Legal Knowledge and Economic Development: The Case of Land Rights in Uganda

Klaus DEININGER
Daniel AYALEW
Takashi YAMANO

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Klaus Deininger,[*1] Daniel Ayalew[*], Takashi Yamano[#]

[*] World Bank, Washington DC

[#] Foundation for Advanced Studies in International Development (FASID), Tokyo

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[1] 1818 H St. NW, Washington DC, 20433; Tel 202 4730430, fax 202 522 1151, email kdeininger@worldbank.org. We thank Dick Sserunkuuma and George Omiat for invaluable assistance in collecting the data and Rexford Ahene, Clarissa Augustinus, Frank Byamugisha, Gershon Feder, Songqing Jin, Richard Oput, and seminar participants for valuable comments. Funding from the Japanese Consultant Trust Fund, the DFID-World Bank collaborative program on land policy, and the Trust Fund for Statistical Capacity Building is gratefully acknowledged.

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Abstract: Mixed evidence on the impact of formal title in much of Africa is often used to question the relevance of dealing with land policy issues in this continent. We use data from Uganda to assess the impact of a disaggregated set of rights on investment, productivity, and land values and to test the hypothesis that individuals' lack of knowledge of the new law reduces their tenure security. Results point towards strong and positive effects of greater tenure security and transferability. Use of exogenous knowledge of its provisions as a proxy for the value of the land law suggests that this piece of legislation had major economic benefits that remain to be fully realized.

1. Introduction

There are few issues on which neoclassical development economists seem to be able to agree as easily as on the importance of secure property rights. Giving secure land rights to households has been shown to increase land-related investment, augment land values, reduce the level and likelihood of conflict, and spur economic participation. It will also provide a basis for reallocating an important factor of production to more efficient users and, if accompanied by a low-cost and formal means of verifying land ownership status, improve credit access (de Soto 2000). Based on this view of formalizing property rights as a key element for expanding the rule of law and reducing poverty, policy-makers all over the world have spent significant resources on programs to formalize land tenure, award title to land, and establish the administrative infrastructure to maintain the records created in this process.

However, empirical evidence concerning the impact of traditional methods to increase land tenure security in Africa is rather mixed (Bruce and Migot-Adholla 1994, Besley 1998). In fact, a large number of rather ineffective interventions (Atwood 1990) led some to characterize efforts to increase tenure security as "unimportant" or even dangerous (Pinckney and Kimuyu 1994) while prompting others to warn against "institutional midwifery" that would combine an overly teleologic worldview with unrealistic perceptions about the ability to transfer blueprints between countries (Platteau 1996, Sjaastad and Bromley 2000a). African land tenure institutions, are subject to extraordinary strains arising form a major economic transition and urbanization, demographic and ecological pressures, and recently the tragedy of HIV/AIDS (Andre and Platteau 1998, Deininger and Castagnini 2005). Given the limited outreach of formal tenure systems (Oosterberg 2002), the main burden falls on customary institutions. Even though these have proven to be quite adaptive in the past, their ability to deal with gender and inter-ethnic conflict, and to maintain traditional structures of control in an increasingly impersonal "modern" environment can not be taken for granted. In fact, such limitations have led to problems related to gender discrimination (Khadiagala 2001, Tripp 2004), wealth bias (Goetz 2002, Peters 2004), and corruption (Fitzpatrick 2005).

Recognition of the limited success of traditional approaches has given rise to a more nuanced approach that is aware of the multi-dimensional nature of land rights which is unlikely to be captured by a simple "title-no title" dichotomy. It views institutional change as a process that will proceed at different speeds in different environments even within the same country and where clear rules and mechanisms for enforcement will be as important as the substantive content of rights (Deininger 2003). In this spirit, many African countries have recently revised their land legislation to help establish land tenure regimes offering greater tenure security to groups who have traditionally been left out and arrangements that can be flexibly adapted to local conditions (Toulmin and Quan 2000). The multi-faceted importance of land polices for growth and equity makes analysis of the impact of such legal changes that could identify lessons for others of great interest. However, while there are a growing number of descriptive accounts, we know of no study that aims to evaluate the impact of such changes.

In this paper, we use the case of Uganda to address this issue. We go beyond existing literature in two respects, by explicitly distinguishing tenure security from transferability, and by introducing an objective measure of households' awareness about the provisions of the new law. The former arises from the need to distinguish between different types of formal and informal rights while the latter recognizes that knowledge about provisions contained in new legislation is a necessary, though not sufficient, condition for laws to have an impact. Availability of data from two otherwise comparable groups of communities, one of which was subject to sensitization by government officials in preparation of a pilot for systematic adjudication, provides an exogenous source of variation. To the extent that this allows us to consider knowledge as exogenous, we are able to derive an estimate of the "value" of legal change.

The paper is organized as follows. Section two reviews literature measuring tenure security and assessing the economic impact of interventions that aim to increase the security of producers' land rights and derives the framework underlying our econometric estimation. Section three links this general debate to Uganda by highlighting the nature of the country's land tenure system and the changes in tenure security brought about by the new land law. This is followed by a description of the data used and a range of basic descriptive statistics. Section four presents results regarding the impact of knowledge as well as other factors on land-related investments, the efficiency of agricultural production, and self-assessed land sales. Section five draws out implications for policy and further research.

2. Background and motivation

This section introduces the variables to represent the different elements of interest and provides the justification for distinguishing tenure security from transferability. Relating our variables to the existing literature and the results obtained therein, we draw out implications and discuss the specification and framework for testing these relationships econometrically.

2.1 Land tenure security and investment: Conceptual and measurement issues

The empirical link between greater tenure security and transferability of land and incentives for investment and efficiency of resource use rests on three arguments. First, security of rights, i.e. a reduction in the probability of being evicted or otherwise losing land rights has been shown to provide land users with greater assurance that they will be able to enjoy the fruits of their labor, thus encouraging them to make long-term investments and manage land in a sustainable fashion (Besley 1995). Having land rights defined clearly and accessible enforcement institutions available reduces the probability of unproductive spending on conflict, something that has been shown to have far-reaching impacts on productivity as well as equity (Deininger and Castagnini 2005). Second, adding the right to transfer land to others, either through rental or sale, encourages investment as it makes it easier to liquidate such investment in case of an exogenous shock (Deininger *et al.* 2005). It also constitutes an essential precondition for transactions that can help bring land to more efficient uses, thus maximizing output and allocative efficiency and creating the preconditions for labor to move from agriculture to non-agricultural pursuits in the broader context of economic development (Kung 2002). With rapid economic transition, e.g. at the urban fringe or in areas of rapid commercial expansion, and the associated increase in the number of transactions, ways of ensuring the legitimacy of land transfers and eliminate incentives for opportunistic behavior by one of the contracting parties have been shown to be critical to (Lavigne Delville 2002). Finally, having a formalized and low-cost way to unambiguously identity land owners without the need to physically inspect the parcel, enquire with neighbors, or conduct an extensive search of land records, allows the use land as collateral. This will, in turn, be critical to facilitate financial market development and the emergence of more sophisticated financial instruments that draw on the abstract representation of land rights provided by titles (de Soto 2000).

Differentiating elements of property rights in this way illustrates two points. First, although they do not form a necessary evolutionary sequence, different elements build upon each other and the institutions to support them become increasingly more sophisticated and costly to implement (Sjaastad and Bromley 2000b). Second, any land tenure regimes defines a multi-dimensional bundle of rights, the content of which often differs depending on local circumstances. More disaggregated information on the individual "sticks" in this bundle will be required to accurately assess the impact of specific rights. In fact, the high variability in the results from empirical studies aiming to explore the impact of title (Pinckney and Kimuyu 1994, Migot-Adholla *et al.* 1994, Roth *et al.* 1994) can be interpreted as resulting at least partly from omission of "lesser" rights to transfer land with or without permission by the lineage or a finer gradation of tenure security linked to this arrangement in specific contexts. For example, formal title will have maximum impact on increasing tenure security if owners and potential buyers are aware of the

significance of such documents, they are socially accepted, unambiguous, up to date, and backed up by enforcement institutions that are accessible at low cost. Even then, the cost of establishing a system of title may be justified only in areas where there is demand for credit. Lower cost options, which can be upgraded incrementally, may, within a given resource envelope, have a potential to provide "adequate" level of security to a greater number of people. For our analysis, this has two consequences.

One implication is that, even though transfer rights and tenure security can be synonymous, as is implicitly assumed in a large number of studies (Blarel 1994, Matlon 1994, Place and Migot-Adholla 1998, Place and Otsuka 2001), this is by no means necessary. In fact, there are many situations where the correlation between security and transferability is modest at best.[1] In this case, treating the two as interchangeable can lead to flawed conclusions, e.g. recommending improvements in transferability rather than greater attention to tenure security. For example, in Ethiopia security against land loss has an impact that is quite distinct to that of transferability (Deininger *et al.* 2005, Ayalew *et al.* 2005), a nuance which important policy implications that are easily lost if both are lumped together. This implies that in the empirical analysis, it will be necessary to distinguish security against eviction (or against land loss) from transferability, i.e. the ability to transfer land to other users tin the market for either sales or rental.

A second issue of relevance is that empirical research on land tenure in Africa has rarely paid attention to the fact that the security and ability to enforce all types of land rights in any given institutional environment depends on the owner's knowledge of his or her rights. The 'power of knowledge' has been highlighted in a wide array of contexts such as the allocation of public funds (Reinikka and Svensson 2003), the quality and effectiveness of public service delivery (Deininger and Mpuga 2005), and policies for natural resource management (Pender *et al.* 2004). Taking more explicit account of knowledge is of particular relevance in our context as many African countries have recently passed new land laws without always having sufficient capacity to disseminate or implement them (McAuslan 1998).

