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Land Tenure Center
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Madison, Wisconsin 53706

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**TENURE SECURITY, CREDIT USE, AND FARM INVESTMENT
IN THE RUJUMBURA
PILOT LAND REGISTRATION SCHEME,
RUKUNGIRI DISTRICT, UGANDA**

by

Michael Roth, Jeff Cochrane, and W. Kisamba-Mugerwa*

* Michael Roth is associate research scientist with the Land Tenure Center and the Department of Agricultural Economics, University of Wisconsin-Madison, USA; Jeff Cochrane is graduate research assistant with the Land Tenure Center; and W. Kisamba-Mugerwa is senior research fellow with the Makerere Institute of Social Research, Makerere University, Uganda.

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TABLE OF CONTENTS

	<u>Page</u>
Introduction	1
Kigezi District	2
Land tenure in Kigezi District	2
Precolonial era	2
Colonial era	4
Rujumbura pilot land registration scheme	5
Independent Uganda	8
Research Design	9
Socioeconomic Profile	14
Parish comparisons	14
Comparisons among registration strata	17
Tenure Security, Land Disputes, and Credit Access	19
Subdivision and Fragmentation	24
Registration and Agricultural Investment	26
Short-term investments	26
Intermediate to long-term investments	26
Theoretical logit investment model	27
Investment demand equations	28
Effect of household-level attributes	31
Effect of parcel-level attributes	32
Effect of registration	34
Land Rights and Agricultural Investment	35
Implications	38
Annex A: Investment Demand Model, Variable Descriptions	41
Bibliography	45

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INTRODUCTION

Based on proposals of the East Africa Royal Commission (1955), the colonial protectorate government of Uganda implemented a pilot land registration scheme in Kigezi District in 1958.¹ The commission, citing the failure of the indigenous tenure system to foster accelerated economic development, proposed a nationwide program of individualized land tenure based on adjudication and registration. According to colonial authorities, two fundamental problems were inherent in the indigenous system: subdivision and fragmentation resulting from succession; and diffuse separation of land rights among individuals, communities, and clans which created tenure insecurity for the landholder and provided neither individuals nor groups with sufficient incentives to develop the land. Twenty-nine years later, the pilot scheme was revisited to study the impacts of land registration on tenure security, credit use, and agricultural investment. Data were collected in 1987 from a sample of households in Uganda's first registered parish and a neighboring control parish. Logit regression analysis is used to test the relationship between registration and farm investment. The analysis indicates that supply-side benefits of title on farm investment through enhanced credit use are negligible. However, the positive relationship found between certain investments and land registration provides some evidence of demand-side effects through enhanced tenure security.

1. What was originally Kigezi District in 1958 has been subdivided into three districts, namely, Kabale, Rukungiri, and Kisoro.

KIGEZI DISTRICT

The former Kigezi District was situated in the extreme southwest corner of Uganda, bordered by Zaire to the west, Rwanda to the south, and Ankole District to the east and north. Stretching to the shores of Lake Edwards, the entire district covered 2,039 square miles. Its headquarters was located at Kabale, some 430 kilometers by road from Kampala. Three-quarters of the district is covered by rugged escarpments and steep-sided mountains which rise over 8,000 feet and deep, precipitous gorges and valleys which sometimes descend below 5,000 feet. This mountainous terrain changes to undulating landscape on the eastern boundary with Ankole District. Rainfall averages about 40 inches per year and seldom exceeds 1 inch in 24 hours. Population density is high. At the time of the pilot registration program in 1958, the district averaged 260 persons per square mile, but reached as high as 800 in the southern-most counties (Obol-Ochola 1971; Lawrance 1960). Moderately sloping hillsides and valley floors provide rich and cultivable soils, but the more rugged hillsides contain rocky soils which are easily eroded. Competition for land is keen. As early as 1970, population pressure had begun to push cultivation onto these marginal hillsides, with a marked increase in soil erosion (Obol-Ochola 1971).

LAND TENURE IN KIGEZI DISTRICT

PRECOLONIAL ERA

Three main tribal groups lived in Kigezi District: the Bantu Bakiga; the Bantu Banyarunda, mainly in the southwest; and the Bahima pastoralists, mainly in the east. The Bakiga originally emigrated from Rwanda. Strongly independent and led by powerful and ruthless leaders, the Bakiga clans eventually drove the Bahima, the then-native inhabitants, eastward to Ankole District. Each Bakiga clan occupied demarcated territories with land reserved for clan members only. Strangers encroaching on clan territories were killed or beaten. Interclan wars, skirmishes, and fights over land were common prior to the advent of colonial rule (Obol-Ochola 1971).

Rights to land in Bakiga society were divided among individuals, communities, and clans. Clan members held individual rights to land, subject to the oversight of family or clan. These rights included using the land, renting, and leasing land; pledging crops on land but not the land itself; selling land subject to family consent;² disposing of land through

2. The origin of land sale in Kigezi District is obscure. Although land sales are now well established, Obol-Ochola (1971, p. 233) states that cash sales were not an established Bakiga custom: according to Bakiga elders, "sale of land was first introduced . . . by the Baganda chiefs who ruled the District during the first two decades of the Protectorate. These chiefs sold land whenever parcels

inheritance; prohibiting grazing on land near the homestead or fields; and fencing areas around the homestead and fields (Gayer 1957; Makubuya 1981). The community had free access to communal grazing land, salt licks, watering holes, springs, and other resources considered common property. The clan or family had the right to settle land disputes within its jurisdiction, exercise the option to buy any land offered for sale by its members, prohibit the sale of clan land to "undesirable" buyers, and declare void any land transaction which it had not approved.

The extent to which the land tenure system of the precolonial Bakiga was in fact individualistic remains a debated issue. Edel (1969) contends that land rights were quite strongly weighted toward individual control. Obol-Ochola (1971) agrees that the Bakiga were quite independent and individually minded as a people, yet observes that in many respects the land tenure system was communal. These differences aside, the modern-day land tenure system in Kigezi is quite individualistic. Land can be freely sold, mortgaged, leased, or pledged without the permission of clan elders. In cases where land transfer involves alienation, the consent of social groups is sometimes sought to maintain good social relations, but mandatory consent has ceased to be a precondition. Obol-Ochola (1971) attributes this present-day propensity toward individual land rights to four factors: shortage of arable land; absence of cash crops forcing landholders to realize cash from sale of land; the individualistic nature of the Bakiga; and the need for greater assertion of individual rights stemming from acute land shortage, widespread boundary encroachments, and land disputes.

Prior to the pilot land registration scheme, the incidence of disputes and boundary encroachments had reached major proportions.³ Obol-Ochola (1971, p. 278), based on his discussions with Bakiga elders, states: "Most of the former and present chiefs . . . stressed . . . there were many cases of unscrupulous cheating and encroachments on boundaries. [According to the chiefs,] '[w]e all know our boundaries, but people with small plots of land try to . . . extend their holdings by cheating and fraudulently altering the boundaries. These practices lead to quarrels and litigations.'"

. . . within their jurisdictions were vacant. . . . [T]hey also sold all the land they acquired . . . when they returned to Baganda. The indigenous Bakiga chiefs emulated the Ganda chiefs and adopted the practice of selling land" Another view is that Bakiga chiefs started the practice about 1930 when they began receiving cash salaries and using the cash to invest in land. A third view is that sale of land was practiced long before the advent of the Europeans. The emergence of the money economy simply converted the barter system of exchanging a goat or cow for use of land to a cash system.

3. According to Obol-Ochola (1971, p. 279), "land disputes had advanced to such a serious stage that . . . in 1962 . . . [200 of] 224 Civil Appeals to the [Kigezi] District African Court . . . [involved] . . . land disputes." In the process of adjudicating claims in the Ru'umbura pilot land registration scheme, one in three parcels (of the 3,200 parcels initially adjudicated) involved some form of land dispute (Lawrance 1960).

COLONIAL ERA

The colonial government in Uganda was built on the official philosophy of protectorate and indirect rule rather than as a colony or territory. Its policies toward the indigenous tenure system, however, were far from indirect. While officials stressed the need to confirm individual customary rights of ownership over land, such policies as the introduction of freehold tenure (in Ankole and Toro), *mailo* tenure (in Buganda), and leasehold estates (on crown land) implicitly sought a radical transformation of the customary tenure system (Beattie 1971; Mugerwa 1973; Perlman 1962; Richards 1963; Richards et al. 1973; West 1964, 1972).

Agreements at the beginning of the century between the British government and rulers of the kingdoms of Buganda, Ankole, and Toro established grants of individualized registered title on 10,000 square miles of Uganda.⁴ The remaining 70,000 square miles in the protectorate were vested in the crown, but Africans had the right under the Crown Land Ordinance to occupy crown land without lease or license (Lawrance 1960). Nevertheless, there persisted the belief that vesting ownership in the crown enabled the government to alienate land to foreigners. Even before the East Africa Royal Commission in 1955, the Uganda government had considered granting legal title to Africans in hope of dispelling or lessening this distrust (Lawrance 1960).

General concern over the status of African societies throughout East Africa and over how to accelerate agricultural development led to the appointment of the East Africa Royal Commission in 1953. Its report, issued in 1955, recommended wide-ranging economic and social changes for Kenya, Tanganyika, and Uganda. Among its provisions, the report proposed that: land tenure policy should seek individualization of landownership; land transactions should be facilitated to enable easier land access for economic use; customary land rights should be ascertained and accommodated before exclusive individual rights are sanctioned; registration should not promote subdivision and fragmentation; and land tenure reform should be pursued only with local support. The Uganda government in its Land Tenure Proposals of 1955 officially accepted the commission's recommendations, in particular, that land tenure thenceforth be based on individualized freehold tenure.

Colonial authorities in Uganda felt that the indigenous tenure system was prone to tenure insecurity. The division of land rights among individual, family, and clan was not easily discernible in practice. Clan and community lacked the means and initiative to invest in the land, while those individuals with initiative and means lacked incentives to make

4. Article 15 of the Uganda Agreement of 1900 created a form of freehold tenure for political notables (West 1972). Land was allocated in square-mile blocks (termed *mailo*). A small amount (573 square miles) was given to the Kabaka (king) and high officials (official *mailo*), 8,430 square miles were given to other political officials (private *mailo*), and less than 300 square miles were allocated to churches, the central government, and non-Africans. Over 4,000 individuals received private *mailo* (Barrows and Kisamba-Mugerwa 1989).

improvements because of inadequate tenure security. Customary inheritance laws that resulted in the father's land being bequeathed to each living son led to fragmented holdings and subdivisions that were not financially viable (Lawrance 1960).

RUJUMBURA PILOT LAND REGISTRATION SCHEME

Rujumbura was the first county in Kigezi District to be targeted for registration under the 1955 Land Tenure Proposals, pursuant to the Crown Lands (Adjudication) Rules of 1958. Nyakaina was the first parish selected for adjudication and registration in the county in what later became known as the Rujumbura Pilot Land Registration Scheme.⁵ Besides the intent of registering the land rights of Africans, the pilot scheme sought to provide information on the techniques of adjudication, survey, and registration, and on the cost and time of converting native customary rights to freehold title (Lawrance 1960).

