

In the absence of an efficient land market, lenders will not accept land as collateral for loans. This inhibits farmers' access to credit, reducing their ability to invest. In this study, the use of land as collateral was confined to respondents that had exclusive and secure land rights.

Exclusive and secure land rights also encourage on-farm investment by enhancing the incentive to invest. Secure property rights remove uncertainty about future returns and positively influence a farmer's decision to invest in improvements that maintain or enhance the productive capacity of land. Exclusive property rights ensure that the benefits of such improvements accrue to the investor and not to free-riders. The incentive to invest is strengthened when the land market is efficient as owners can capture the expected benefits of improvements at any time by selling or leasing. A land market also encourages owners who have a high rate of time preference to conserve their land, raising its value as collateral against which immediate income can be borrowed. In this study the conditional probability of investment in fixed improvements was highest amongst respondents that had secure and exclusive property rights to land. Theft, which creates uncertainty about returns, was considered a major deterrent to investment, particular in fencing.

Land titling is widely regarded as a means of securing private property rights. Although title-deeds exist in Madadeni, land 'owners' are seldom exposed to the opportunities, incentives and penalties imposed by a land market because few have secure or exclusive rights to land. One reason for this is that many farms have multiple owners. Another is that title-deeds were not transferred to heirs. The latter problem might be resolved by simplifying the legal process and reducing the cost of transferring title-deeds.

Where no land market exists, a rental market would have efficiency as well as equity benefits because land would transfer to better farmers, and lessors would gain rental income without losing their property. Rental contracts would have to be enforceable, and land rights exclusive and secure, otherwise high transaction costs (which include risk) will prevent leasing.

The transfer of land to residential uses where returns are higher and more certain has eroded the agricultural potential of many freehold farms in Madadeni. Although zoning implies an imperfect land market, it could have positive implications for future generations. Land zoning should not be confused with restrictions that govern the minimum size of farms. The latter imperfection constrains land transfers between farmers.

Notes

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