2.2 Conceptual framework and estimation strategy

For a number of reasons, the case of Uganda provides ideal conditions to explore some of the above issues empirically. In 1998, the country introduced a new land law that has far-reaching impacts on the rights of most rural cultivators but little effort was made to disseminate this law. Available data allow to distinguish tenure security from conditional or unconditional transferability, in addition to containing a separate indicator of knowledge. We also have several outcome indicators, in particular whether or not visible (trees) or non-visible (mulching, application of manure) investments were undertaken, the

[1] Land rights that are fully transferable but highly insecure are often encountered in post-conflict situations as in Nicaragua or Cambodia (Sophal *et al.* 2001, Deininger and Chamorro 2004). On the other hand, a number of countries such as Ethiopia, Mexico, India, or China impose restrictions on the transferability of land through either rental or sale even though tenure security is often quite high especially following recent legal changes and efforts to register land rights (Zepeda 2000, Haque 2001, Teklu and Lemi 2004, Deininger and Jin 2005).

productivity of land use, and self-assessed land values. This allows assessing the impact of tenure security, transferability and legal knowledge on visible and non-visible investment, productivity of land use, and land values, to test for possible differential effects of land tenure security and transferability and to quantify the impact of the recent legal changes. In fact, to the extent that, due to the pattern of dissemination of the law, legal knowledge by households can be considered as exogenous, measuring its impact on observed behavior provides a good estimate of the impact of new legal provisions.

Our conceptual framework with respect to the three outcome variables of interest is straightforward. Concerning *investment*, we assume that greater security against eviction will increase the propensity to make both visible and non-visible investments while greater transferability will affect the former but not the latter (Deininger *et al.* 2005). In addition to encouraging visible investment, transferability will also enhance the ability to use land as collateral for credit, although this is of limited relevance as long as the investments considered are labor-intensive. Higher levels of tenure security and transferability will increase *productivity* of land use through their effect on visible investments. Tenure security will also affect producers' incentives to exert effort and may be correlated with unobservable stocks of non-visible investments accumulated from the past. Transferability, in turn, may enhance productivity by making it easier for producers to obtain input credit. As *land prices* represent the present value of the income stream to be derived from a piece of land, they provide a way of checking the consistency of our results and to summarize the impact of policy change in a statistic that is easily understood and can be used to compare cost and benefit of alternative policy action.

We consider *tenure security* to be a function of the tenure regime, presence of ownership as compared to mere occupancy rights and the households' knowledge of current legal provisions. The latter is approximated by an index that is constructed based on household members' response to six questions referring to key aspects of the new law as explained in more detail below. To represent the level of *transferability*, we follow the literature and add the number of transfer rights in three dimensions (sale, rental, and bequest) at the parcel level (Besley 1995). We do so for rights that can be exercised with and without outside approval, thus obtaining one index of conditional and one of unconditional rights. Linking the different types of rights to observed outcomes then provides us with a straightforward set of hypotheses, as we will discuss in more detail in the context of the empirical framework for estimation.

Land-related investment: We use a dummy for whether any trees were planted during the 5-year period preceding the survey and the number of tress planted as indicators for visible long-term investment. Invisible investment is proxied by whether or not the plot had received manure, mulch or crop residue during the year preceding the survey. Letting I denote either the amount of land-related long-term

investment or a dummy for whether or not visible or invisible investment was undertaken and indexing households by *h* and parcels by *i*, the estimating equation can be written as:

$$I_{hi} = \alpha_1 + \boldsymbol{\beta}_1 \boldsymbol{X}_h + \phi_1 K_h + \boldsymbol{\gamma}_1 \boldsymbol{R}_{hi} + \theta_1 T_{hi} + \vartheta_1 T_{hi} \otimes O_{hi} + \boldsymbol{\eta}_1 \boldsymbol{P}_{hi} + \boldsymbol{\lambda}_1 \boldsymbol{V} + \varepsilon_{hi}, \quad (1)$$

where I_{hi} denotes the different indicators of investment as defined above and $\boldsymbol{X}_h$ and $\boldsymbol{P}_{hi}$ are vectors of household- and parcel characteristics, respectively to control for heterogeneity across farmers and parcels (e.g. in terms of soil quality, topography and location). At the parcel level, $\boldsymbol{R}_{hi}$ is a vector of transfer rights, T_{hi} is a dummy variable representing the tenure type (freehold/*mailo* or customary) of a given parcel and O_{hi}, which is interacted with T_{hi}, is a dummy for whether the plot is owned or occupied. K_h is an index measuring household *h*'s knowledge of the land law, $\boldsymbol{V}$ is a vector of village level infrastructure such as distance to the nearest district city and electricity access, ε_{hi} is an iid error term, and the remaining greek letters are coefficients to be estimated.

To construct R_{hi}, we add the number of transfer rights for each parcel as described above. As the formal documentation for freehold and *mailo* land is identical, we let T_h equal one if the parcel is held under either of these forms (including also 2 parcels held under leasehold tenure) and zero otherwise. It matters, of course, greatly whether a household is an owner or an occupant on *mailo* or other freehold land, we interact T_h with an occupancy dummy (one for occupants and zero otherwise), something that will also allow us to quantify possible investment- and productivity benefits from regularizing *mailo* occupants. The level of legal knowledge, K_h, at the household level is represented by the maximum score in the quiz administered to both the main male and female household members, thus implicitly assuming that such information is fully shared within the household.

While many empirical studies assume rights to be exogenously given, others show that farmers make land related investments to enhance such rights (Besley 1995, Brasselle *et al.* 2002, Place and Otsuka 2002). In our context, although a parcel's land tenure status can be considered exogenous, investments to increase transferability of land are a concern that is of empirical relevance. If transferability is endogenous, estimation of the above model by OLS will yield biased estimates. To deal with this, we use the Amemiya Generalized Least Squares (AGLS) estimator which has been shown to provide consistent and asymptotically efficient parameter estimates for limited dependent variable models (Newey 1987). As is standard in IV techniques, this procedure requires inclusion of identifying variables that are exogenous causes of variation in the rights variables but do not directly affect land-related investments. Modes of acquisition are well-suited to perform this function and categories included to empirically represent these in the first stage regression are whether a plot has been inherited, separately from the husband's and the wife's family, rented-in or occupied without permission, with purchase being the excluded category.

Based on the above discussion, we expect the variables measuring transferability and overall awareness of the land law to have positive effects on land-related investments by enhancing tenure security. Moreover, we can test for differences in tenure security that affect investment between lands held under freehold or *mailo*, and differentially for owners and occupants of such lands, by assessing whether the sign of the coefficient on the freehold/*mailo* dummy or the sum of this coefficient and its interaction with the occupancy dummy is significantly different from zero. The magnitude of the latter allows quantification of the increment in investment incentives that could be expected from regularizing *mailo* tenants while comparing the former will help to assess the importance of knowledge relative to more traditional indicators of tenure security.

Productivity of land use: While the general framework is similar, separate regressions for the productivity of land use, where past investments are included as right hand side variables allow us to test the extent to which tenure security and transferability have an impact over and above their impact on investment. As discussed above, finding such an effect would point towards increased incentives to supply effort (for tenure security) or greater ability to obtain credit (for transferability). We estimate a production function where the gross value of output is a function of input use, the presence of improvements and other parcel as well as household characteristics, and our tenure security variables. The specification takes the form

$$Y_{hi} = \alpha_2 + \boldsymbol{\beta}_2 \boldsymbol{X}_h + \phi_2 K_h + \boldsymbol{\gamma}_2 \boldsymbol{R}_{hi} + \theta_2 T_{hi} + \vartheta_2 T_{hi} \otimes O_{hi} + \boldsymbol{\eta}_2 \boldsymbol{P}_{hi} + \boldsymbol{\delta}_2 \boldsymbol{Q}_{hi} + \varphi_2 \boldsymbol{Z}_{hi} + \boldsymbol{\lambda}_2 \boldsymbol{V} + \upsilon_{hi}, \qquad (2)$$

where Y_{hi} is the value of crop output of household *h* from parcel *i*, $\boldsymbol{Z}_{hi}$ is the value of purchased inputs on each parcel, $\boldsymbol{Q}_{hi}$ is a vector denoting the pre-existing stock of different types of land-related investments (number of trees, soil and water conservation infrastructure), and υ_{hi} is an error term. All the other variables are as defined in (1). In addition to expecting positive coefficients on standard land quality and human capital characteristics, we also expect the stock of land-related improvements (visible and non-visible) will increase the productivity capacity of land, the variables that measure tenure security may have an additional positive impact on productivity by increasing labor effort or the ability to obtain credit.

Land values: As land sale values are the present value of expected profits from cultivating a plot, any factor that affects land productivity should have a similar impact in a hedonic land price regression (Rosen 1974). Regressing self-assessed land prices on the same set of right-hand side variables as was used in the productivity regression thus provides a way of checking for the robustness of our results, in addition to allowing the derivation of a monetary value for some of the tenure security variables included earlier. Presence of considerable noise in the land price data by occupants forces us to restrict the sample to owned plots for which we estimate a land value function of the form

$$L_{hi} = \alpha_3 + \boldsymbol{\beta}_3 \boldsymbol{X}_h + \phi_3 K_h + \boldsymbol{\gamma}_3 \boldsymbol{R}_{hi} + \theta_3 T_{hi} + \boldsymbol{\eta}_3 \boldsymbol{P}_{hi} + \boldsymbol{\delta}_3 \boldsymbol{Q}_{hi} + \boldsymbol{\lambda}_3 \boldsymbol{V} + \nu_{hi}, \qquad (3)$$

where L_{hi} is the subjective land value of parcel i owned by household h, and ν_{hi} is an error term. The interaction term of the tenure regime with ownership status is excluded because the estimation is done on a sub-sample of owners for the reason mentioned above. Given the subjective nature of reported land values, and the fact that household characteristics may affect the ability to make the most productive use of land, we also control for household characteristics and expect signs of the coefficients on the different variables to be consistent with what had been obtained earlier.