The choice of Nyakaina Parish within Rujumbura County was based partly on demand for registration, partly on the wish to avoid unduly difficult terrain for surveying purposes, and partly to avoid fragmented or severely subdivided areas. The government wanted the registration exercise to be based on conditions of demand and need. Demand was apparently met by the high number of applications made to the district lands office and by the perception that land registration would meet with general acceptance by rural landholders. Need, according to colonial authorities, meant situations of high population density, land scarcity, presence of valuable crops, individualization (indicated by widespread sales), or disintegrating customary tenures (evidenced by widespread disputes and litigation). All these factors, according to Lawrance (1960), were present in Kigezi District.

The pilot scheme covers about 70 square miles in the northeast part of the district. At the time of its inception, southern portions were undulating open grasslands used almost entirely for grazing cattle; further north, the Bahororo (of the Bahima tribe) cultivated subsistence crops (grain and bananas) over most of the area and kept some cattle (Lawrance 1960).

Reaching an agreement to proceed with registration proved to be far more difficult than had been originally envisioned. When the proposals were submitted to the Kigezi District Council in 1956, as many people were opposed to registration as were for it. The

5. Nyakaina Parish is now located in Buyanja subcounty in Rubabo County in Rukungiri District. The pilot scheme was originally introduced into Kigezi District which was, in 1974, divided into Kabale District (formerly South Kigezi) and Rukungiri District (formerly North Kigezi). Most of what is now Rukungiri District was originally known as Rujumbura County. The present-day Rukungiri District is divided into three counties: Rujumbura, Kinkinzi, and Rubabo. Hence the present-day Rujumbura County encompasses only a small part of the original Rujumbura County. Nyakaina Parish, while originally falling under the former Rujumbura County, now falls under Rubabo County in Rukungiri District.

Minister of Lands mounted a districtwide campaign to promote the proposals. Also, the District Secretary General, the Kigezi Legislative Council, and other local government officials undertook an aggressive lobbying effort. Some chiefs who opposed the proposals were sacked for being reactionary and unprogressive. Only after the secretary general and other dignitaries took the lead in registering their own land did the district council pass a resolution favoring grants of title to those who wanted them.

Resistance to land registration, according to Obol-Ochola (1971), stemmed from a number of factors. First, since people elsewhere in Uganda were opposing the proposals, dissenters felt that it would be presumptuous to support them in Kigezi. Second, there were strong suspicions that the protectorate government intended to expropriate land to the Europeans, an argument that was enhanced by the similarities between the "White Highlands" of Kenya and the climate of Kigezi District. Third, people felt that registration would be preceded by consolidation which, as Haugerud (1983) observed in the Kenya highlands, tends to undermine the need of the subsistence economy for ecological diversity. Fourth, some felt that land registration represented a clever strategy to levy more taxes on peasants. Fifth, there were accusations of deceit that most of the chiefs had registered public and communal lands, not the land that they had inherited from their fathers.

What finally convinced the Kigezi District Council to vote in favor of the proposals? Obol-Ochola (1971) again offers five reasons: (1) the demonstration by the secretary general, six county chiefs, and members of the legislative council of registering their land invoked a spirit of individual conscience that ultimately led to the disintegration of the united front presented by the district council; (2) local government officials were persuaded or became convinced that land would cease to be property of the crown and would become private freehold property; (3) land would become commercial property that could be mortgaged to increase borrowing from financial institutions; (4) boundary encroachments and land disputes would be reduced (the most important factor in the eyes of the chiefs); and (5) many landholders had acquired their land through the resettlement program.⁶ These settlers wanted secure title and the boundaries of their land surveyed because of concerns of possible latent aboriginal claims to the land and fears that the government would yet bring more settlers into the area, causing yet higher population pressures and more boundary encroachments.

Provisions for protection of customary land rights were set out in the 1955 Land Tenure Proposals, later revised in the Public Lands Act of 1965 and 1969. Under these

6. Resettlement policies, aimed at moving people from densely populated pockets to relatively underpopulated areas, had been implemented by the Resettlement Allocation Authority in Kigezi since 1945. Under the indigenous system in Kigezi, upon marriage each son gets a piece of land from his father. The subdivision associated with each generation along with population pressures had resulted in overcropping, soil exhaustion, and landlessness. The Department of Agriculture in 1944 investigated areas for resettlement of the surplus population from South Kigezi. Less populated areas of North Kigezi and West Ankole were targeted to receive the first groups of settlers. About 31,000 people were eventually settled in North Kigezi (Agricultural Task Force 1987).

provisions, a person could legally occupy in customary tenure any rural land not alienated in leasehold or freehold. The controlling authority was restricted from granting a freehold/leasehold on any land occupied by customary tenure without consent of the customary holder. Any application for a freehold or leasehold occupied by customary tenure had to state that the land was so occupied and to furnish evidence that the customary tenant(s) had consented to their land being alienated. Even when the customary tenant(s) consented to the grant, compensation as approved by the minister had to be paid.

The Crown Lands Rules established the procedures for registering land, for designating an adjudication district, and for appointing land adjudication committees. An adjudication committee was to consist of 10-20 taxpayers chosen by all adult members of a parish, with the parish chief as chairperson. Once the rules were applied to an adjudication district, any occupier of land under customary tenure became eligible to apply for registered freehold. Each application required completing two forms plus a deposit of 110 Uganda shillings (US\$110, then about US\$18) for open land or US\$137 (US\$23) for bushy land. The completed application then had to be returned to the district land office. Once the district commissioner became satisfied that there were enough applications to warrant a survey, s/he would declare the parish an adjudication area.

An adjudication committee could be formed only after an adjudication area was declared. The district commissioner as chairperson of the district land committee would issue a public notice naming the applicants and indicating that their applications would be considered in 30 days following the date of notice. After 30 days, the adjudication committee would review the application in public and hear any objections. If it was decided that the applicant was the rightful owner, the committee would visit the parcel with a surveyor who would mark the boundaries with concrete markers. The adjudication committee would then report its conclusions and recommendations to the district land committee for validation. Any decisions of the adjudication committee were appealable to a magistrate grade II within 30 days. In the absence of any appeals, the surveyor would return to the parcel and carry out a survey according to plan. All survey plans had to be submitted to the land office in Entebbe for approval. A final notice was then issued declaring the applicant the owner by native custom and registering the property as freehold. A title certificate could be acquired upon payment of the assurance of title fee (US\$10).

By the time the Rujumbura scheme was completed in March 1962, 6,000 plots had been adjudicated, and about 6,400 had been demarcated and surveyed (Obol-Ochola 1971). Parcel size averaged 4.9 acres (based on the first 800 properties surveyed), and 9 markstones were required on average per parcel.⁷ The average number of parcels per proprietor was

7. Lawrance (1960) cites one case, however, where a particularly irregular parcel required at least 46 markstones.

1.6.⁸ The cost of demarcation and survey, inclusive of aerial photography, plotting, field survey, computation, and drawing and printing of cadastral plans, averaged US\$32 per acre (Lawrance 1960). By 1968, only 1,800 out of the 6,400 titles available for issue to the public had been paid for and taken by proprietors. According to the district commissioner (Obol-Ochola 1971, p. 308), "Titles were not obtained from the District Land Office . . . [because]: of lack of knowledge on the advantages of possessing title; . . . Kabale was too far away from Rujumbura for many proprietors to . . . collect their titles; . . . the majority of the unsold titles . . . belonged to the small and poorer land owners; and . . . most of the plots were too small and devoid of mortgage value . . . [to warrant] . . . purchase of title."

The adjudication committees were suspended in Kigezi in 1968, though according to records at the Rukungiri District Lands Office, follow-up survey and issuance of freehold titles continued until the 1975 Land Reform Decree. Although registration was intended to be voluntary and sporadic, nearly all parcels in Nyakaina Parish were adjudicated and registered, resulting effectively in comprehensive and systematic registration.

INDEPENDENT UGANDA

Fundamental legal changes in Uganda's land tenure system were invoked by the Land Reform Decree of 1975. Under this decree, all land in Uganda is declared to be public land to be administered by the Uganda Lands Commission in accordance with the provisions of the Public Lands Act of 1969 (§1.1). No person may occupy public land by customary tenure except with written permission of the prescribed authority (§5.1). All freeholds, including *mailo* ownership that existed before commencement of the decree, are converted to long-term leaseholds (§2.1) of 99 years for public bodies and religious organizations and 99 years for individuals (§2.3). Written consent of the commission is necessary before the lessee can transfer the whole of the lease for value (§10). Any transfer of public land except under these conditions is an offense by law (§4.2).

However, the de facto impact of the 1975 Land Reform Decree in Kigezi has been minimal. Although the decree converted all freehold land to long-term leasehold, freeholders in Kigezi are generally unaware of its provisions or of the change in registration status. Transactions of previously registered concessions continue to be registered as previously, using the same procedures and forms. Only those seeking first registrations (as leaseholds) of previously unregistered land are made aware of the change.

8. Lawrance (1960) indicates that 461 owners had been registered with respect to 733 properties. Much of this fragmentation was due to bananas, a staple food, being grown on one large plantation in which individuals own separate plots.

RESEARCH DESIGN

The Land Tenure Center and the Makerere Institute of Social Research conducted a survey of landholders in the vicinity of Uganda's first registered parish, Nyakaina, in 1987. The research set out to test a number of hypotheses that are often asserted to be veritable outcomes of individualization—specifically, that registration will: (1) increase credit use through greater incentives for investment (demand-side effects originating from borrowers) and through improved creditworthiness and higher collateral value of land (supply-side effects originating from lenders); (2) reduce land disputes through clearer definition and enforcement of rights; (3) increase land transactions, facilitating the movement of land from less efficient uses and users by increasing the certainty of contracts and lowering enforcement costs; and (4) increase agricultural output by enhancing credit use and increasing incentives to undertake land-improving investments.

The research had originally intended to compare a sample of registered households in Nyakaina Parish with a second sample from an adjacent control parish, Kyamakanda. It had been assumed that the control parish was similar in all respects except that landholdings would not be registered. However, upon suspension of the adjudication committees in 1968, sporadic registration continued in surrounding parishes until 1975 when the Land Reform Decree abolished freehold title. Every parish adjacent to Nyakaina had some parcels surveyed and registered.

The notion of simply comparing agricultural performance under freehold tenure via registration with that of land under the indigenous tenure system also proved to be naive. The tenure matrix in practice was far more complex and empirically intractable than had originally been believed. Prior to 1968, registration in Nyakaina Parish was freehold and, while in theory based on voluntary choice, was in practice somewhat compulsory and nearly comprehensive. Between 1969 and 1975, land registration in Nyakaina and Kyamakanda involved freehold tenure based on voluntary and sporadic registration. Following the 1975 Land Reform Decree, existing freeholds continued to be renewed in practice, but registrations of previously unregistered land were granted only as leaseholds and on the basis of voluntary and sporadic registration.⁹

Sporadic registration requires a voluntary and purposeful (endogenous) decision whether or not to register land and which parcel(s) to register. Under systematic and compulsory registration, the decision to register is exogenously imposed upon the household. Presence of registration based on purposeful choice raises the concern of possible self-selection biases that lead to spurious conclusions about titling impacts (i.e., differences in output and investment between registered and nonregistered households are incorrectly attributed to registration when they are, in fact, due to systematic differences in household

9. Out of 206 parcels reported as being registered in the study, only 6 are leaseholds; the rest are freeholds.

and parcel quality characteristics). As long as parcel and household characteristics are randomly distributed between parishes and among tenure strata, analysis of mean differences in input use and performance indicators (investments, productivity) would represent a reasonable first approach for hypothesis testing. Conversely, if household and parcel characteristics are strongly correlated with registration status, the analysis of performance indicators would require econometric procedures that control for their influence.¹⁰

The research design targeted three strata of households: (A) Nyakaina registered landholders (n=100 households); (B) Kyamakanda registered landholders (n=40); and (C) Kyamakanda nonregistered landholders (n=100). Strata (A) and (C) correspond to the original research design of comparing exogenously registered households in Nyakaina with nonregistered households in Kyamakanda, except that household and parcel characteristics of the nonregistered sample have been biased by the exodus of households registering parcels under purposeful registration (strata B).¹¹ Since the exogenously registered stratum (A) contains both households that would have purposefully registered land had they been given the choice of doing so and households that would have not, attributes of the sample would tend to fall somewhere between strata (B) and (C), *ceteris paribus*.