3. Context and descriptive evidence

To provide the context for our empirical analysis, this section highlights the importance of tenure security for investment and increased agricultural productivity for poverty reduction in Uganda. It describes the historical events that have significantly reduced tenure security for a large number of occupants as well as the measures taken by the recently passed Land Act to restore such security. We note the vast gap between the desired institutional structure and actual levels of implementation and use our survey data to provide empirical evidence on household and parcel characteristics as well as awareness of different provisions of the Land Act in the population.

3.1 The broader relevance of land-related investment

Although Uganda is a rather small country by African standards, it is characterized by a high level of variation in population density - which ranges from 65 per km^2 in the North to 226 per km^2 in the South-West and in physio-geographic conditions, which vary between nomadic semi-deserts in the North-East and the high elevations of the West and South-East. Population growth of 3.3% in the 1991-2002 period considerably increased land scarcity, with an increase in average population density from 64 persons per km^2 in 1980 to 124 in 2002 (Uganda Bureau of Statistics 2005). As more than 85% of the population live in rural areas and agriculture accounts for 77% of employment and 50% of total output (Belshaw *et al.* 1999), land has enormous socio-economic significance as a key productive asset and source of livelihood. Household surveys indicate that land makes up more than 50% of the average household's asset endowment and that 74% of households use agricultural land for subsistence (Deininger and Okidi 2003).

Elimination of implicit and explicit taxation of the agricultural sector in the early 1990s, together with comparatively high levels of economic growth created favorable conditions for agricultural productivity growth (Blake *et al.* 2002). However, the extent of investment and associated diversification of the productive sector remained limited and productivity failed to increase as expected (Belshaw *et al.* 1999). As a result, most of the increments in production achieved were due to expansion of cultivated area at the expense of woodlots, wetlands and natural grazing areas (Place and Otsuka 2000, Pender 2004) that can not be sustained in the future. There is consensus that higher investment to enhance land productivity,

allow the rural sector to realize its economic potential and lay the foundation for more rapid and sustained poverty reduction that could narrow a growing rural-urban gap (Kappel *et al.* 2005) will be critical. However, few studies have explored the contribution of tenure insecurity to limited rural investment in Uganda and the scope of land policy to help achieve broader goals. Before proceeding to the empirical part of the paper, we highlight that tenure insecurity is indeed widespread and that efforts to reduce it through the Land Act have not yet been fully effective.

3.2 Uganda's land policy

The key elements of Uganda's land tenure system date back to colonial occupation. Under the 1900 Buganda agreement,[2] the British awarded large tracts of "*mailo*" land and any smallholders occupying them to the Buganda king and his notables (Brett 1973). Only in 1928 were residual rights of the original occupants (who had been converted into tenants by a stroke of the pen) recognized by the *busuulu* (ground rent) and *envujju* (tribute) law which put a limit on the rent to be paid and provided protection against eviction without compensation of land-related investment. Lands not covered under this agreement were declared Crown Land, allowing the government to alienate such land (including their occupants) under freehold or leasehold grants. All of this implied that peasants on customary lands did not have any ownership rights of their own but were instead declared tenants who may or may not have some security against eviction. The ensuing insecurity and overlap of property rights created not only a fertile ground for conflict but also severe disincentives for land-related investment.

Nationalization of land under Idi Amin's 1975 land reform decree added to this complexity. The decree abolished freehold and *mailo* ownership and converted all land held under these categories into leasehold but made no attempt to resolve the problem of overlapping land rights (Baland *et al.* 2003). Its impact on the ground was, however, limited due to lack of implementation (Hunt 2004). As years of heated debate failed to produce an agreement on a legal basis for land issues that could have been included in the 1995 constitution, the constitution overturns the land reform decree and mandates passage of a separate land law within 2 years from its coming into force.

The 1998 Land Act, adopted in response to this requirement, includes far-reaching steps to increase tenure security for three groups who had enjoyed little or no protection in the past, namely customary land users, occupants on *mailo* land, and women. First, and most importantly, customary ownership is formally recognized and occupants on customary land converted into owners. Mechanisms are spelled out to allow customary owners to obtain a "certificate of customary ownership" that can be transferred through sale, rent, gift, or mortgage, and even converted into freehold titles through a well-defined process. Second,

[2] In this agreement, the total area of Uganda, estimated at 19,600 square miles, was distributed among the Buganda king, the kabaka (958 square miles), one thousand chiefs and private landowners (8 square miles each), and the remainder which was declared Crown Land to be vested in the colonial government (West 1972).

mailo owners' demands to reinstate *mailo* as a separate category of land ownership could not be resisted, implying that it was impossible to award full ownership to tenants on such lands.[3] Still, tenants' rights are strengthened and granted far-reaching protection. Tenants who had peacefully occupied a piece of land for 12 years before passage of the Act are given formal recognition although they have to pay a nominal ground rent of USh 1,000 (less than 1 US$) annually, irrespectively of the area occupied. *Mailo* tenants can also apply for a certificate of occupancy that provides the right to give away, sublet, mortgage or transfer land through inheritance, and can be converted into a freehold title, all with the consent of the registered owner. Third, even though last-minute changes precluded inclusion of far-reaching provisions that would have strengthened women's position by giving automatic co-ownership to spousal land,[4] the Act nullifies customary provisions that discriminate against women. A subsequent amendment introduced the concept of "family land", defined as land used by the household to derive its livelihood, which can not be transferred without consent by the spouse or children depending on this land.

The land act's progressive provisions, many of which are effective without any formal process or survey, are in contrast to the institutional designs for implementation many of which appear to have been adopted with little effort to weigh potential costs against benefits and then arrive at a compromise that could actually be implemented. Before proceeding towards implementation, it was thus necessary to completely redesign the implementation strategy for the Act (Hunt 2004). Three aspects are of interest. First, even though the Act mandates establishment of land committees at the lowest administrative level, financing to establish them was unavailable and would have been difficult to justify.[5] Even though their authority had *de jure* lapsed with the passage of the Act, local courts continued to dispense justice and were reinstated with adoption of the Land Act Implementation Strategy (Government of Uganda 1999) which included other far-reaching changes in the institutional design as well. Second, lack of *ex ante* analysis and survey techniques that would be sufficiently-low cost to allow a system of land administration to be sustained from user fees curtailed the extension of land administration to traditional areas and the issuance of certificates of customary ownership as envisaged in the legislation.

[3] A land fund was to be established to help customary tenants obtain certificates of occupancy fund payment of compensation to land owners whose rights are diminished through such certificates. While the land fund and the associated promise of compensation to *mailo* landlords was partly needed to secure the consent of Baganda landlords to the Land Act, it also aimed to honor the President's pledge to secure land rights of tenants in Kibaale county, who had a major role in the independence struggle, by extinguishing the rights of landlords there (Hunt 2004).

[4] While the original draft had contained a clause that, through automatic co-ownership of land by both spouses in the household, aimed to strengthen property rights enjoyed by women significantly, this clause was dropped from the final version, leading to concerns that women may be particularly vulnerable, especially in the context of the significantly increased adult mortality caused by HIV/AIDS.

[5] For each of the (then) 45 districts, a District Land board was to be set up to hold and allocate land not owned by a person or authority; facilitate the registration and transfer of interests in land; take over and exercise the powers of a lessor in respect of leases granted out of former public land; and compile and keep under review compensation rates payable where land is to be compulsorily acquired. Expenses and fees of the boards were to be charged to District Administration funds. In addition, for each of the approximately 4,517 parishes, a Parish Land Committee, and for each of the 64 gazetted urban areas, an Urban Land Committee, who would be responsible for adjudicating boundaries and rights and issuance as well as maintenance of certificates of customary ownership, were to be established. With the exception of the High Court, the act eliminated the jurisdiction of the courts over land disputes. Instead, it set up District Land Tribunals consisting of 3 members to be appointed by the chief justice on the advice of the Judicial Service Commission. For each sub-county, urban area and division of the city, a Sub-county Land Tribunal and an Urban Land Tribunal. However, no arrangements for funding the costs of these tribunals were made (McAuslan 2003).

In fact, 7 years after passage of the Act, not a single one of these certificates has been awarded, despite considerable grassroots demand and the fact that in some areas work on systematic surveys with lower-cost technologies had been initiated (Rugadya *et al.* 2004). Lack of a sustainable business model and institutional structure imply that even in traditional *mailo* areas, land administration is challenged to live up to requirements. Finally, the government failed to widely disseminate the Act, despite the fact that no behavioral changes can be expected unless households are aware of its provisions. Only recently, in preparation for pilots to systematically demarcate land in few parishes, were systematic efforts, including preparation of leaflets in local languages and training sessions, undertaken. The fact that these activities were limited to the parishes singled out for subsequent intervention provides us with an interesting exogenous source of variation in the level of knowledge which can be utilized in econometric estimation.