As indicated in table 1, the final research design is complicated by the distinction between endogenous and exogenous choice in registration status and the presence of "mixed" households with both registered and unregistered land. After eliminating cases with missing or unreliable data, the sample was reduced to 29 households with all parcels exogenously registered entirely from Nyakaina, 38 households with all parcels endogenously registered split between Nyakaina and Kyamakanda, 52 households with some parcels endogenously registered and others not, and 109 households with all parcels unregistered mostly from Kyamakanda.

These 228 households controlled 505 parcels in total (table 2). Of the 229 parcels in Nyakaina Parish, 94 had been adjudicated in the name of the current holder under the pilot scheme, 60 had once been adjudicated, then transferred, but purposefully renewed by the current holder, and 75 had once been adjudicated, then transferred, but not renewed by the

10. Registration status is highly correlated with certain household characteristics. Parcel registration based on systematic enrollment is positively correlated with the length of time the parcel has been held ($\rho = .376$), age of household head ($\rho = .298$), farm size ($\rho = .148$), number of parcels held ($\rho = .147$), and household head not born in the area ($\rho = .120$), all significant to at least the .01 level. Parcel registration based on purposeful choice is positively correlated with possession of farm equipment other than hand tools ($\rho = .198$), parcel size ($\rho = .197$), possession of durable assets ($\rho = .196$), and farm size ($\rho = .150$), and negatively related with length of parcel ownership ($\rho = -.134$).

11. The importance of this problem depends on the scale of registration in Kyamakanda. Although precise figures are not available, the scale appears sufficient to warrant concern.

TABLE 1
Final household classification in the research design^a

	HOUSEHOLDS WITH ALL PARCELS REG- ISTERED	HOUSEHOLDS WITH SOME PARCELS REGISTERED	HOUSEHOLDS WITH NO PARCELS REGISTERED	TOTAL
Registration imposed	A ^b (29)	B (0)	C (0)	29
Purposeful choice	D (38)	E (52)	F (109)	199
TOTAL	67	52	109	228

- a. A = Households in Nyakaina, which were adjudicated under the Pilot Land Registration scheme, having only parcels acquired before 1969.
 B = No households were prevented from registering at least one parcel.
 C = No households were prevented from registering all their parcels.
 D = Households in Nyakaina parish only with parcels acquired between 1969 and 1987, and households in Kyamakanda parish with parcels acquired prior to 1987, all registered.
 E = Households in Nyakaina parish with parcels acquired between 1969 and 1987, and households in Kyamakanda parish with parcels acquired prior to 1987, some registered, some not.
 F = Households in Nyakaina parish only with parcels acquired between 1969 and 1987, and households in Kyamakanda parish with parcels acquired prior to 1987, none registered.
- b. Figures in parentheses are respective household sample sizes.

TABLE 2
Final parcel classification in the research design

	NYAKAINA	KYAMAKANDA	TOTAL
Compulsorily registered	94	0	94
Purposefully registered	60	52	112
Unregistered	75	224	299
TOTAL	229	276	505

current holder.¹² Of the 276 parcels in Kyamakanda, 52 had been purposefully registered and 224 had not been registered.

The population of Nyakaina and Kyamakanda parishes was derived from a list of registered holders obtained from the district land office and lists of tax payers obtained from parish and subparish chiefs. Crosschecking tax and registration records proved useful since land records in the district office were often out of date with many unrecorded transactions. With the assistance of the chiefs and residents, those tax payers who had no landholdings in the area were eliminated from the list (mainly young men still living with parents), and other landholders who paid no taxes (mainly the elderly and widows) were added. Landholders were then stratified by parish and registration status, and households were randomly selected from each of the three substrata.

A research team visited the research site in June 1987 to conduct a preliminary rapid appraisal. Discussions were held with local officials (district administrator, district executive secretary, district agricultural officer, veterinary officer, and parish and subparish chiefs) and other key informants (farmers, elders, teachers, and local government officials). An intensive appraisal was also undertaken to develop a socioeconomic profile of the research area. A draft questionnaire, prepared prior to the visit, was pretested at that time.

Enumerators were chosen and trained on a second visit to the area in June 1987. Sixteen enumerators were selected from over 40 applicants. All those selected held school certificates or had at least 12 years of formal education; all were fluent in English and Runyankole/Rukiga. Efforts were made to see that each enumerator worked in his or her home parish. The questionnaire, revised after the first visit, was again pretested during a training program developed for the enumerators. The training took 3 days and consisted of talks by key local officials and reviewing the questionnaire. After describing the objectives and background of the study in detail, the principal researchers went through the questionnaire, explaining each question's purpose and the amount and quality of data expected. The enumerator who performed best during training was chosen as field coordinator.

Questionnaires were drafted in English and administered in a single-round interview. The enumerators' fluency in both English and the local dialect enabled simultaneous translation in the field. The questionnaire was addressed to the head of household. Aside from household-level information (demographics, employment), land tenure questions were dealt with only at parcel and field levels, not at the level of land rights of household members to plots within the parcel. Data on size of parcels/fields and income were based on respondent recall or estimation rather than direct measurement. Data collection lasted about one month spread between August and September 1987. Questionnaires were checked for accuracy and completeness each evening after they were completed. A second follow-up interview was conducted in situations where information was incomplete or inconsistent. For

12. Since the registration program in Nyakaina was not strictly compulsory, it is possible that some of these 75 parcels might never have been adjudicated.

for further information on the questionnaire, enumerator's manual, and research design, refer to Kisamba-Mugerwa et al. (1989).

SOCIOECONOMIC PROFILE

Selected data on household and parcel characteristics are presented in tables 3 and 4 for five strata of households: (I) Nyakaina Parish; (II) Kyamakanda Parish; (III) households possessing only parcels that were exogenously registered under the pilot registration program in Nyakaina; (IV) households that have purposefully registered at least one parcel (other parcels held may be exogenously registered or nonregistered), regardless of parish; and (V) households without any registered parcels, regardless of parish. Parish comparisons (I and II) permit a preliminary assessment of whether structural differences between the two sites may be biasing registration impacts. Data by registration status (III, IV, and V) help assess whether systematic differences in household and parcel characteristics are resulting in the self-selection of households into the various tenure categories. Presence of self-selection biases would indicate a nonrandom experimental design and thus the inappropriateness of simple bivariate analysis in evaluating the impact of registration.

PARISH COMPARISONS

With regard to parishes, households in Nyakaina (I) tend to have larger family size (7.6 versus 6.2 persons), a greater percentage of active workers listing their main occupation as farming (37% versus 30%), fewer household heads born in the area (63% versus 83%), and more years spent in farming by household heads (32.2 versus 27.0 years). Households in Kyamakanda (II) tend to have more family members with secondary (8.7% versus 5.5%) and higher (2.7% versus 1.5%) education, greater orientation of active workers toward nonfarm employment (laborers/porters, housework, trader/shopkeepers, teaching, artisanship, and other) (15% versus 7%), higher average monthly cash incomes (US\$169.1 versus US\$86.1) and cash remittances (US\$37.2 versus US\$14.2), and a greater number of barns (.66 versus .36) and livestock (2.38 versus 1.64). Residents in Kyamakanda thus appear to be more prosperous, slightly better educated, more dependent on livestock, and more reliant on nonfarm sources of income. Overall, 96 to 98 percent of the household heads interviewed were male.

Differences in farm and parcel characteristics between the two parishes are negligible. Mean number of parcels per household (2.3 in Nyakaina versus 2.1 in Kyamakanda) and mean parcel size (4.1 versus 3.5 acres) are quite similar. Nyakaina tends to be a bit more flat (23% versus 21% of parcels); Kyamakanda tends to be more hilly (61% versus 53% of parcels). Some differences are apparent in mode of land acquisition. Land purchase has been more important in Nyakaina than in Kyamakanda (59% versus 39%), while inheritance/transfer has been more important in Kyamakanda (56% versus 37%). A large amount of land in Kyamakanda is still under fallow (16.2% versus 6.1%); otherwise, cropping patterns are not very different.

TABLE 3
Household socioeconomic profile, Uganda land registration study

	NYAKAINA (I)	KYAMAKANDA (II)	HOUSEHOLDS WITH ALL PAR- CELS EXG. REGISTERED (III)	HOUSEHOLDS WITH SOME PARCELS END. REGISTERED (IV)	HOUSEHOLDS WITH NO PARCELS REGISTERED (V)
Mean family size (persons)	7.6	6.2	6.9	7.6	6.3
Mean family age (years)	24.6	28.0	29.4	26.5	25.4
Family education (% with):					
Primary education	56.5	53.6	58.3	56.7	53.4
Secondary education	5.5	8.7	5.8	11.8	5.4
Technical or univer- sity education	1.5	2.7	1.6	4.0	1.0
Main occupation (%):					
Farming	37	30	41	27	33
Student	28	32	25	30	31
Laborer/porter	2	4	1	4	4
Housework	1	3	1	3	2
Trader/shopkeeper	1	2	1	2	2
Teaching	0	2	1	1	1
Artisan	2	0	1	1	0
Other	1	4	2	4	2
Young and unemployed	27	23	27	28	25
Family monthly cash income (1st+2nd sources, USh)	86.1	169.1	71.9	160.9	128.7
Cash remittances (USh)	14.2	37.2	1.5	27.1	38.9
Assets (mean #/household):					
Barns	.36	.66	.31	.63	.52
Bicycles	.14	.16	.03	.30	.12
Hand sprayers	.04	.07	.00	.14	.02
Livestock housing	.14	.15	.03	.27	.09
Livestock units	1.64	2.38	1.94	3.32	1.18
Radios	.21	.22	.17	.39	.14
Store buildings	.69	.44	.52	.79	.36
Water sources	.44	.42	.38	.70	.27
Wheelbarrows	.03	.06	.00	.13	.02
Households with iron sheet roofs (%)	41.0	36.5	37.9	46.5	29.6
Households heads:					
Percent male	98	96	100	96	96
Percent born in area	63	83	62	67	85
Mean years of age	54	52	62	54	48
Mean years farming	32.2	27.0	40.0	30.4	24.3
Primary education (%)	48	51	48	50	55
Secondary education (%)	4	1	0	6	1
Technical or univer- sity education (%)	0	4	0	6	1

TABLE 4
Farm size, cropping patterns, and land quality characteristics,
Uganda land registration study^a

	HOUSEHOLDS				
	NYAKAINA (I)	KYAMAKANDA (II)	REGISTERED (III)	REGISTERED (IV)	REGISTERED (V)
Mean parcels/household	2.3	2.1	1.7	2.7	1.9
Maximum parcels/household	12.0	6.0	4.0	12.0	6.0
Mean parcel size (acres)	4.1	3.5	5.4	4.4	2.7
Mean farm size (acres)	9.5	7.1	9.1	11.7	5.0
Land quality (% parcels):					
Flat land	23	21	19	24	22
Hillside	53	61	69	53	64
Swamp	0	3	0	2	2
Other	24	15	12	21	12
Ownership time (years)	21.6	22.6	35.4	19.8	20.8
Mode of acquisition (% parcels acquired by):					
Adjudication ^a	2	2	6	2	1
Borrowing	1	1	0	0	0
Gift	0	0	0	0	0
Inheritance/transfer	37	56	44	37	63
Pledge	0	0	0	0	0
Purchase	59	39	50	60	33
Rent/lease	0	3	0	1	2
Cropping patterns (% field area):					
Banana	32.7	29.8	29.3	27.6	34.9
Beans	8.4	6.7	7.7	6.2	9.1
Coffee	6.1	6.1	11.1	4.1	7.1
Fallow	6.1	16.2	6.6	9.3	16.8
Maize	6.2	5.5	5.2	4.0	8.0
Millet	4.6	3.2	3.7	3.5	4.7
Pasture	9.9	7.9	3.0	9.3	6.1
Sweet potatoes	5.1	6.2	4.9	5.0	7.4
Other crops	20.9	18.4	28.5	31.0	5.9

a. Some parcels appear to have been acquired in the process of adjudication itself.