3.3 Data and descriptive evidence

The data for our analysis are from a survey conducted in the second half of 2004 by the World Bank in collaboration with the Ministry of Water Land and Environment (MWLE), Makerere University, and FASID to provide a baseline that could help to study the impact of systematic demarcation at a later stage. In each of six districts, chosen to capture the diversity of Uganda's different regions, one parish that had been selected for systematic demarcation and a neighboring parish with similar characteristics were chosen.[6] This yielded a total sample of 970 households or 2185 parcels in 12 parishes. Within each parish, households were selected randomly. In addition to standard household characteristics, the survey contains results from administering a quiz on provisions of the new land Act to both the main male and female person in the household (usually head and spouse) to assess the extent of their legal knowledge. This is complemented by a large array of information on land ownership and transfer rights, soil quality, and production at the plot level.

Key statistics for parcels owned or operated by the sample households, by main tenure type, as reported in table 1, yield a number of insights. First, contrary to widespread belief, the difference in transferability between freehold and customary tenure is one of degree (i.e. unconditional vs. conditional) rather than principle. In fact, while the ability to sell without restrictions is, with 50%, lowest under the customary tenure regime, 26% of customary holders, as compared to 12% under freehold and 8% under *mailo*, are able to sell provided they have obtained prior approval. Even though the number of rights that can be exercised without approval is highest for freehold parcels, customary parcels have the highest number of rights with approval, while *mailo* comes in lowest in both categories. This suggests that customary lands do not appear to suffer from limited transferability; to the contrary, constraints to land transfers may be

[6] The districts are Iganga, Mbale and Soroti from the East, Kibalale from the West, Moroto from the North and Wakiso from the Central region. The "control" parishes from each sub-county were selected purposefully in consultation with sub-county officials to correspond to the pilot sites.

more of an issue on *mailo* land, an interpretation that is supported by similar differences in the ability to rent and to give land with or without approval across tenure categories.

Figures on the mode of acquisition suggest that about half of the parcels were inherited, in the majority (43% overall) from the husband's family, while 28% were purchased and 19% rented in. Concerning land-related investments, one of the key variables in our analysis, we note a clear difference between the presence of trees and recent investments in such improvements. While 46% of parcels have tree crops (66% on freehold, 53% on *mailo*, and 42% on customary land), only about one quarter of households made tree investments during the last 5 years (41% on freehold, 30% on *mailo*, and 25% on customary lands), planting on average 30 trees (33 on customary land and about 25 each on freehold and *mailo*). About 25% practiced soil conservation (32% on freehold, 28% on *mailo*, and 23% on customary). The fact that more than 97% of parcels have no formal document implies that use of a title dummy would not be a good approximation of households' level of tenure security, quite apart from the fact that even in cases where households claim to have such a document, its legal value may be open to doubt. However, we find that more than 95% of those who could obtain a document - either a title or a certificate of customary ownership – actually want to have one. With 89%, a surprisingly high share indicated that they would be willing to pay, with the mean and median willingness to pay being US$ 15 and US$ 6 per acre, respectively. This suggests not only that tenure insecurity in Uganda is high but also lends credence to the hypothesis that households are actively seeking to escape this situation and that greater tenure security could therefore help increase investment incentives and agricultural productivity.

Mean self-assessed values for land sales or rental amount to US$ 718 and US$ 34 per acre, respectively. Closer inspection of these prices suggests that policy announcements regarding the planned establishment of a land fund, to be used by government to purchase land in Kibaale (the only *mailo* region included in the sample), had a significant impact on prices. Compared to sale prices of US$ 550 and US$ 600 per acre for customary and freehold land, respectively, *mailo* owners in this region believe their land to be worth more than 10 times this amount (US $ 7,000 per acre). Even though the mean is affected by outliers, the median self-assessed land value for *mailo* owners of US$ 1,300 per acre is still more than 4 times that of customary and freehold owners (US$ 202 and US$ 289 per acre). As *mailo* land that is "encumbered" by presence of a tenant with permanent and inheritable occupancy rights, prices for such land should actually be significantly lower than that of freehold land.

Together with the fact that a difference of this magnitude can not be justified by underlying productivity characteristics, this suggests that the announcement of the land fund has led to a speculative increase in land prices. This will not only make it much harder to finance the land purchases envisaged under this fund but also casts further doubt on the justification, at least from a poverty perspective, of such a scheme

as the costs are likely to be enormous while most of the benefits will accrue to wealthy land owners who would be paid inflated prices by the government for the land they "offer". The fact that *mailo* parcels are estimated to fetch US$ 156 per acre in rental markets, compared to US$ 29 for customary and US$ 65 for freehold lands, a difference that is maintained if one looks at the median instead where rental prices are US$ 43, 30, and 15, respectively. This suggests that inflated expectations have also affected hypothetical land rental prices, thus negatively affecting potential renters' ability to gain access to such lands through market mechanisms. Finding ways to increase security of *mailo* tenants in a way that is more incentive compatible (and less costly) than the open-ended promise of financing under the land fund will be critical.

Comparing hypothetical land values to the total value of production net of cash input costs suggests that with the exception of *mailo* areas, land sales prices are, at about 7 times profits, in line with international evidence. Figures on input use also suggest that, with only 1% of producers using fertilizer and 4% applying pesticides, use of chemical inputs is very low; in contrast to about 50% who purchase seeds and 32% who rely at least partly on hired labor. This is consistent with other studies of Ugandan agriculture (Pender 2004). There are significant differences across tenure regimes in the extent to which higher value root crops, fruits, or cooking banana (*matooke*) is cultivated. While these are likely to be rooted in inherent variation of agro-ecological suitability, soil fertility, and market access, the high correlation of such regional features with tenure status implies that, to avoid misinterpretation of the tenure variable, we will need to adjust for such inherent productivity differences.

Table 2 presents key household characteristics for all households and by quartile of the asset distribution. The importance of land and of policies that affect it is illustrated by the fact that land constitutes more 60% of the total assets owned by sample households. With a Gini coefficient of 0.80 for the total value of non-land assets and the bottom quartile owning less than US$ 50 and the top quartile more than 100 times this amount, inequality in non-land assets is considerable. We find a similar result in terms of land values (the sum of the value of owned and occupied parcels) though not as the same level of magnitude as the value of non-land assets. The value of land held by the top quartile (US$ 5,939) is 10 times higher than that by the bottom quartile. There is also a high correlation between ownership of human and physical capital assets as well as income levels. Although our data do not allow comparison over time, they are not inconsistent with evidence suggesting a widening of the gap in assets as well as educational achievement between rural and urban areas, increasing inequality, and a rise of rural poverty following a good record of poverty reduction in the country (Kappel *et al.* 2005, Uganda Bureau of Statistics 2005).

The table illustrates that a key difference between rich and poor households is that the former have access to a more diversified range of income sources, especially wage income (33% for the top as compared to less than 15% for all the three bottom quartiles), and sale of livestock products (62% as compared to less

than 30% for the bottom). The importance of improved agricultural productivity, and the possible contribution of secure land rights, for poverty reduction is illustrated by the high dependence of the poor on income from crop production; those in the three bottom quintiles receive about two thirds of their total income from crops, as compared to a much lower share (24%) for the top quartile. We also note that, with only about one quarter as compared to almost half of households in the top quartile, the level of knowledge about the new land law increases significantly with asset ownership and educational level, two factors that would be expected to be correlated with ownership of radios or the ability to read written pamphlets, something we will make use of below to reduce the scope for omitted variable bias.

Table 3 contains more specific evidence on male and female household members' knowledge of different aspects of the new land law based on a multiple choice quiz with specific questions on this Act that was administered to male and female households separately. Consistent with the main innovations brought about by the Act, our measure of legal knowledge combines three elements, namely (i) awareness of the land rights awarded by this law and the channels to enforce these rights; (ii) knowledge of the scope for government to impose restrictions on land use, especially by *mailo* tenants; and (iii) recognition and protection of women's land rights. As less than 30% of overall respondents provided correct answers, we conclude not only that the level of legal knowledge remains quite limited but also that the specific issues asked have some discriminatory power.

The first two knowledge questions relate to customary lands aim to explore whether households are aware that the new law legitimizes customary tenure and allows receipt of certificates of customary land ownership that can be converted into fully surveyed ownership certificates upon payment of a fee. Although slightly higher among customary owners (39% as compared to 36% for the total), the level of awareness about this regulation remains fairly low even among male respondents and is slightly lower for female ones. The two questions regarding *mailo* tenants aim to enquire whether respondents know that such tenants are, under certain circumstances, protected from eviction and whether, landlords can prohibit tenants from planting perennials on the land they occupy for fear of gaining permanent rights - an issue which will have immediate impacts on tenants' investment incentives. Responses indicate that more than 50% of *mailo* tenants in the sample are not aware of the tenure security afforded to them under the new law and almost 70% mistakenly believe that the landlord can prevent them from planting trees or undertaking other land-improving investments. The latter is likely to reduce their eagerness to take advantage of opportunities to make the most productive use of their land.

A final set of legal questions refers to the conditions under which occupancy rights can be acquired and whether the protection afforded by law to women's rights on family land is unconditional or conditional on an administrative procedure. Regarding the latter we find that, even though awareness of the fact that

recognition of family land is automatic, i.e. does not require any intervention by local governments, less than one third of the individuals asked know about this. As women play a major role in cultivation, the fact that more than two thirds of women are unaware of their legal land rights to land could indeed have far-reaching implications for investment and land use decisions that will in turn translate into lower levels of productivity. All of the descriptive evidence suggests that dissemination to overcome the ignorance surrounding key provisions of the Land Act could have a significant impact in a number of respects. Below we explore the extent to which this is borne out by more rigorous econometric evidence.

4. Econometric results

Exploring the impact of tenure security and transferability on investment, productivity, and land values provides not strong support for our hypotheses that disaggregating different types of land rights (i.e. tenure security and transferability) can provide important insights. It also suggests that the legal change can provide very large benefits. To the extent that lack of dissemination by the government and the corresponding lack of knowledge by households have thus far prevented full realization of the benefits from this Act, efforts to better disseminate the new law will have a high return.

4.1 Factors affecting visible and non-visible investments

First stage results for land transfer rights, using the modes of acquisition as identifying instruments, are reported in appendix table 1. They point towards a significant impact of the mode of acquisition on the transfer rights for any given parcel (omitted reference categories are *mailo* tenure and purchased land, respectively). Plots that had been inherited or just occupied as well as house plots (or those closer to home) are significantly more likely to be transferable only with outside approval, that plots under *mailo* or freehold tenure and those closer to urban centers and infrastructure (electricity) are more likely not to be subject to such restrictions, while rented plots are significantly less likely to be transferable at all. Households' level of education and their knowledge about the land Act make it more likely for them to be aware of the conditions imposed on transferability of land.

Table 4 presents results from the second-stage AGLS regression to identify determinants of land-related investment, measured by a dummy for whether or not any trees were planted (column 1), measures of soil conservation were undertaken (column 3), or the log of the number of trees planted per acre (column 5). Signs of the coefficients on parcel characteristics such as distance to the house, land quality, size and topography of the plot are significant, indicating that long-term investment is more likely on parcels that are close to the homestead, larger in size, steep or undulating rather than completely flat, and have at least medium levels of land quality.

As expected, greater transfer rights are associated with significantly higher levels of long-term investment (tree planting) but do not have any significant impact on the propensity to undertake soil conservation, consistent with the hypothesis that transferability in the sales market matters less for invisible short-term investments than for visible improvements that are likely to affect land prices. At the margin, adding one unconditional or conditional right to the existing bundle is estimated to increase the probability of tree planting by between 8 and 11 percentage points. Interestingly, the point estimate for the coefficient on conditional rights (i.e. with outside approval) is larger than that on the coefficient on unconditional rights although we can not statistically reject equality of the two coefficients. This would imply that concerns about the need for spousal approval acting as a significant break on land-related investment that have featured prominently in the debate surrounding passage of the Land Act (Ovonji-Odida 2002) appear to be ill-founded, at least for the type of land and investments considered here.

Consistent with the coefficients on transferability, the propensity to make long-term investments on the land is significantly higher on land held under freehold or *mailo* tenure with the point estimate suggestin a marginal effect of 15.5 points. However, this impact is confined to owners; the negative coefficient on the dummy for tenants or occupants and the inability to reject the hypothesis of the sum of both equaling zero imply that, although being located on *mailo* or freehold land, tenants' propensity to make long-term investments is not different from that of customary owners.

The coefficients on household's knowledge of the land law are significant and positive, suggesting that, irrespectively of the land tenure regime, better knowledge of legal provisions, along the dimension discussed earlier, will increase the propensity to make long-term investments. The marginal impact of exogenously increasing a household's knowledge on one additional item is estimated to increase this figure by slightly more than one percentage point. The point estimates for addition of one (conditional or unconditional) transfer right or for shifting a household from ignorance to full knowledge of the law are each about half of the estimated investment-enhancing impact of freehold tenure although we can not statistically reject the hypothesis of θ_1 and φ_1 being equal. This supports the notion that tenure status is of great importance while at the same time illustrating the scope for less complex and costly changes in land rights to have a significant investment-effect. While results from the two-step tobit regression do not allow us to reject the hypothesis that knowledge of the land law will not significantly affect the number of trees planted (as compared to whether or not such an investment is made), this may be due to the limitations of data quality explained earlier. Also, as the null hypothesis of exogeneity can not be rejected, a simple tobit regression may provide more efficient estimates. Results from doing so, reported in appendix table 2, suggest that an exogenous increase in legal knowledge from the current level to full awareness would be associated with a 10% increase in the number of trees planted per acre.

The importance of legal knowledge is reinforced by the significance and magnitude of the coefficient of our knowledge index for short-term soil conservation. An increase of a household's legal knowledge by one element would, according to the coefficients, result in an increase in the propensity to undertake soil conservation that is equivalent to increasing the length of possession by more than 10 years the head's level of education by more than 3 years. In addition to being significant, the length of time for which the plot has been held by the household has the expected positive sign. The rather modest size of the coefficient suggests that long possession has little potential to improve what are essentially defective rights. Results are similar for short-term investments with the exception of a smaller negative coefficient on distance to the house and flat topography, and lack of significance of the land quality variable and steeply sloped land. Consistent with the limited visibility of the fruits of short-term investment, we find little evidence of transferability on increasing such activity, further reinforcing the importance of legal knowledge and, by implication, measures of dissemination that aim to increase such knowledge, on the way in which land is used. In fact, the χ^2 test statistic rejects equality of the coefficients on both variables, suggesting that, as far as short term investments in soil management are concerned, knowledge of the law matters more than having transfer rights to the land.

Household characteristics that increase farmer's propensity to invest include the level of education which is likely to improve understanding of the underlying relationships and marketing of the products from such investment, household size and the associated availability of labor for undertaking the investment, and, somewhat surprisingly, a dummy indicating that the household is headed by a female. Higher levels of household assets in the past have no appreciable impact on investments in soil fertility but reduce the propensity to plant trees, pointing towards a substitution effect between land-attached and other productive assets.

4.2 Productivity determinants

Results from the OLS regression with the log of the value of annual crop production per parcel as dependent variable are presented in table 5. Column 1 contains the reduced form while column 2 adds variables for tenure security (tenure type and our knowledge index) and transferability (conditional and unconditional rights) while column 3 contains additional controls for agro-ecological suitability. We adjust for non-use of certain inputs with dummies (Battese 1997), the coefficients for which are not reported due to space constraints. Results indicate that household size – used as a proxy of family labor – and hired labor are positively and significantly associated with the value of crop production. The same is true for other conventional inputs with the exception of chemical fertilizer and pesticides, the use intensity of which is very low. Due to the negative intercept, purchased seed has a positive impact on crop productivity only above a minimum value of about US $ 4.

Coefficients on other parcel and household characteristics generally have the expected sign. The most important is the increased availability of moisture on swamps and wetlands which is estimated to have a very significant and large (about 75%) positive impact on the value of crop production, most likely due to the ability to obtain multiple crops per year. Poor soil quality has a marginally negative effect (significant at 5% or 10%, depending on the specification) and topography is only of marginal significance. While the coefficient on household assets looses significance once tenure characteristics are added, human capital endowments are significant throughout, suggesting that an additional year of education by the head will increase output by about 2 percentage points. Availability of markets and other infrastructure, proxied by the distance to the next biggest town, is consistently significant with the point estimate suggesting that being located 10 miles closer to the city will increase output value by about 20 percentage points.

The regression also allows insights on the impact of tenure security and land-related investments. Land improvements in the form of both tree planting and soil conservation have a strongly positive effect on productivity of land use in all three specifications. Inability to reject the hypothesis that the marginal impact of additional tree planting on productivity equals that of additional investment in soil conservation measures, irrespectively of whether a dummy for presence of trees or the actual number of trees is used, testifies to the importance of the latter and the high relevance of tenure security which, according to the earlier results, is the only variable that has a significant impact on soil fertility investment.

Columns 2 and 3 also illustrate that knowledge of the law also has an independent impact on productivity of land use. According to the size of the coefficient, shifting a household from complete ignorance to full awareness of the law would to increase his or her output by 20 percentage points, in addition to any indirect impact on investment. The significance of knowledge contrasts to the insignificant coefficient on transfer rights which suggests that such rights affect productivity only indirectly through long-term investment, suggesting that the levels of transferability enjoyed currently is not the most binding constraint for producers' ability to access credit or otherwise improve productivity. The positive and highly significant coefficient on freehold or *mailo* tenure in column 2 could point towards an independent credit effect that is associated with availability of land title. The fact that the significance of this coefficient completely disappears once indicators of agro-ecological suitability are added in column 3 suggests that other forces may be at play and further investigation may be warranted. Compared to formal rights or knowledge about the law, the number of years a plot has been in possession of the household is estimated to not have any significant impact. All of this supports the hypothesis that, in the environment at hand, dissemination of the Land Act's contents may have a significant impact on increasing productivity directly by improving tenure security and indirectly, by increasing households' propensity to undertake land-related investments.

4.3 Land value determinants

Results from equation (3), reported in table 6 for two specifications with and without knowledge and rights variables, are largely consistent with earlier evidence. In both specifications, we include a dummy for *mailo* to control for price inflation on such land that had been noted earlier. Land prices are estimated to decrease in parcel size, albeit at a decreasing rate and location in a swamp or wetland increases values by between 54 and 60 points, as noted earlier. In fact, the highly significant and large coefficient on this variable (of almost 1.4) supports the notion of considerable overvaluation of *mailo* land as a result of having the land fund. Good land quality is estimated to increase land prices by about 16 to 18 percentage points. The negative coefficients on flat and steeply sloped land suggest that hilly or undulating land, the base category, is considered more valuable than these categories. Land in places where public electricity is accessible is also significantly more valuable. With the exception of the head's level of education which was an important proxy for the ability to make good use of the land earlier as well as total asset holdings, no other household level variables emerge as significant.