COMPARISONS AMONG REGISTRATION STRATA

Households with all parcels exogenously registered (III) tend to be older (29.4 years) compared with either purposefully registered households (26.5) or those without registered land (25.4), have a greater percentage of workers listing farming as their main employment (41% versus 27/33%), have a lower monthly cash income (US\$71.9 versus US\$160.9/128.7) and cash remittances (US\$1.5 versus US\$27.1/38.9), and are important coffee producers (11.1% versus 4.1/7.1% of arable land). Household heads are older (62 versus 54/48 years) and have more farming experience (40.0 versus 30.4/24.3 years). Mean parcel size is larger (5.4 versus 4.4/2.7 acres) and mean ownership time of parcels is longer (35.4 versus 19.8/20.8 years). This profile depicts a group of households that are near the end of their life cycle, are heavily dependent on farming, and have only limited dependence on nonfarm income and remittances. They also own fewer productive assets.

Households that have purposefully registered at least one parcel (IV) tend to have larger family size (7.6 persons versus 6.9 for exogenously registered households and 6.3 for unregistered households), are better educated (11.8% versus 5.8/5.4% secondary education, 4.0% versus 1.6/1.0% higher education), have fewer active workers engaged mainly in farming (27% versus 41/33%), have larger farm size (11.7 versus 9.1/5.0 acres), used purchase as the primary means of land acquisition (60% versus 50/33%), have higher cash incomes (US\$160.9 versus US\$71.9/128.7), have more livestock (3.3 versus 1.9/1.2), have greater number of consumer goods (.39 versus .17/.14 radios and .30 versus .03/.12 bicycles), and have a greater number of productive assets (.63 versus .31/.52 barns, .14 versus .00/.02 hand sprayers, .79 versus .52/.36 stores, .70 versus .38/.27 water sources). These households also tend to have higher dependence on livestock farming, indicated by number of livestock owned, units of livestock housing (.27 versus .03/.09), and access to pasture (9.3% versus 3.0/6.1% of arable land). This profile suggests a group of medium-aged households with larger-sized farms and greater involvement in livestock farming, whose members are wealthier, have greater access to nonfarm opportunities, are better educated, and are more progressive than their counterparts in the exogenously registered strata.

Compared with households in the exogenously registered/endogenously registered categories, households with only unregistered parcels (V) tend to be younger (25.4 versus 29.4/26.5 years for mean family age, and 48 versus 62/54 years for age of household head), have smaller farm sizes (5.0 versus 9.1/11.7 acres), have relied on inheritance as the primary mode of land acquisition (63% versus 44/37%), and have high dependence on nonfarm income (US\$128.7 versus US\$71.9/160.9) and cash remittances (US\$38.9 versus US\$1.5/27.1). A greater percentage of household heads were born in the area (85% versus 62/67%) and have spent fewer years in farming (24.3 versus 40.0/30.4 years). Despite the lowest land-per-resident ratio of any farm size category (means of 0.79 versus 1.32/1.54 acres per resident), they have the highest frequency of fallow (16.8 versus 6.6/9.3% of arable land), indicating an insufficient supply of farm labor. This profile characterizes households nearer to the beginning of their life cycle with smaller farms and substantially younger household heads, most of whom were born in the area and have inherited their land from their fathers.

These findings lend weak support for the view that Nyakaina has somewhat higher quality land (flat versus hilly), may have been settled earlier than Kyamakanda, provides a setting in which registration did accommodate if not facilitate land transfers to outsiders, and may be the home in part of parents whose sons and daughters are Kyamakanda residents.¹³ Further, these findings reveal that household and parcel characteristics are not randomly distributed among registered strata. Wealth and progressiveness, in particular, appear to be highly correlated with purposeful registration. Self-selection biases will be an important concern in evaluating registration impacts in the subsequent analysis.

13. Data are not sufficiently detailed to determine whether unregistered households are those headed by the sons of Nyakaina fathers who moved away because land was more plentiful, who were forced to seek land outside the scheme because of restrictions on subdivision, or whose fathers were older farmers in Kyamakanda, many of whom immigrated to the area.

TENURE SECURITY, LAND DISPUTES, AND CREDIT ACCESS

Despite a registration process that involves a very costly and cumbersome set of procedures for potential registrants and a legal system that is imperfect in scope and implementation, it will be seen shortly that the majority of landholders perceive important benefits to land registration. In discussions with holders of registered land, some respondents ascribed a certain status to title possession. Certificates of landownership are highly prized, carefully guarded, and hidden. Others mention a sense of freedom and independence associated with no longer having to consult chiefs in land transfers.

Further, registration confers a form of insurance against four mentioned vagaries associated with land rights under the indigenous system. First, growing population pressure and in-migration have sharply increased demand for land and heightened the uncertainty of those holding "unutilized" land under indigenous tenures. Under the indigenous system, an occupant "pays" a one-time tribute to the chief to legitimize his or her land use rights, but use must be confirmed to guarantee possession.¹⁴ Permanent buildings, tree crops, and/or graveyards are generally sufficient to ensure recognition of land use rights. Evictions from cultivated land are rare, though ownership claims to bushland have grown more precarious in recent years. Landholders strongly assert their claims to bushland as a reserve for fallow, grazing, and future inheritances. However, the recent economic boom in Uganda's southwest has brought an influx of outsiders with capital searching for land, and the chiefs have been exercising their felt right to allocate or sell "unutilized" land to outsiders and to entrepreneurs.

Second, the processes for allocating and distributing land rights under the indigenous system confer a greater sense of uncertainty than formal and legal processes. This uncertainty arises from different views on what constitutes "unutilized" land. Eviction within the indigenous system is a family or clan affair decided by the chief and elders. Use rights are reasonably secure as long as the holder is physically residing on the land and the parcel is cultivated and in continuous use. A parcel reverts to the chief or clan when it is left "unutilized" or when the holder emigrates from the area. In contrast, eviction from a registered parcel is very rare and can be decided only at a high level within government, in most cases the court of law. Even when a registered parcel is not cultivated, people will generally not attempt to use it without the consent of the registered owner.

Third, the land market is beginning to undermine the powers and authority of the chiefs. Individuals have begun selling land among themselves without formal approval. The very fact or perception that the chief's authority is being weakened in itself increases the

14. Based on recent developments, land purchased under the indigenous system appears to be conferring greater tenure security (though not to the extent of registered tenure) than land allocated through inheritance or other mechanisms of land allotment by the chief.

uncertainty of those landholders who have historically relied on that authority for securing access to land.

Fourth, land grabbing has increased, mainly from political elites enclosing land via one or more variants of the following process. Someone with political connections and money will visit a chief and negotiate the purchase of bushland. That person will then visit the lands office to apply for a lease. Surveyors from the lands office will demarcate the parcel, but, lacking a cadastre, often mark boundaries that incorporate land (cultivated and/or bush) that is currently claimed. The occupants are then given three months' notice to vacate. These dislocations are sometimes passive, in that the registrations unwittingly incorporate land that is claimed by another. In other instances, a purchase is negotiated for a small piece of bush- or swampland, but the person buying the land purposefully registers a block much larger in size (e.g., 100 acres).

It is difficult to assess accurately the level and scope of tenure insecurity in the area. The hyperbole that sometimes accompanies land grabbing and land disputes distorts the evaluation of real tenure-security effects. The assessment is further complicated by the fact that many people still behave as if the law does not pertain to them, thus clouding issues of legal compliance and effectiveness of legal enforcement. It is possible to say that tenure security under the indigenous system is weakening due to the following factors: (1) growing population pressure; (2) a booming economy that is increasing the demand of outsiders and entrepreneurs for land; (3) chiefs responding to this increased demand by selling the bushland of current landholders without their consent; (4) elites wittingly or unwittingly registering allocations through administrative channels, sometimes incorporating current land claims; (5) improper adjudication; and (6) a private land market that is beginning to undermine the chiefs' powers in land allocation. It is against this backdrop that landholders' perceptions of registration must be gauged.

Respondents, both with and without registered land, were asked whether registration increases security against disputes or evictions, increases security for credit, has other benefits, or provides no benefits whatsoever. The results (percent of household heads responding affirmatively) are reported in table 5. Nearly all respondents see some benefits to registration. Very few landholders were able to cite benefits beyond increased security against disputes and evictions and enhanced security of access to credit. Table 6 provides complementary information on incidence and causes of disputes. A number of salient points stand out from the data.

First, most registered households felt that registration enhances security against disputes (65.5% for all exogenously registered and 62.0% for endogenously registered households). Only a minority felt that registration increases security against eviction (31.0% and 33.8%). Eviction is a more stringent condition since the government can ultimately invoke its right of eminent domain. The possibility cannot be discounted that provisions in the 1975 Land Reform Decree which give government greater powers of custodianship and the shift from freehold to leasehold tenure may be undermining registration's perceived ability to prevent eviction.

TABLE 5
Perceptions of titling benefits, Uganda land registration study^a
 (percent of sample responding affirmatively)

	NYAKAINA (I)	KYAMAKANDA (II)	HOUSEHOLDS WITH ALL PAR- CELS EXG. REGISTERED (III)	HOUSEHOLDS WITH SOME PARCELS END. REGISTERED (IV)	HOUSEHOLDS WITH NO PARCELS REGISTERED (V)
Registration increases:					
Security against disputes	57.0	51.8	65.5	62.0	47.8
Security against eviction	30.0	36.5	31.0	33.8	32.2
Security for credit	29.0	62.8	31.0	43.7	59.1
Other benefits	3.0	2.9	3.4	1.4	2.6
No benefits	0	0.7	0	0	0.9
Reasons for not registering:					
Prefer indigenous system	15.0	10.9	27.6	11.3	11.3
Do not know procedures	29.0	30.7	44.8	22.5	34.8
Procedures too complicated	45.0	48.2	51.7	47.9	49.6
Procedures too costly	8.0	33.6	3.4	14.1	33.0
Do not wish to upset family and neighbors	24.0	15.3	31.0	22.5	16.5
Other	4.0	12.4	0	9.9	9.6

a. Column totals do not sum to 100 due to multiple responses.

TABLE 6
Land disputes, Uganda land registration study^a

	NYAKAINA (I)	KYAMAKANDA (II)	HOUSEHOLDS WITH ALL PAR- CELS EXG. REGISTERED (III)	HOUSEHOLDS WITH SOME PARCELS END. REGISTERED (IV)	HOUSEHOLDS WITH NO PARCELS REGISTERED (V)
# households	100	137	29	71	115
Total disputes reported by all households for last 5 years (#)	24 (24.0) ^a	54 (39.4)	8 (27.6)	19 (26.8)	46 (40.0)
Disputes over: (% of total) ^b					
Boundary	66.7	59.3	87.5	52.6	60.9
Ownership	20.8	18.5	0.0	21.1	19.6
Inheritance	8.3	9.3	0.0	21.1	6.5
Grazing rights	4.2	7.4	12.5	10.5	4.3
Common resources	4.2	1.9	0.0	0.0	2.2
Other	4.2	3.7	0.0	0.0	6.5

a. Figures in parentheses are total disputes as a percent of households.

b. Column totals exceed 100 because certain disputes have multiple causes.

Second, a smaller percentage of unregistered households perceive that registration enhances security against disputes (47.8% versus 65.5/62.0%). Perceptions toward security of eviction are nearly equal to those of the registered category (32.2% versus 31.0/33.8%). The lower percentage could indicate that land rights are already quite secure under indigenous tenures, but the fact that only 11.3 percent of nonregistered households prefer the indigenous system seems contradictory. Another hypothesis is that disputes are already low under the indigenous system. Data in table 6 would seem to refute this hypothesis; land disputes in the unregistered category are much higher (40.0% versus 27.6/26.8%) than in either of the registered categories. Finally, high disputes under the indigenous system, combined with lack of experience with registration, may be causing unregistered landholders to underestimate the effectiveness of registration in curbing disputes.

Third, land registration appears to have had an important effect on the frequency and nature of land disputes. Compared with the unregistered category, landholders in the exogenously/endogenously registered category experienced fewer disputes (27.6/26.8% versus 40.0%). Of the disputes occurred, boundary encroachments (87.5/52.6% versus 60.9%) and disagreements over grazing rights (12.5/10.5% versus 4.3%) predominated. No disputes were reported by exogenously registered households with regard to the most serious infractions—ownership (0.0% versus 21.1/19.6%) or inheritance (0.0% versus 21.1/6.5%). Results for the purposefully registered category are difficult to interpret; ownership and inheritance disputes are higher relative to nonregistered households, but the implication is impossible to assess because the survey did not inquire whether the disputes arose prior to registration or after (disputes under the indigenous tenure system may have been the causal factor in choosing title).

Fourth, perceptions on the usefulness of registration as security for credit are mixed. Only 31.0 percent and 43.7 percent of households in the exogenously registered and the purposefully registered categories, respectively, responded affirmatively. Conversely, 59.1 percent of unregistered households felt that registration enhances credit access. Responses of nonregistered households are influenced by exaggerated claims of the benefits of registration in the absence of actual experience with legal ownership. Registered owners by experience have learned that registration is not sufficient to gain credit access.¹⁵

Credit use in the research area is very low, is acquired mostly from informal lenders rather than commercial banks, and is mostly applied to nonfarm uses. Of 228 households in the survey, only 15 had acquired loans sometime in the previous 5 years. All were received by households in Kyamakanda—4 by purposefully registered households (5.6% of sample) and 11 by unregistered households (9.6%). Of these loans, 46 percent were obtained from

15. Possession of title is normally a prerequisite for land to be considered as security for loans. However, not all registered landholders in the sample actually held the title certificate. Of the 206 parcels certified as registered freeholds and leaseholds in the two parishes, 80.6% of the title documents were currently in the hands of the owner, 11.6% were at the survey office, 6.3% were still being held by the original owner, and 1.5% were of unknown whereabouts.

moneylenders, 20 percent from commercial banks, 20 percent from neighbors, 7 percent from relatives, and 7 percent from cooperatives. Twenty-seven percent were used for education, 53 percent for general nonfarm uses, 13 percent for farm use, and 7 percent for ceremonies. At the time of the field research in 1987, the nearest agricultural bank was in Kabale, 3 hours away by road. A Uganda commercial bank established a branch in the area the year before the research. But commercial banks generally extend credit only for business enterprises, not for agricultural purposes.

Despite the lack of formal credit sources, farmers provided a variety of other explanations for their low use of formal credit. When asked why applications were not made to banks or cooperative associations, the majority of landholders (35%) responded that they fear debt (most important reason, 37%). Other responses included fear of losing collateral, especially land (19% and 3%); lack of collateral (4% and 17%); not aware of these credit sources (12% and 12%); have no need (11% and 11%); have other sources (6% and 7%); have enough money (6% and 4%); and none or other (7% and 9%). Regardless of the reason, these data indicate that registration has had a negligible effect on credit use. To the extent that a positive investment response to registration is found in the subsequent analysis, it must be due to demand-side effects (through enhanced tenure security) since supply-side effects (increased access to credit) are negligible.

If landholders perceive positive benefits to registration, why do more farmers not register their land? According to registered landholders (judging the actions of nonregistered households), procedures are too complicated (51.7% and 47.9% for exogenously and purposefully registered households, respectively); nonregistered landholders are inadequately informed about registration procedures (44.8% and 22.5%); landholders do not wish to upset family and neighbors (31.0% and 22.5%); landholders prefer the indigenous tenure system (27.6% and 11.3%); and registration is too costly (3.4% and 14.1%). However, nonregistered landholders gave a different ordering: procedures are too complicated (49.6%); process is not clearly understood (34.8%); procedures are too costly (33%); fear of upsetting family and neighbors (16.5%); and prefer the indigenous system (11.3%). Registered landholders thus tend to overestimate the importance of family/neighbors and the indigenous system and to underestimate the effect of costs as constraints to acquiring registration.

SUBDIVISION AND FRAGMENTATION

The ability to control for subdivision and fragmentation was an important objective of land registration programs throughout East Africa. Registration could potentially affect subdivision through a number of mechanisms: if it is accompanied by consolidation (not the case in Kigezi); if a land market is facilitated which acts to consolidate or fragment holdings; or if a formal limitation that curbs transactions or successions is imposed by law.

Data in tables 4 and 7 provide some sense of registration's effectiveness in curbing subdivisions and fragmentation in practice. Where registrations have been kept up to date, they appear to have been successful in restraining subdivision [based on Lawrance's (1960) estimates of 1.6 parcels/farm and 4.9 acres/parcel at the time of adjudication versus 1.7 parcels/farm and 5.4 acres/parcel for households in the exogenously registered strata]. However, if aggregate data for Nyakaina (2.3 parcels/farm and 4.1 acres/parcel) are considered instead, including households that have purposefully not renewed their registrations, de facto subdivision appears to be occurring on land whose registration has lapsed into a state of noncurrency.¹⁶ The lower rate of subdivision by exogenously registered households in Nyakaina can thus be attributed to one or more of the following factors: (1) the lands office has been effective in controlling subdivisions; or (2) the registration holders have not yet reached the point of bequeathing land to their sons, an explanation consistent with the older age of household heads in the exogenously registered strata compared with either Kyamakanda registered or unregistered households.

TABLE 7
Subdivision and fragmentation, Uganda land registration study

	NYAKAINA (I)	KYAMAKANDA (II)	HOUSEHOLDS WITH ALL PAR- CELS EXG. REGISTERED (III)	HOUSEHOLDS WITH SOME PARCELS END. REGISTERED (IV)	HOUSEHOLDS WITH NO PARCELS REGISTERED (V)
Mean # of times parcel subdivided since 1960	1.45	1.54	0.69	1.27	1.80
Parcel will be subdivided if inherited by 2 or more persons (% yes)	92.0	91.2	93.1	93.0	92.2
Sufficient land available for children (% yes)	34.0	27.7	31.0	36.6	27.8

16. The subdivisions are still registered land, just not current.

Data in table 7 would seem to lend support to the latter hypothesis (i.e., 2). Households with all parcels exogenously registered experienced only 0.69 subdivisions since 1960 versus 1.27/1.80 for purposefully registered/unregistered households. Yet the average of subdivisions for Nyakaina as a whole (1.45) is only marginally lower than for Kyamakanda (1.54), indicating that subdivision is accompanying the failure to renew registrations. When respondents were asked whether the parcel would be subdivided if 2 or more persons were in line for inheritance, 92 percent or more in all categories responded affirmatively. Furthermore, only 27.8-36.6 percent of households among registration strata felt that sufficient land was available for children. Registration alone is thus unlikely to dampen future subdivisions in absence of effective controls by the lands office or in absence of labor out-migration from agriculture. Efforts by the lands office will become more feasible as registration and title increase in value, yet controls that are too restrictive or implemented too prematurely would be contravened as landholders move their transfers off the register.

REGISTRATION AND AGRICULTURAL INVESTMENT

SHORT-TERM INVESTMENTS

Only limited use is made of chemical inputs and improved seeds by respondents in the survey area regardless of registration status. Data on the number of fields treated with a given input are provided in table 8. Of the 193 (517) fields located on exogenously (purposefully) registered parcels, 1.6 percent (2.3%) had acaricide applied; 0.0 percent (0.2%) fertilizer; 0.0 percent (0.2%) herbicide; 2.6 percent (1.5%) improved seeds; and 0.5 percent (0.2%) pesticides. Applications on fields of nonregistered households are equally negligible: 0.9 percent, acaricide; 0.0 percent, fertilizer; 0.0 percent, herbicide; 0.8 percent, improved seeds; and 0.5 percent, pesticides. The region's remoteness partially explains the low intensity of commercial input use, yet its dependence on the external economy for coffee exports would seem to lessen the importance of high transport costs as an explanatory factor. Whatever the reason, so few field observations of input use make it impractical to conduct further analysis of variations among tenure categories.

TABLE 8
Use of short-term inputs, Uganda land registration study

	NYAKAINA (I)	KYAMAKANDA (II)	HOUSEHOLDS WITH ALL PAR- CELS EXG. REGISTERED (III)	HOUSEHOLDS WITH SOME PARCELS END. REGISTERED (IV)	HOUSEHOLDS WITH NO PARCELS REGISTERED (V)
# of fields	712	813	193	517	650
% of fields with inputs:					
Acaricide ^a	1.7	1.5	1.6	2.3	0.9
Fertilizer	0.1	0.0	0.0	0.2	0.0
Herbicide	0.0	0.1	0.0	0.2	0.0
Improved seed	2.2	0.5	2.6	1.5	0.8
Pesticide	0.3	0.4	0.5	0.2	0.5

a. Acaricide is used to kill snails.

INTERMEDIATE TO LONG-TERM INVESTMENTS

Compared with the dearth of purchased inputs, a high percentage of households have invested in intermediate to long-term land improvements (table 9). Households with all parcels registered under the pilot scheme have the highest percentage with access roads

(62.5%), continuous manuring (43.8%), destumping (35.4%), drainage (27.1%), fencing (35.4%), grass stripping (37.5%), terracing (41.7%), and tree crops (52.1%). Investments are generally lowest on those parcels falling under the unregistered household category. Drawing conclusions based on mean comparisons, however, can lead to spurious conclusions. Rather than stemming from registration, the higher frequency of tree crops and terracing by exogenously registered households could simply be due to their more extensive holdings of hilly land (69%; see table 4, p. 16). The higher percentage of parcels with access to roads may simply be caused by parish and site selection biases introduced at the time of the scheme's inception. The impact of registration on investment—while controlling for the influences of other household and parcel characteristics—is the focus of the next section.