While presence of long-term investment, i.e. the number of trees on any given parcel, is estimated to have a very positive impact with an elasticity of 12% to 13% depending on the specification, we can not confirm a significant impact of soil conservation on land prices. This may be because such investments are less easily noticed by an outsider who might wish to purchase the land. Including variables for subjective and objective tenure security and transferability (column 2) adds two elements of interest. First, legal knowledge, our proxy for households' subjective level of tenure security and their ability to enforce the law, is highly significant and positive; the point estimate suggests that a shift from ignorance to knowledge would increase land values by about 25%. While there may be concerns about omitted variable bias leading to upward bias on the knowledge coefficient, this is unlikely to be an issue as other observables that may affect this variable are included and, more importantly, because the key source of information on the new land law is from an exogenously placed dissemination program that was initiated in preparation for systematic demarcation.

We also find that unconditional transfer rights have a marginally significant and positive impact; although the hypothesis of equal coefficients on conditional and unconditional rights can not be rejected at conventional levels of significance. The large and significant *mailo* dummy suggests that, after adjusting for quality differences, the land fund announcement may have more than doubled land prices, something that will, paradoxically, make it harder to implement such a measure.

Under the assumption that our measure of knowledge is exogenous and fully captures the innovations brought about through the Land Act, the predicted knowledge-induced increase in land values provides a first approximation of the "value" of this piece of legislation as well as the potential benefit from fully

disseminating its content. Doing so suggests that the Land Act has a potential to increase households' net wealth by 14 percentage points, i.e. about US$ 340 per household or US$ 1.15 billion for all owners or occupiers of land in rural Uganda.[7] The fact that, due to low levels of awareness,[8] the lion's share of these benefits has not yet been realized, illustrates the potentially very large from more aggressive dissemination of its contents. As there are few landless in Uganda and the distribution of land is more equal than the overall asset distribution, the associated increase in asset values would be pro-poor in the sense that the relative gain would be bigger for the bottom than the top quartiles of the non-land asset distribution. The presence of a significant demand for certificates of customary ownership or full freehold title evidenced by our survey points towards ample opportunities to strengthen the pro-poor impact of this by establishing a program that would respond to this demand but establish higher charges for titles than for basic customary certificates. This implies not only that, even by conservative estimates, changes in land legislation may be a worthwhile investment but also that Uganda and possibly other countries in the region as well can reap significant benefits from more determined efforts to disseminate new land laws.

5. Conclusion

By providing an in-depth analysis of the economic impact of Uganda's 1998 Land Act, this paper adds to the methodological as well as policy debate. On the methodological side, our findings suggest that one reason for the divergent conclusions on the impact of land title found in earlier literature may be a failure to account for the multi-dimensional nature and complexity of land rights. We find a clear difference between rights to transfer land, which increase the propensity to undertake visible investments and thus can be expected to affect land values in case of a sale, and more traditional measures of tenure security, which in addition increase the tendency to manage soil fertility in a sustainable manner. Similarly, households' awareness of their land rights in a number of dimensions has a significant and large impact on outcome variables that is in many respects equal to the impact of the land rights variables considered in the earlier literature, suggesting that failure to account for this variable may result in biased estimates.

Although a large number of African countries have recently embarked on revisions of their land legislation that aim to increase the level of tenure security enjoyed by customary land owners and women, we know of no study aiming to assess the economic impact, both actual and potential, of such steps. We show that, under reasonable assumptions, use of an objective measure of households' knowledge of these provisions can be used to approximate the "value" of the legal changes. Results point towards a large

[7] The 2002 Census of Population and Housing puts the number of rural households at 4.4 million but does not report the share of those who operate agricultural holdings. As we did not have access to disaggregated Census data, we use the 1999 Uganda National Household Survey which indicates that 77% of rural households own or occupy agricultural land. Absence of data for land, including agricultural land that is rented out, owned by urban dwellers, constrains our ability to make inferences beyond rural land that is either owned or occupied, thus providing a conservative estimate of the potential benefits from the land Act.

[8] As half of our sample comprises of areas where at least some dissemination activities have been undertaken, the level of knowledge about the Land Act in the overall population is likely to be significantly below the figures that were obtained in this sample.

potential impact (US$ 1.15 bn. for owners and occupants in rural Uganda), much of which is not realized due to limited dissemination. It implies that efforts to inform households about their rights and obligations under the new law could lead to large benefits. More generally, we conclude that, where human and fiscal resources to implement land administration programs are limited, well-disseminated legal reform can be an important and far-reaching first step to reap the benefits of higher tenure security.

Regarding the broader policy debate, our results support the hypothesis that enforceable legal change can have a major impact on investment and productivity even if it is not accompanied by immediate programs to award certificates. Still, evidence of a high demand for certificates of customary ownership that is backed up by a realistic willingness to pay suggests that, in the medium to long term, legal reform is unlikely to obviate the need for establishment of an effective land administration system. Identification of cost-effective mechanisms (e.g. using advanced handheld GPS) that can quickly respond to this demand in a way that allows maintenance of records and options for demand-driven upgrading as needed is a high priority to increase coverage of land administration in Africa. Complementing the evidence on the value of legal innovation provided in this paper with an evaluation of the impact of such certificates is a high priority for future research in this area.

Table 1: Key parcel level variables

	Total	Tenure type				
		Freehold		Customary	*Mailo*	
1. Land rights						
Sell without approval (%)	51.5	58.1	*	50.1	54.4	*
Sell with outside approval (%)	20.9	11.5	***	25.9	8.0	***
Rent without approval (%)	60.3	69.6	**	60.1	58.3	
Rent with outside approval (%)	13.4	5.4	***	16.6	5.7	***
Give without approval (%)	57.0	63.5	*	56.5	56.9	
Give with outside approval (%)	18.7	9.5	***	23.4	6.7	***
Plant timber trees without approval (%)	74.6	75.7	*	81.4	52.8	***
Plant timber trees with outside approval (%)	4.8	4.1		5.2	3.7	
Number rights without approval	2.4	2.7		2.5	2.2	***
Number rights with outside approval	0.6	0.3	***	0.7	0.2	***
2. Mode of acquisition and parcel characteristics						
Parcel purchased (%)	27.5	36.5	***	24.1	35.6	***
Parcel inherited from husband's family (%)	43.0	30.4	***	50.6	22.7	***
Parcel inherited from wife's family (%)	6.7	6.1		6.9	6.3	
Parcel rented-in (%)	19.3	21.6	**	15.3	31.3	***
Parcel area in acres	1.8	2.1		1.9	1.4	***
Distance from house in minutes	20.1	16.5		22.3	14.2	***
Years possessed	17.2	14.2	***	18.4	14.4	***
Good land quality (%)	34.5	35.1		36.3	28.6	***
Fair land quality (%)	49.5	51.4		49.7	48.1	
Flat land (%)	56.1	50.0	***	63.8	33.3	***
Gently sloped land (%)	33.8	40.5	***	25.5	57.9	***
Rainfed (%)	97.2	97.3	*	97.3	96.5	***
Swamp/Wetland (%)	1.3	0.7		1.5	0.8	
3. Land related improvements and land values[1]						
Dummy: planted trees during the past 5 years (%)	27.4	41.2	***	25.4	29.9	**
Number of trees planted during the past 5 years per acre	29.9	25.1		32.8	24.1	
Dummy: parcel has tree crops (%)	46.0	66.2	***	41.9	52.8	***
Number of trees per acre	47.0	32.3		52.4	39.2	
Practiced soil conservation (%)	24.9	31.8	**	23.1	28.4	**
Hypothetical value of land per acre (US $)	717.9	607.9		548.4	7826.3	***
Hypothetical rental price per acre (US $)	34.4	65.1	***	28.7	156.2	***
4. Crop production and input use per acre						
Total value of crop production per acre (US $)	117.7	149.8		109.7	133.6	
Dummy: used purchased seed (%)	50.3	39.1	***	53.6	42.8	***
Dummy: used purchased chemical fertilizer (%)	1.2	1.8		1.2	0.7	
Dummy: used purchased pesticides (%)	4.2	6.4		4.1	3.6	
Dummy: used hired labor (%)	32.4	30.0		34.6	25.2	***
Value of purchased seed per acre (US $)	6.6	5.2	**	6.6	7.1	***
Value of purchased chemical fertilizer per acre (US $)	4.0	0.4		5.2	0.8	
Value of purchased pesticides per acre (US $)	6.1	6.5	*	6.9	2.5	
Value of hired labor per acre (US $)	19.2	16.1		19.2	21.1	***
Banana on parcel (%)	32.3	64.6	***	23.9	49.2	***
Root crops on parcel (%)	49.5	75.6	***	38.5	77.3	***
Fruit crops on parcel (%)	9.2	32.3	***	4.0	18.9	***
Vegetables on parcel (%)	2.4	3.1		2.2	2.8	
Number of observations	2185	148		1546	489	

[1] Land sales values are only for owners but not for renters.

* significant at 10%; ** significant at 5%; *** significant at 1% for the t-statistic to test the equality of group means using customary tenure as a reference group. Note that 26.4 % and 93.5 % of the parcels under freehold and *mailo* tenure systems are respectively occupied by tenants.

Source: Own computation from 2004 WB/Makerere/FASID land tenure survey.