TABLE 9
Intermediate to long-term fixed place investments in land,
Uganda land registration study

	NYAKAINA (I)	KYAMAKANDA (II)	HOUSEHOLDS WITH ALL PAR- CELS EXG. REGISTERED (III)	HOUSEHOLDS WITH SOME PARCELS END. REGISTERED (IV)	HOUSEHOLDS WITH NO PARCELS REGISTERED (V)
# of parcels	231	280	48	188	213
% of parcels with investment in: ^a					
Access road	45.9	38.2	62.5	48.9	33.3
Continuous manuring	25.1	31.4	43.8	32.4	26.8
Drainage/bunding	17.7	26.4	27.1	26.1	20.2
Fencing	28.1	15.0	35.4	29.3	8.9
Grass stripping	27.3	24.3	37.5	24.5	26.8
Making beds	6.1	5.7	8.3	4.3	8.0
Mulching	63.2	65.4	70.8	67.0	67.6
Removing stumps	23.8	16.8	35.4	23.4	16.9
Terracing	22.5	2.1	41.7	14.4	4.2
Tree crops (mainly coffee and bananas)	44.6	25.7	52.1	36.7	28.2

- a. Percentages include parcels with investments both existing at time of acquisition and made since acquisition.

THEORETICAL LOGIT INVESTMENT MODEL

The logit regression model for an investment demand equation directly estimates the probability of an investment event occurring. The logit model for one dependent variable and multiple explanatory variables can be written:

$$(1) \quad \text{Prob}(I) = \frac{e^z}{1+e^z} = \frac{1}{1+e^{-z}}; \text{ and } z = b_0 + b_1 x_1 + \dots + b_m x_m$$

where, Prob (I) is the probability of the investment event occurring, I is a binary dependent variable measuring the investment (1 if present, 0 if not), b_0, \dots, b_m are estimated from the data, x_1, \dots, x_m are explanatory variables measuring household and parcel characteristics, and 'e' is the base of the natural logarithm. The logit regression is rewritten in equation (2) in terms of the odds of an event occurring (ratio of the probability that the investment event will occur to the probability that it will not):

$$(2) \quad \frac{\text{Prob}(I)}{\text{Prob}(noI)} = e^{b_0} e^{b_1 x_1} \dots e^{b_m x_m} = e^{(b_0 + b_1 x_1 + \dots + b_m x_m)}$$

The change in the odds associated with a change in the i-th variable is given by:

$$(3) \quad \frac{\partial \left(\frac{\text{Prob}(I)}{\text{Prob}(noI)} \right)}{\partial x_i} = \frac{\partial e^z}{\partial x_i} = b_i e^{(z)}$$

Thus $b_i e^{(z)}$ is the factor by which the odds change when the i-th explanatory variable increases by 1 unit. Since $e^{(z)}$ is always nonnegative, a positive value of b_i would imply that the odds of the investment being undertaken would increase; a negative value would imply that odds would decline. Only when b_i is 0 are the odds left unchanged. If, for example, investment (I) is terracing and b_i is the coefficient associated with registration/title, then the impact of registration on the odds that terracing would occur is given by $b_i e^{(z)}$. A positive value of b_i would imply that the odds of terracing would improve with registration.

INVESTMENT DEMAND EQUATIONS

The logit model in equations (1) and (2) was estimated for six intermediate- and long-term fixed place investments. Model results are presented in tables 10 and 11. Intermediate-term investments with benefits occurring over a one- to five-year time horizon include (A) continuous manuring, (B) mulching, and (C) fencing. Long-term investments with benefit streams occurring over a longer time horizon include (D) tree crops (mainly

TABLE 10
Logit investment models and registration, Uganda land registration study

	CONTINUOUS MANURING		MULCHING		FENCING	
	(I)	(II)	(I)	(II)	(I)	(II)
Constant	-1.175 (.940)	-1.194 (.945)	-.488 (.782)	-.371 (.791)	-4.157* (1.025)	-4.199* (1.027)
Parish (Kyamakanda=1)	.053 (.305)	.085 (.352)	-.796* (.260)	-1.026* (.287)	-.650* (.322)	-.512 (.369)
Location (1=within parish)	.403 (.579)	.403 (.579)	1.558* (.471)	1.554* (.473)	.387 (.563)	.404 (.565)
Size of parcel (acres)	.031 (.033)	.031 (.033)	.033 (.030)	.030 (.030)	.082* (.037)	.083* (.037)
Flat land (y=1)	-1.266* (.358)	-1.267* (.358)	-.613* (.259)	-.597* (.261)	-.456 (.385)	-.465 (.384)
Swamp/other land (y=1)	-.523 (.359)	-.521 (.359)	-.353 (.287)	-.384 (.290)	-.935* (.349)	-.947* (.350)
Access road present (y=1)	1.228* (.260)	1.231* (.260)	.421** (.238)	.386** (.240)	.646* (.293)	.658* (.293)
Registration (y=1)	.682* (.315)		.521* (.263)		.869* (.325)	
Compulsory registration (y=1)		.746** (.464)		-.039 (.377)		1.123* (.463)
Purposeful registration (y=1)		.663* (.331)		.768* (.294)		.782* (.347)
Investment made prior to acquisition (y=1)	.917 (.615)	.904 (.619)	.118 (.251)	.103 (.253)	-1.071 (1.165)	-1.079 (1.169)
Ownership time (years)	.006 (.011)	.005 (.011)	.008 (.009)	.014 (.010)	-.025* (.011)	-.029* (.013)
Age household head (years)	.006 (.011)	.006 (.011)	-.001 (.010)	-.002 (.010)	.048* (.013)	.048* (.013)
Education household head (years)	-.219 (.210)	-.216 (.211)	-.186 (.181)	-.205 (.183)	.063 (.229)	.072 (.228)
Full-time farmer (y=1)	-.904* (.299)	-.903* (.299)	.047 (.272)	-.061 (.274)	-.495 (.345)	-.509 (.346)
Political office (y=1)	.373 (.272)	.364 (.276)	.757* (.235)	.807* (.237)	-.131 (.311)	-.162 (.314)
Total family income (000)	-.060 (.100)	-.058 (.100)	.094 (.100)	-.100 (.100)	.055 (.200)	.066 (.200)
# livestock units	.081* (.029)	.081* (.029)	-.029 (.026)	-.026 (.026)	.044 (.029)	.042 (.029)
# parcels	-.319* (.095)	-.319* (.095)	-.233* (.067)	-.239* (.067)	-.118 (.077)	-.115 (.078)
Land per resident ratio	.078 (.098)	.080 (.098)	.009 (.087)	.005 (.087)	.070 (.098)	.075 (.098)
# observations	480	480	480	480	480	480

Note: * = significant at the 5% confidence level; ** = 10% level. Figures in parentheses are standard errors of the coefficient. A squared term for income was also included to control for outlier points (maximum values in table 3, p. 15), but was found to be nearly zero and insignificant.

TABLE 11
Logit investment models and registration, Uganda land registration study

	TREE CROPS		TERRACING		NONFARM BUILDINGS	
	(I)	(II)	(I)	(II)	(I)	(II)
Constant	-3.938 (1.192)	-3.893* (1.195)	-2.821 (1.681)	-2.844** (1.687)	-2.122* (1.036)	-2.214 (1.046)
Parish (Kyamakanda = 1)	-1.093* (.288)	-1.317* (.324)	-3.130* (.690)	-3.044* (.733)	.319 (.398)	.448 (.441)
Location (1 = within parish)	2.420* (.927)	2.395* (.924)	.781 (1.082)	.827 (1.093)	-.699 (.551)	-.681 (.551)
Size of parcel (acres)	.085* (.031)	.082* (.031)	.011 (.052)	.011 (.053)	.007 (.034)	-.005 (.034)
Flat land (y = 1)	-.722* (.329)	-.715* (.331)	-3.500* (1.098)	-3.494* (1.095)	.300 (.353)	.289 (.354)
Swamp/other land (y = 1)	.411 (.327)	.387 (.329)	-2.502* (1.107)	-2.495* (1.108)	-1.003* (.458)	-.997* (.458)
Access road present (y = 1)	.818* (.258)	.793* (.259)	2.109* (.468)	2.113* (.470)	.391 (.326)	.419 (.328)
Registration (y = 1)	.329 (.289)		.281 (.608)		.521 (.389)	
Compulsory registration (y = 1)		-.094 (.396)		.438 (.761)		.835 (.582)
Purposeful registration (y = 1)		.528** (.313)		.198 (.658)		.446 (.406)
Investment made prior to acquisition (y = 1)	-.319 (.445)	-.324 (.447)	-1.918 (39.52)	-1.895 (39.55)		
Ownership time (years)	.021* (.010)	.027* (.011)	-.031** (.019)	-.036 (.024)	.001 (.014)	-.005 (.016)
Age household head (years)	.009 (.011)	.009 (.011)	.032 (.021)	.032 (.021)	-.035* (.016)	-.034* (.016)
Education household head (years)	.130 (.206)	.122 (.207)	-.219 (.393)	-.218 (.393)	.464* (.222)	.479* (.222)
Full-time farmer (y = 1)	.020 (.319)	.038 (.321)	-.063 (.581)	-.074 (.582)	-1.146* (.363)	-1.156* (.363)
Political office (y = 1)	-.052 (.267)	.008 (.271)	-.107 (.566)	-.130 (.569)	.494 (.333)	.470 (.334)
Total family income (000)	-.030** (.010)	-.030* (.010)	.010 (.030)	.010 (.030)	.170* (.040)	.170* (.040)
# livestock units	.009 (.028)	.012 (.028)	-.021 (.040)	-.023 (.040)	-.054 (.034)	-.055 (.035)
# parcels	-.101 (.074)	-.103 (.073)	-.342* (.153)	-.338* (.154)	.531* (.097)	.535* (.098)
Land per resident ratio	-.043 (.089)	-.051 (.088)	.320** (.168)	.329* (.171)	.286* (.099)	.284* (.098)
# observations	480	480	480	480	480	480

Note: * = significant at the 5% confidence level; ** = 10% level. Figures in parentheses are standard errors of the coefficient. A squared term for income was also included to control for outlier points (maximum values in table 3, p. 15), but was found to be nearly zero and insignificant.

coffee and bananas), (E) terracing, and (F) nonagricultural buildings (dwelling house, restaurants, pub/bar, and shops). The investment variable is binary (1 if present, 0 if not). A parcel with only a fraction of its area in tree crops, for example, has the same weight (i.e., 1) as it would if its entire area were planted in tree crops. Although this problem has important implications for model fit and predictive power, correcting the situation by gauging the cost, value, or importance of investments proved to be prohibitively difficult in practice.

Two variant models are estimated for each type of improvement. Model (I) includes registration as an independent variable regardless of type (compulsory or purposeful). Model (II) includes registration proxies for two separate processes—parcels exogenously registered prior to 1969 under the pilot registration scheme, and parcels registered by purposeful choice from 1969 onward. Variable definitions for investments, household characteristics, and parcel characteristics are provided in annex A.