Table 2: Key household characteristics

	Total	Quartile of asset distribution			
		Bottom	2nd	3rd	Top
Head's age (years)	45.4	42.2	43.9	46.3	49.2
Head's education (years)	4.7	2.6	4.1	4.9	7.2
Female headed household (%)	17.2	21.7	18.7	14.4	14.0
Household size	6.3	4.5	6.0	6.9	7.8
Knowledge of land law at the household level (%)	40.7	26.1	46.1	43.1	47.6
Value of household assets now (US $)	1194.2	33.8	141.5	352.6	4257.7
Value of livestock assets now (US $)	197.6	8.5	43.5	186.4	553.2
Value of all non-land assets now (US $)	1408.9	46.7	191.5	552.2	4854.9
Value of land owned (US $)	1521.0	444.8	701.8	1135.4	3813.1
Value of land occupied (US $)[1]	783.4	116.7	195.5	677.3	2126.1
Total value of land (US $)	2304.5	561.5	897.4	1812.6	5939.2
Value of land and non-land assets (US $)	3760.2	611.9	1101.7	2388.7	10943.2
Number of parcels owned	1.6	1.7	1.4	1.5	1.6
Number of parcels occupied	0.4	0.2	0.4	0.4	0.8
Total Number of parcels	2.0	2.0	1.7	1.9	2.4
Area of land owned in acres	4.8	3.4	2.5	3.3	9.9
Area of land occupied in acres	0.7	0.2	0.5	1.0	1.0
Total area of land	5.5	3.7	3.0	4.3	10.9
Number of parcels	2.3	2.3	2.1	2.2	2.7
Total area of land holdings in acres	4.0	3.5	3.2	4.3	5.0
Engaged in crop production (%)	93.7	92.2	98.8	95.1	88.8
Engaged in wage employment (%)	15.9	6.6	11.6	12.8	32.6
Engaged in business activities (%)	32.6	24.6	33.6	36.6	35.5
Engaged in selling own livestock products (%)	52.6	28.3	57.7	63.0	61.6
Crop income (US $)	247.1	127.9	192.6	381.2	287.0
Wage income (US $)	167.8	28.9	44.2	70.7	528.3
Business income (US $)	110.4	40.8	68.1	88.0	245.1
Livestock products income (US $)	43.8	6.9	4.4	18.5	145.8
Total income (US $)	569.2	204.6	309.3	558.5	1206.2
Share of crop income in total (%)	43.4	62.5	62.3	68.3	23.8
Share of wage income in total (%)	29.5	14.1	14.3	12.7	43.8
Share of business income in total (%)	19.4	20.0	22.0	15.8	20.3
Share of livestock products in total (%)	7.7	3.4	1.4	3.3	12.1
Number of observations	970	244	241	243	242

[1] Occupied parcels are evaluated using the median prices corresponding to the respective communities. Rented-in (both under fixed and sharecropping contracts) and borrowed-in parcels are excluded while computing the value of land occupied by the household.
Source: Own computation from 2004 WB/Makerere/FASID land tenure survey.

Table 3: Households' knowledge of important legal provisions

	Total	Main tenure type				
		Freehold		Customary	*Mailo*	
Male knowledge of the land law						
Possible to obtain certificates of customary ownership	36.0	35.2		39.2	28.1	***
Certificate can be converted into ownership upon payment	31.3	40.8		31.4	28.5	
Mailo tenants are protected from eviction	28.5	52.1	***	18.7	46.5	***
Mailo tenants can prohibit investments	20.2	50.7	***	12.3	31.6	***
Anybody occupying land for 12 years gets a certificate	34.5	56.3	***	29.9	40.2	***
Recognition of family land needs application to LC1	26.0	35.2	**	23.5	29.7	*
Index	29.4	45.1	***	25.8	34.1	***
Female knowledge of the land law						
Possible to obtain certificates of customary ownership	32.2	33.8		33.6	28.1	
Certificate can be converted into ownership upon payment	29.0	42.3	***	26.3	32.0	*
Mailo tenants are protected from eviction	27.8	39.4	***	14.8	57.4	***
Mailo owners can prohibit investments	21.8	60.6	***	9.6	41.4	***
Anybody occupying land for 12 years gets a certificate	31.0	43.7	***	25.2	42.2	***
Recognition of family land needs application to LC1	31.6	46.5	***	28.1	36.3	**
Index	28.9	44.4	***	22.9	39.6	***
Number of observations	970	71		643	256	

* significant at 10%; ** significant at 5%; *** significant at 1% for the t-statistic to test the equality of group means using customary tenure as a reference group.

Source: Own computation from 2004 WB/Makerere/FASID land tenure survey.

Table 4: Determinants of land-related investments: AGLS two-step estimates

	Trees planted (Probit)		Soil conservation (Probit)		Trees (Tobit)
	Coefficients	**Marginal effect**	**Coefficients**	**Marginal effect**	**Coefficients**
Unconditional transfer rights, γ_1	0.266***	0.078***	0.038	0.012	0.812***
	(5.71)	(5.71)	(0.92)	(0.92)	(6.55)
Conditional transfer rights, γ_2	0.381***	0.112***	0.167	0.051	1.046***
	(3.29)	(3.29)	(1.62)	(1.62)	(3.48)
Knowledge of land law (index), θ_1	0.238**	0.070**	0.615***	0.187***	0.430
	(2.01)	(2.01)	(5.45)	(5.45)	(1.39)
Freehold and *mailo* tenure, φ_1	0.491***	0.155***	0.185	0.058	1.360***
	(3.38)	(3.38)	(1.35)	(1.35)	(3.75)
Freehold and *mailo* occupant/tenant, φ_2	-0.350**	-0.095**	-0.176	-0.051	-1.039***
	(2.48)	(2.48)	(1.32)	(1.32)	(3.01)
No. of years possessed	0.014***	0.004***	0.011***	0.003***	0.033***
	(4.18)	(4.18)	(3.45)	(3.45)	(3.86)
Distance from house	-0.014***	-0.004***	-0.004***	-0.001***	-0.036***
	(9.45)	(9.45)	(4.50)	(4.50)	(8.80)
Parcel area in acres	0.103***	0.030***	0.032*	0.010*	0.090*
	(5.15)	(5.15)	(1.75)	(1.75)	(1.88)
Parcel area squared	-0.001***	-0.000***	-0.000	-0.000	-0.001
	(2.92)	(2.92)	(0.68)	(0.68)	(1.32)
Good land quality	-0.022	-0.006	-0.089	-0.027	0.007
	(0.29)	(0.29)	(1.26)	(1.26)	(0.04)
Poor land quality	-0.283***	-0.076***	-0.058	-0.017	-0.654**
	(2.81)	(2.81)	(0.60)	(0.60)	(2.49)
Flat land	-0.268***	-0.080***	-0.129*	-0.039*	-0.902***
	(3.72)	(3.72)	(1.88)	(1.88)	(4.86)
Steeply sloped land	0.254*	0.081*	0.126	0.040	0.800**
	(1.91)	(1.91)	(0.96)	(0.96)	(2.39)
Irrigated land	0.369	0.122	0.282	0.094	0.561
	(1.05)	(1.05)	(0.86)	(0.86)	(0.66)
Swamp/Wetland	-0.219	-0.059	-0.023	-0.007	-0.103
	(0.63)	(0.63)	(0.08)	(0.08)	(0.12)
Household head's age	0.019	0.005	-0.022*	-0.007*	0.048
	(1.37)	(1.37)	(1.77)	(1.76)	(1.35)
Head's age squared	-0.000*	-0.000*	0.000	0.000	-0.001*
	(1.86)	(1.86)	(1.46)	(1.46)	(1.87)
Head's education in years	0.049***	0.014***	0.032***	0.010***	0.120***
	(5.18)	(5.18)	(3.61)	(3.61)	(4.95)
Female headed household	0.272***	0.086***	0.193*	0.061*	0.582**
	(2.58)	(2.58)	(1.95)	(1.95)	(2.16)
Household size	0.032***	0.009***	0.029***	0.009***	0.053*
	(2.99)	(2.99)	(2.83)	(2.83)	(1.91)
Value of all assets three years ago (Log)	-0.084***	-0.025***	-0.007	-0.002	-0.185***
	(3.09)	(3.09)	(0.27)	(0.27)	(2.60)
Distance to the nearest town in miles	-0.006	-0.002	-0.013	-0.004	-0.036
	(0.74)	(0.74)	(1.58)	(1.58)	(1.57)
Electricity available	0.142	0.043	0.175**	0.055**	0.328
	(1.54)	(1.54)	(2.00)	(2.00)	(1.38)
Constant	-1.158***		-0.817**	2185	-2.718**
	(2.67)		(2.05)		(2.39)
Observations	2185		2185		2185
Model Wald χ^2 (17)	328.55***		171.23***		271.41***
Wald χ^2test of exogeneity	5.82		1.76		2.03
Exogeneity test Wald p-value	0.055		0.415		0.362
χ^2test: $\gamma_1 = \gamma 2$	0.82		1.19		0.51
Prob > χ^2	0.366		0.275		0.475
χ^2test: $\gamma_1 = \gamma_2 = \theta_1$	0.85		25.08		1.75
Prob > χ^2	0.655		0.000		0.416
χ^2test: $\varphi_1 = -\varphi_2$	1.58		0.01		1.24
Prob > χ^2	0.209		0.929		0.266

Absolute value of z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%
Marginal effects evaluated at the mean for continuous variables, or as a discrete change from 0 to 1 for dummies.