EFFECT OF HOUSEHOLD-LEVEL ATTRIBUTES

Investment demand in this analysis is theorized to be a function of the following attributes: **experience**, measured by age of household head; **managerial skills** of the household head, measured by years of education; **political status**, measured by current or past involvement in one or more political offices; **farm involvement**, an indicator of whether the household head is a full time farmer; **wealth**, measured by either household income, livestock (standardized units) owned, or land per resident ratio; and **land dispersion**, measured by number of parcels held.¹⁷

A priori, it is expected that experience and managerial skills would increase the likelihood of an investment occurring through application of improved techniques and better farm management. Results in tables 10 and 11 indicate that age of household head has a modest positive effect on manuring, tree crops, and terracing, but results are statistically insignificant. Age has a significant positive effect on fencing (I and II, .048) and a significant negative effect (I -.035, II -.034) on nonfarm buildings. Thus older household heads appear to be making the investments in fencing,¹⁸ while investments in nonfarm buildings and businesses are being undertaken by younger household heads. Results for the education variable are mixed, some positive and some negative, but the positive coefficient for nonfarm buildings (I .464, II .479) is the only one that is significant. Education thus appears to be

17. Other proxies were tried without improving the current specification: experience (years of farming); progressiveness (an index derived from presence or absence of fertilizer, pesticide, or herbicide use); and farm size.

18. This positive relationship between age and fencing is partially due to the significant positive correlation between livestock ownership and age ($\rho = .139$), consistent with life cycle (and asset accumulation) expectations.

encouraging diversification of economic activity (bars, restaurants, pubs, shops, or housing rental units).

Political status would have a negative effect if time is diverted away from farm management, but would have a positive effect if it increases control over labor in the community, enhances access to inputs, improves financial management or strength, or increases acceptance of new technology. Results again are inconclusive. Only for mulching (I .757, II .807) are the odds significantly improved with political status.

Degree of farm involvement can also produce different theoretical outcomes: full-time farming would have a positive effect on investment demand if greater effort and management are applied to the farm enterprise or a negative effect if it entrenches old ideas and techniques, reduces exposure to government services, or lessens involvement in markets. Model results show that being a full-time farmer significantly decreases the odds of nonfarm buildings (I -1.146, II -1.156) and continuous manuring (I -.904, II -.903). The odds of mulching and tree crops improve, and of fencing and terracing decline, but coefficients are not statistically significant.

Wealth would have a positive effect if it relaxes financial constraints or if economies of size are realized from a larger asset base. It would have a negative effect if households are unable to attract sufficient labor to fully operate the farm enterprise, if it increases leisure time, or if it dampens economic initiative. Results show that neither family income nor number of livestock units has a significant influence on the likelihood of any investment occurring, with the exception of income's positive effect on nonfarm buildings (I and II, .170), and livestock ownership's positive effect on manuring (I and II, .081). Those households with higher land-per-resident ratios are more likely to invest in terracing (I .320, II .329) and nonfarm buildings (I .286, II .284). An insignificant negative coefficient was found for tree crops. While coffee is normally grown on plantations, bananas are a subsistence crop mainly grown on small plots; the tree crop variable in the model includes both types of trees.

Greater dispersion of landholdings could negatively affect investment in two ways. A higher number of parcels could increase exposure to disputes, particularly if those parcels are widely dispersed and far removed from the household. Number of parcels is also a crude proxy for fragmentation and for higher labor costs in farming activities. Model results indicate that the number of parcel holdings is negatively related to investments in terracing (I -.342, II -.338), manuring (I and II, -.319), and mulching (I -.233, II -.239), but positively related to nonfarm buildings (I .531, II .535).

EFFECT OF PARCEL-LEVEL ATTRIBUTES

Land investment may also be influenced by parcel characteristics: **locational factors**, measured by position of parcel relative to place of residence, presence of access roads, and

site of parish; **land quality**, measured by parcel size and topography; **investment status**, that is, whether the investment was already present at the time of acquisition; **temporal attributes**, measured by ownership time; and **registration status**.

Three proxy variables are incorporated in the model to control for spatial factors affecting investment decisions. Parcel location relative to the homestead (whether inside or outside the parish of residence) is a crude proxy of costs associated with monitoring and enforcing investment claims. Parcels farther away from the homestead (outside the parish) would be expected to experience more disputes and higher tenure insecurity than parcels nearer the homestead (within the parish). Model results indicate that closer proximity increases the likelihood of all farm investments, significantly so for tree crops (I 2.420, II 2.395) and mulching (I 1.558, II 1.554). Investment in nonfarm buildings shows the opposite effect.¹⁹ Presence of an access road prior to acquisition was included as a proxy for transportation costs, ease of access, and ease of monitoring and enforcement.²⁰ Presence of an access road strongly increases the odds of terracing (I 2.109, II 2.113), manuring (I 1.228, II 1.231), tree crops (I .818, II .793), fencing (I .646, II .658), and mulching (I .421, II .386). Parish location is incorporated to capture the effects missed by other independent variables. Location of a parcel in Kyamakanda tends to significantly decrease the odds of terracing (I -3.130, II -3.044), tree crops (I -1.093, II -1.317), mulching (I -.796, II -1.026), and fencing (I -.650), suggesting that latent structural differences between the two parishes are affecting investment demand.

Mixed results are obtained for land quality attributes. Larger parcel size improves the probability of all investments being undertaken, but is significant only for tree crops (I .085, II .082) and fencing (I .082, II .083). Terracing (I -3.500, II -3.494), continuous manuring (I -1.266, II -1.267), tree crops (I -.722 and II -.715), and mulching (I -.613, II -.597) generally tend to be undertaken on hilly land. Swamplands and marginal lands are the most likely to be fenced (I .935, II .947).

Ownership time (years passed since acquisition) is included as a proxy for time required to make—and to accumulate capital for—land improvements. In the first few years following parcel acquisition, increasing ownership time would be expected to have a positive impact on investment. However, once long-term improvements are made, further investment is unnecessary until their benefits are fully exhausted. Thus ownership time would tend to have a zero or positive effect on short-term investments, but a negative effect on long-term

19. Since these investments would be made closer to towns/villages, they would more likely be found outside the parish than would other investments.

20. Including investment in access roads after acquisition would have created a causality problem, i.e., whether the investment or the access road came first. However, the majority of access roads were already in place at the time of parcel acquisition. Of the 106 parcels in Nyakaina that had investments in access roads, 69.8% had the investment in place at the time of acquisition. In Kyamakanda, 80.4% of the 107 parcels with access roads had the investment in place at the time of parcel acquisition. The vast majority of other investments were made after acquisition.

investments (i.e., increasing years does not increase investment). Results for short-term investments (continuous manuring, mulching), as expected, are positive but not significant. Results for fencing (I -.025, II -.029) and terracing (I -.031) are negative and statistically significant.

Investment status is incorporated in the model to control for investment already in place at the time of acquisition. Presence of long-term investment at time of acquisition would have a negative effect on postacquisition investment as long as the investment at acquisition covered the entire parcel, and as long as ownership time has not exceeded the investment's residual income stream. The effect for short-term investments would tend to be zero or positive if habits have formed in management practices. Model results show that presence of the investment at time of acquisition has a positive (but insignificant) effect on continuous manuring and mulching, and a negative (also insignificant) effect on fencing, tree crops, and terracing.

EFFECT OF REGISTRATION

Registration in model (I) measures presence of registration regardless of type (compulsory versus purposeful). Results indicate that registration is significantly and positively related to investments in fencing (I .869), continuous manuring (I .682), and mulching (I .521), and positively but insignificantly related to all remaining long-term investments. Model (II) includes two separate variables for registration, one for those parcels systematically and compulsorily registered under the pilot scheme, the second for those registered voluntarily and purposefully. One would expect a priori that purposeful registration would have a larger positive impact than exogenous registration. Had farmers under the pilot scheme been given the opportunity to do so, some would have purposefully sought registration while others would not have registered land in any case. Model results indicate that purposefully registered parcels consistently had a positive effect on all land investments, and significantly so for fencing (II .782), mulching (II .768), continuous manuring (II .663), and tree crops (II .528). Exogenous registration had a significant positive effect on fencing (II 1.123) and continuous manuring (II .746), but coefficients for other investments are mixed and insignificant.

LAND RIGHTS AND AGRICULTURAL INVESTMENT

In recent studies examining agricultural investment and productivity in Ghana and Rwanda, the World Bank used perception of land rights as a proxy for tenure security (Place and Roth 1991; Blarel 1990; Migot-Adholla; Place and Atsu 1990). Binary responses (1 if the respondent affirms that a particular right is held, 0 if not) were obtained from the respondent (household head) for each of a well-defined set of rights associated with a given parcel: (1) **use rights**—rights to grow perennial crops, grow annual crops, make permanent improvements, bury the dead, collect firewood, collect wild fruit, and cut trees; (2) **exclusion rights**—rights to exclude others from planting crops, making improvements, collecting wild fruit, collecting firewood, grazing animals, using footpaths, or cutting trees; and (3) **transfer rights**—rights to sell, give, mortgage, lease, rent, bequeath, or register.

The number of distinct combinations or bundles of land rights is potentially enormous. The World Bank found very little variation among use rights among parcels in the Ghana and Rwanda case studies. However, the variation in the number of transfer rights was very large. A number of assumptions were made to reduce the combinations to a more manageable set of proxies for tenure security. First, transfer rights were assumed to imply a greater number of rights and more tenure security than use rights. Second, among transfer rights, rights of permanent transfer were assumed to be superior to rights of temporary transfer. Third, among permanent transfer rights, the right to sell was assumed to be superior to the right to give, which in turn should dominate the right to bequeath. These assumptions were based on the following arguments. If a parcel can be transferred, the landholder ought to be able to use the land as s/he wishes, but the converse is not true. A permanent transfer implies the ability to make a temporary transfer to the same person, but not vice versa. Transfers through gift or bequest are more restrictive than those by sale, since the latter can be made to a wider range of individuals.

Based on these lexicographic relationships, three mutually exclusive categories of land rights were developed based on landholders' positive responses to transfer rights they held. Parcels with **complete transfer rights** are those that can be sold by the current operator. Parcels that cannot be sold but may be given or bequeathed have **preferential transfer rights**, indicating that gifts or bequests are normally directed to members of the family or lineage. The remaining parcels, those that may not be permanently transferred, have **limited transfer rights**. The analysis made by the World Bank confirmed the validity of these observations. A greater breadth of land rights was found to be associated with parcels possessing "complete transfer rights," followed by those with "preferential transfer rights," and finally those with "limited transfer rights."