Table 5: Determinants of land productivity

	No tenure or knowledge var's	Tenure but no agro-ecological var's	All variables
Total number of trees (Log)	0.137***	0.118***	0.059***
	(7.77)	(6.62)	(3.22)
Soil conservation dummy	0.264***	0.244***	0.163***
	(4.31)	(4.03)	(2.75)
Knowledge of land law at the hh level (index)		0.183*	0.192**
		(1.88)	(2.00)
Unconditional transfer rights		0.014	0.008
		(0.69)	(0.39)
Conditional transfer rights		0.001	-0.008
		(0.05)	(0.27)
Freehold and *mailo* tenure		0.462***	0.096
		(4.19)	(0.86)
Freehold and *mailo* occupant/tenant		-0.016	0.016
		(0.14)	(0.14)
Parcel area in acres (Log)	0.431***	0.431***	0.370***
	(13.03)	(12.86)	(11.17)
Log of parcel area squared	-0.012	-0.029	-0.037**
	(0.66)	(1.55)	(2.08)
Household size (Log)	0.110*	0.134**	0.121**
	(1.91)	(2.34)	(2.21)
Value of purchased seeds (Log)	0.135***	0.125***	0.148***
	(2.94)	(2.78)	(3.42)
Value of purchased chemical fertilizer (Log)	0.172	0.163	0.170
	(0.55)	(0.53)	(0.58)
Value of purchased pesticides (Log)	0.091	0.094	0.030
	(0.60)	(0.64)	(0.20)
Value of hired labor (Log)	0.134***	0.135***	0.174***
	(2.80)	(2.87)	(3.82)
Household head's age	-0.036***	-0.029***	-0.026**
	(3.21)	(2.61)	(2.46)
Head's age squared	0.000***	0.000***	0.000**
	(3.23)	(2.66)	(2.51)
Head's education in years	0.020**	0.020**	0.017**
	(2.51)	(2.53)	(2.17)
Female headed household	0.049	-0.013	-0.009
	(0.60)	(0.16)	(0.11)
Current value of household assets (Log)	0.052**	0.031	0.022
	(2.44)	(1.46)	(1.10)
Distance from house	0.001	0.003	0.002
	(0.33)	(0.98)	(0.72)
Good land quality	-0.001*	-0.001	-0.000
	(1.71)	(1.41)	(0.61)
Poor land quality	0.068	0.068	0.065
	(1.18)	(1.20)	(1.18)
Flat land	-0.147	-0.194**	-0.163*
	(1.62)	(2.19)	(1.91)
Steeply sloped land	-0.097*	-0.042	-0.007
	(1.69)	(0.73)	(0.13)
Swamp/Wetland	-0.186*	-0.107	-0.162
	(1.72)	(1.01)	(1.58)
Distance to the nearest district town in miles	0.728***	0.732***	0.851***
	(3.00)	(3.07)	(3.72)
Electricity accessible	-0.014*	-0.029***	-0.021***
	(1.93)	(3.81)	(2.85)
Banana on parcel			-0.003
			(0.04)
Root crops on parcel			0.380***
			(5.62)
Fruit crops on parcel			0.447***
			(7.59)
Vegetables on parcel			0.443***
			(4.55)
Observations	1378	1377	1377
R^2	0.38	0.41	0.46

Absolute value of z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%
Constant and dummies for use of different inputs as well as irrigation dummy included but not reported.

Table 6: Determinants of land values per acre

	No tenure or knowledge variables	All variables
Total number of trees per acre (Log)	0.144***	0.125***
	(7.74)	(6.75)
Soil conservation dummy	0.022	0.018
	(0.33)	(0.28)
Knowledge of land law (index)		0.236**
		(2.38)
Unconditional transfer rights		0.253*
		(1.71)
Conditional transfer rights		0.138
		(0.93)
Freehold tenure		0.196*
		(1.82)
Mailo tenure	1.361***	1.377***
	(6.27)	(6.43)
Parcel area in acres	-0.212***	-0.213***
	(14.60)	(14.77)
Parcel area squared	0.004***	0.004***
	(10.15)	(10.26)
Household head's age	-0.011	-0.014
	(0.96)	(1.27)
Head's age squared	0.000*	0.000*
	(1.74)	(1.89)
Head's education in years	0.041***	0.039***
	(5.19)	(4.91)
Female headed household	-0.147	-0.078
	(1.53)	(0.81)
Value of all assets three years ago (Log)	0.138***	0.123***
	(7.07)	(6.34)
No. of years possessed	-0.004	-0.002
	(1.37)	(0.70)
Distance from house	-0.002***	-0.002***
	(3.37)	(3.95)
Good land quality	0.184***	0.168***
	(2.96)	(2.73)
Poor land quality	0.168*	0.129
	(1.85)	(1.43)
Flat land	-0.225***	-0.198***
	(3.49)	(3.08)
Steeply sloped land	-0.202*	-0.173
	(1.74)	(1.50)
Irrigated land	0.632	0.419
	(1.29)	(0.87)
Swamp/Wetland	0.532**	0.488**
	(2.16)	(2.01)
Distance to the nearest district town in miles	-0.026***	-0.029***
	(2.61)	(2.85)
Public electricity accessible to households	0.675***	0.663***
	(7.70)	(7.58)
Constant	4.999***	4.209***
	(17.73)	(6.45)
Observations	1237	1237
R-squared	0.43	0.45

Absolute value of z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Appendix table 1: First stage regression - determinants of transfer rights

	Rights without Approval	Rights with Approval
Inherited from husband's family	-0.801***	0.579***
	(13.17)	(10.11)
Inherited from wife's family	-1.150***	0.852***
	(11.56)	(9.11)
Just walked-in	-0.442***	0.307**
	(3.48)	(2.57)
Rented-in	-2.483***	-0.221***
	(35.16)	(3.33)
Freehold and *mailo* tenure	0.367***	-0.432***
	(3.88)	(4.85)
Freehold and *mailo* occupant/tenant	-0.127	0.039
	(1.27)	(0.41)
Knowledge of land law at the hh level (index)	0.070	0.240***
	(0.89)	(3.25)
No. of years possessed	0.001	-0.001
	(0.36)	(0.40)
Distance from house	0.004***	-0.002***
	(6.81)	(4.54)
Parcel area in acres	-0.015	0.021*
	(1.13)	(1.71)
Parcel area squared	0.000	-0.000
	(1.17)	(1.21)
Good land quality	-0.063	-0.131***
	(1.29)	(2.85)
Poor land quality	0.079	-0.033
	(1.14)	(0.50)
Flat land	-0.092*	0.022
	(1.88)	(0.47)
Steeply sloped land	0.132	-0.051
	(1.41)	(0.58)
Irrigated land	0.029	-0.101
	(0.12)	(0.44)
Swamp/Wetland	-0.088	0.090
	(0.45)	(0.49)
Household head's age	0.019**	-0.032***
	(2.14)	(3.89)
Head's age squared	-0.000	0.000***
	(1.00)	(3.14)
Head's education in years	-0.015**	0.020***
	(2.34)	(3.42)
Female headed household	-0.433***	0.298***
	(6.51)	(4.76)
Household size	-0.008	0.015**
	(1.09)	(2.07)
Value of all assets three years ago (Log)	0.093***	-0.022
	(5.77)	(1.46)
Distance to the nearest district town in miles	-0.022***	0.016***
	(3.95)	(3.12)
Public electricity accessible to households	0.168***	-0.216***
	(2.79)	(3.82)
Constant	1.607***	1.027***
	(7.54)	(5.12)
Observations	2185	2185
R-squared	0.49	0.20

Absolute value of z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Appendix table 2: Determinants of visible land-related investments: Tobit estimates

	Trees Planted (Tobit)	
	Coefficients	Marginal effects
Rights without approval	0.689***	0.159***
	(7.84)	(8.00)
Rights with outside approval	0.586***	0.135***
	(5.43)	(5.49)
Knowledge of land law at the hh level (index)	0.631**	0.146**
	(2.09)	(2.09)
Freehold and *mailo* tenure	1.266***	0.310***
	(3.89)	(3.69)
Freehold and *mailo* occupant/tenant	-1.172***	-0.254***
	(3.41)	(3.64)
No. of years possessed	0.040***	0.009***
	(4.84)	(4.86)
Distance from house	-0.040***	-0.009***
	(9.73)	(10.63)
Parcel area in acres	0.118**	0.027**
	(2.55)	(2.56)
Parcel area squared	-0.002*	-0.001*
	(1.74)	(1.74)
Good land quality	-0.104	-0.024
	(0.55)	(0.56)
Poor land quality	-0.689***	-0.151***
	(2.61)	(2.75)
Flat land	-0.945***	-0.221***
	(5.08)	(5.03)
Steeply sloped land	0.841**	0.210**
	(2.53)	(2.35)
Irrigated land	0.595	0.146
	(0.71)	(0.67)
Swamp/Wetland	-0.156	-0.036
	(0.17)	(0.18)
Household head's age	0.039	0.009
	(1.15)	(1.15)
Head's age squared	-0.001*	-0.000*
	(1.77)	(1.77)
Head's education in years	0.137***	0.032***
	(5.75)	(5.81)
Female headed household	0.605**	0.146**
	(2.38)	(2.28)
Household size	0.061**	0.014**
	(2.22)	(2.22)
Value of all assets three years ago (Log)	-0.181***	-0.042***
	(2.70)	(2.71)
Distance to the nearest district town in miles	-0.029	-0.007
	(1.32)	(1.32)
Public electricity accessible to households	0.212	0.050
	(0.95)	(0.94)
Constant	-3.776***	
	(4.57)	
Observations	2185	
LR chi2(17)	452.75***	

Absolute value of z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%
Marginal effects evaluated at the mean for continuous variables, or as a discrete change from 0 to 1 for dummies.

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