The Uganda data do not permit as robust an analysis of bundles of land rights as the World Bank research. However, specific parcel data are available that are equivalent to their final tenure groupings—that is, right to sell and right to bequeath. The group of parcels held

TABLE 12
Logit investment models and registration, Uganda land registration study

	CONTINUOUS MANURING		FENCING		TREE CROPS	
	(I)	(II)	(I)	(II)	(I)	(II)
Constant	-1.061 (.942)	-1.089 (.938)	-3.949* (1.009)	-3.856* (1.005)	-3.770* (1.005)	-3.675* (1.200)
Parish (Kyamakanda= 1)	-.280 (.268)	-.207 (.269)	-1.042* (.299)	-.912* (.302)	-1.295* (.261)	-1.190* (.261)
Location (1=within parish)	.614 (.584)	.614 (.582)	.620 (.549)	.634 (.549)	2.592* (.939)	2.599* (.940)
Size of parcel (acres)	.053 (.034)	.051 (.034)	.116* (.038)	.119* (.038)	.105* (.033)	.105* (.033)
Flat land (y= 1)	-1.229* (.355)	-1.236* (.355)	-.432 (.387)	-.445 (.388)	-.756* (.332)	-.774* (.334)
Swamp/other land (y= 1)	-.410 (.353)	-.466 (.351)	.969* (.347)	-.927* (.346)	.444 (.330)	.389 (.330)
Access road present (y= 1)	1.309* (.257)	1.277* (.258)	.708* (.291)	.634* (.294)	.823* (.256)	.754* (.257)
Right to sell (y= 1)	-.595* (.257)		-.778* (.292)		-.802* (.254)	
Right to bequeath (y= 1)		-.506** (.265)		-.908* (.293)		-.895* (.259)
Investment made prior to acquisition (y= 1)	.767 (.623)	.714 (.619)	-1.166 (1.200)	-1.162 (1.206)	-.336 (.445)	-.374 (.443)
Ownership time (years)	.011 (.011)	.012 (.011)	-.015 (.011)	-.014 (.011)	.026* (.010)	.027* (.010)
Age household head (years)	.007 (.011)	.007 (.011)	.047* (.012)	.046* (.012)	.008 (.011)	.008 (.011)
Education household head (years)	-.128 (.208)	-.129 (.209)	.184 (.227)	.171 (.230)	.214 (.206)	.192 (.206)
Full-time farmer (y= 1)	-.866* (.302)	-.892* (.301)	-.473 (.348)	-.496 (.346)	.097 (.324)	.076 (.324)
Political office (y= 1)	.473** (.277)	.397 (.273)	.076 (.316)	.001 (.313)	.127 (.275)	.076 (.273)
Total family income (000)	-.066 (.100)	-.046 (.100)	.073 (.200)	.085 (.200)	-.300* (.100)	-.300* (.100)
# livestock units	.073* (.029)	.076* (.029)	.041 (.029)	.046** (.029)	.004 (.029)	.011 (.029)
# parcels	-.291* (.095)	-.282* (.095)	-.070 (.079)	-.049 (.080)	-.063 (.076)	-.054 (.076)
Land per resident ratio	.104 (.102)	.089 (.101)	.079 (.102)	.054 (.102)	-.050 (.092)	-.071 (.092)
# observations	480	480	480	480	480	480

Note: * = significant at the 5% confidence level; ** = 10% level. Figures in parentheses are standard errors of the coefficient.

by household heads' affirming the right to sell would be equivalent to the "complete transfer rights" stratum in the World Bank research. The group of parcels held by household heads' affirming the right to bequeath (but not the right to sell) would be equivalent to the "limited transfer rights" stratum. The regressions in table 12 assess the effect of these different "bundles" of rights (the right to sell assumed to include the greatest number of rights, absence of right to sell or bequeath the least) on continuous manuring, fencing, and tree crops.

The results in table 12 suggest significant and contradictory evidence to the hypothesis that a greater number of land rights via enhanced tenure security should increase fixed-place investments in the land resource. Right to sell has a significant negative effect on tree crops (I -.802), fencing (I -.778), and continuous manuring (I -.595). The right to bequeath exhibits a significant negative relationship with fencing (II -.908), tree crops (II -.895) and manuring (II -.506).

These results are strongly opposite those found for the registration indicators in the previous section. Three possible explanations may untangle these results: land rights **perceptions** are a poor indicator of tenure security; registered landholders are more aware of the legal framework, noting that recent legal changes have tightened restrictions on land transfers; and rights of transfer are correlated with latent factors that are not explicitly captured in the regressions.

The analysis of simple correlation coefficients provides some insight into the validity of these hypotheses. Those most inclined to say that they have the right to sell a given parcel tend (a) to have purchased the parcel ($\rho = .152$), (b) **not** to have registered the parcel ($\rho = .150$), (c) to be more progressive ($\rho = .145$), (d) to have larger farm sizes ($\rho = .186$) and parcel holdings ($\rho = .193$), and (e) to have had or be currently holding leadership roles in the community ($\rho = .239$), all significant to at least the .01 level. Further, the parcel tends to be located on hilly land ($\rho = .141$). Two implications are weakly supported by these data: (1) those who affirm the right to sell a parcel are larger progressive farmers who have purchased the parcel mainly in less fertile areas and have tended not to register it; and (2) households with these characteristics tend not to have made the respective investments in the parcel. The de facto purchase of land in itself tends to instill superior ownership compared with other forms of land acquisition, lending some credence to the tenure security indicator. Thus other household characteristics besides land rights/tenure security appear to be constraining agricultural investment.

IMPLICATIONS

When the colonial protectorate government of Uganda implemented the pilot registration scheme in 1958, Kigezi District was experiencing population pressure, increasing commercialization, soil erosion, severe fragmentation and subdivision, and acute land disputes. According to colonial authorities, the diffuse separation of land rights among individuals, communities, and clans provided neither individuals nor groups sufficient incentives to develop the land. Land registration proposals sought to reduce land disputes and to lay the foundation for accelerated economic development. Twenty-nine years later, upon revisiting the scheme, this research shows that supply-side benefits of registration on farm investment through enhanced credit use are negligible. However, the positive relationship found between certain investments and land registration provides some evidence of advantageous demand-side effects through enhanced tenure security.

In general, very few farmers appear to be favorably disposed to the indigenous tenure system. Nearly all farmers interviewed perceived positive benefits to registration in helping to curb land disputes and in enhancing tenure security. The possession of registration certificates is highly valued. The two primary reasons why farmers do not register land is lack of knowledge on how to go about it and cost. The 1975 Land Law which prevents those who did not previously register their land from obtaining freehold is also a constraint. Four policy options are open to government to meet farmers' demands: (1) reduce the cost of land registration by lowering direct application fees and by reducing the transactions expenditures of time and travel involved in the application process; (2) increase the efficiency of the land registry; (3) ease procedural requirements and conduct information campaigns to improve farmers' awareness of registration; and (4) reform the 1975 Land Law to again allow freehold registration upon demand.

Land fragmentation and to a lesser extent subdivision appear to be negatively associated with registration. The average number of parcels per household and the average parcel size of households with all plots exogenously registered are very similar to those documented at the time of adjudication. Yet, once unregistered transfers of registered land are taken into account, subdivision is shown to be occurring. When asked about the future, all farmers, regardless of registration status, indicated that available land is now scarce and that subdivision is planned to accommodate the projected needs of their children. Until the rural economy exhibits greater diversification outside of agriculture or the children emigrate from the area, land transfers will come under mounting pressure to be realized off the record.

Has registration had a positive impact on investment and productivity? Data shortcomings prevent analysis of output effects. The analysis of land improvements reveals that registration may have had a positive influence on the presence of certain investments. However, causality remains an issue. The data do not permit analysis of whether registration stimulated the investment, whether presence of investment under worsening conditions of tenure security stimulated registration acquisition, or whether farmers registered higher

quality land upon which subsequent investments were made. Whatever the process—improving tenure security and investment demand or lowering the risk of asset/investment loss—registration has offered positive benefits for the holder.

Credit use is low in the research area. Of the limited amount of credit received, most was obtained by nonregistered landholders without title through informal sources, and was used primarily for nonagricultural purposes. Thus, the supply-side effects of credit's stimulating agricultural investment, observed elsewhere [e.g., Thailand (Feder et al. 1987)], are not apparent in the Uganda case. The investment effects that are occurring must then be due to improvements in the tenure security of the landholder, derived from either increasing expected values of investment returns or lowering investment costs.

Agricultural development cannot depend on greater security of property rights alone. Very low use of chemical inputs, improved seeds, and productive assets in the project area suggests that farmers either have low demand or are experiencing difficulties in acquiring inputs. Conversely, certain public investments are having an important effect on both farm and nonfarm investments. Presence of roads adjacent to parcels was strongly correlated with all agricultural investments, especially manuring and terracing. Education is having a positive effect on diversification of economic activity in the research area. While these results show positive returns to such public investments, low input use and difficulties experienced in acquiring registration indicate that the government still has a long way to go in providing the means for accelerated economic development.

ANNEX A

INVESTMENT DEMAND MODEL, VARIABLE DESCRIPTIONS

The generic logit regression model has the form:

$$Prob(I_i) = \frac{1}{1+e^{-z}}; \text{ and } z = b_0 + b_1 x_1 + \dots + b_m x_m$$

where I_i is the binary dependent variable referring to the i^{th} investment, and x_1, \dots, x_m are the independent variables measuring the influence of various household and parcel characteristics in determining the probability of that investment occurring.

DEPENDENT VARIABLES

I_i = Land investment (1 if investment is currently in place, 0 if not). Investments: (A) continuous manuring, (B) mulching, (C) fencing, (D) tree crops (mainly coffee and bananas), (E) hillside terracing, and (F) urban buildings (restaurants, bar, pub/bar, shop, or rental unit).

INDEPENDENT VARIABLES

HOUSEHOLD CHARACTERISTICS

1. HAGE = Age of the household head (years).
2. HEDUC = Highest level of education achieved, 0 for no schooling, 1 for primary education, 2 for secondary education, 3 for technical education, and 4 for university education.
3. HFARMER = Household head is full-time farmer (1 if household head lists both main and secondary occupation as farming, 0 if otherwise).
4. POLITIC = Household head is holding or has held an office in either the land adjudication committee, village development committee,

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farming cooperative, or savings and credit society (1 if yes, 2 if no).

5. INCOME = Estimated average monthly income of all family members from main and secondary sources plus cash remittances (shillings).
6. LVSTK = Livestock units owned by all members of the household (1 livestock unit = 0.7 adult cattle, 0.5 young cattle, 0.15 adult sheep and goats, 0.1 young sheep and goats, 0.15 adult pigs, and 0.1 young pigs) (number of LU).
7. NPARCEL = Number of parcels held by the household (number).
8. FARMSIZE = Estimated area of all parcels held by the household (acres).
9. LNDRES = Land per resident (farm size divided by total household members) (acres/person).

PARCEL CHARACTERISTICS

10. PARISH = Location of parcel (0 if Nyakaina, 1 if Kyamakanda).
11. LOCATN = Location of parcel relative to parish of residence (1 if parcel is located in parish of residence, 0 if otherwise).
12. P[I] = Investment already present on parcel at the time of acquisition (1 if yes, 0 if no).
13. OWNTIME = Number of years parcel has been held since acquisition (years).
14. SIZE = Estimated size of parcel (acres).
15. TOPAG1 = Dummy variable for flat topography (1 if flat, 0 if otherwise).
16. TOPAG2 = Dummy variable for swampy and other land (1 if swampy or other land, 0 if otherwise).
17. TOPAG3 = Dummy variable for hilly topography (1 if hilly, 0 if otherwise).
18. P[ROAD] = Parcel had access to one or more roads prior to acquisition (1 if yes, 0 if no).
19. REGIST = Registration of parcel regardless of whether title is in hand (1 if registered, 0 if otherwise).

20. REGEXOG = Parcel registered prior to 1969 under the Rujumbura pilot land registration program (1 if registered, 0 if otherwise).
21. REGEND = Parcel registered between 1969 and 1987 based on purposeful choice of the landholder (1 if registered, 0 if otherwise).
22. RSELL = Household head perceives that s/he has the right to sell the land (1 if yes, 0 if otherwise).
23. RBQTH = Household head perceives that s/he has the right to bequeath the land to heirs (1 if yes, 0 if otherwise).

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