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Property rights in a very poor country: tenure insecurity and investment in Ethiopia

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Abstract

This article provides evidence from one of the poorest countries in the world that the institutions of property rights matter for efficiency, investment, and growth. With all land state-owned, the threat of land redistribution never appears far off the agenda. Land rental and leasing have been made legal, but transfer rights remain restricted and the perception of continuing tenure insecurity remains quite strong. Using a unique panel data set, this study investigates whether transfer rights and implied tenure insecurity affect household investment decisions, focusing on trees and shrubs. The panel data estimates suggest that limited perceived transfer rights negatively affects the long-term investment in Ethiopian agriculture, contributing to the low returns from land and perpetuating low growth and poverty.

JEL classifications: O13, O17, Q15

Keywords: Property rights; Investment; Agriculture; Ethiopia; Africa

1. Introduction

The security of property rights is viewed by many as critical for economic growth (see, e.g., Knack and Keefer, 1995; North, 1981, 1990; North and Thomas, 1973; North and Weingast, 1989). The existence of property rights institutions that protect individuals against expropriation by neighbors and other agents, as well as against the state, offers incentives for long-term investment in productive assets and, through this channel, enhances economic growth. Acemoglu and Johnson (2005) give evidence on the relative importance of property rights over contracting institutions in explaining growth and the lack thereof in parts of the world, but also emphasize the relevance of the specific nature of private property rights in different settings, linking colonial property rights systems to the health conditions faced by settlers. Nevertheless, some economic historians have questioned the pivotal role of private property rights in explaining growth, such as its contribution to agricultural growth in pre-industrial England (Allen, 2009; Clark, 1998). Clearly, the relevance of property rights still needs to be established in various contexts across the world and in history. In this article, we add to the limited micro-evidence on linking insecure property rights to capital accumulation. We focus on Africa, the region where growth has been lagging most strikingly in recent decades and where risk to assets has been put forward as a crucial determinant of this growth failure (Collier and Gunning, 1999). We also focus on minimal elements of property rights: the right to transfer property and the threat of expropriation. More specifically, we study Ethiopia, one of the poorest countries in the world, and the role of land tenure insecurity on permanent land-attached investment, such as trees and shrubs. Our study uses longitudinal household-level data to provide micro-level evidence on the link between plot-level transfer rights and perceptions of the threat of expropriation, and capital accumulation.

This article adds to the literature in a number of ways. It builds on Besley's (1995) paper on investment in trees in Ghana by using panel data on the accumulation of capital, rather than a cross-section data set. It also extends this work by adding

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Data Appendix Available Online

A data appendix to replicate main results is available in the online version of this article. Please note: Wiley-Blackwell, Inc. is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author for the article.

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perceptions of the threat of expropriation by the state to the analysis. In this way, it is not dissimilar to the study by Jacoby et al. (2002) on China, but with a key difference that rather than calibrating "objective" risks of appropriation based on past data, we have access to perceived threats, arguably more important for forward-looking investment behavior. We find that the perceived rights to transfer land to others are important for investment on the land, with crucial efficiency and growth implications. Overall, we find that land rights matter to understand limited investment and growth, this time based on evidence from one of the poorest countries in the world. Unpacking the different elements of land rights, we find that perceived transfer rights, rather than a relatively short-term threat of expropriation, are quantitatively the more important factors explaining relatively low investment.

Land remains a most crucial asset for households in Ethiopia. More than 80% of the population still lives in rural areas, contributing about half of GDP via agricultural production. The main export products are agricultural, with coffee still providing two-thirds of the foreign exchange earnings. Despite recent policies to stimulate intensification, land productivity remains low in most parts of Ethiopia. Furthermore, as a land-locked economy with few natural resources, growth in agriculture remains a crucial part of an overall economic growth and poverty reduction strategy.

The question of whether land tenure insecurity has an impact on investment remains, therefore, an important policy question in Ethiopia; it is also politically a deeply sensitive issue. All land is owned by the state and individuals are given only usufruct rights; land cannot be sold, permanently exchanged for other property, or mortgaged, and inheritance is possible only by the immediate family. Despite land tenure reforms in the 1990s, there continues to be a widespread perception of the threat of expropriation, or at least a perception that land may not be transferred to family or others. The right to land for anyone who wishes to make a living by farming is now enshrined in the constitution, and with a rapidly growing population, the pressure for land redistribution remains high in many areas of the country. Land rental markets have been legalized in recent years, lifting extensive restrictions on rental and sharecropping. However, the terms for such arrangements remain somewhat restrictive and the regional land proclamations (the regional governments are now responsible for land policy) remain ambiguous about land redistribution and tenure security (Rahmato, 2004). In recent years, in some areas of the country, land registration programs have started, with seemingly positive effects on tenure perceptions and other outcomes such as land-related investment and rental market participation (Deininger et al., 2008b; Deininger, Ali, Holden, et al., 2008; Holden et al., 2009), although in many areas, including those studied in this article, such programs had not yet been systematically offered at the time when the data for this study were collected.

Beyond the papers looking at the recent registration programs quoted above, a number of papers have looked at the impact of local tenure arrangements on efficiency in Ethiopia. Pender and Fafchamps (2006), for example, find that land lease markets (sharecropping and rental) work sufficiently well to suggest that land market imperfections are not a cause of inefficiency in variable input use. But a key question remains whether land tenure insecurity and limited transferability of land hinder more fundamental long-term investment in agriculture. In this article, we focus on three forms of perennial crop investment: two tree crops—coffee and eucalyptus—and one shrub—chat (or q'at, whose young leaves are chewed and act as a relatively mild but addictive stimulant). They are qualitatively different: coffee and chat involve a sunk investment but coffee has a longer gestation period, while eucalyptus, an important source of timber and poles for construction and wood for fuel, is fast growing and easily uprooted to retrieve the investment. All three are important cash crops.

We use panel data from the Ethiopian Rural Household Survey (ERHS) to assess whether land tenure insecurity has affected investment in trees in this period. The ERHS has now completed 7 rounds between 1994 and 2007, but we use the data from 1997 and 1999, containing detailed data on transfer rights and tenure arrangements. Using plot-level data as part of a household panel data allows us to control for a number of standard problems in analyzing this issue including the endogeneity related to the reverse causality of explaining tree planting to obtain land rights, measurement error in our land transfer rights data, household-level heterogeneity affecting perceptions of security and transferability, as well as allowing us to identify any effects on investment from changes over time rather than cross-sectional variation (only).

In theory, there is a general consensus that making land rights more secure and transferable would promote investment incentives and efficient use of resources. This conventional view has three major justifications. First, it is believed that secure rights provide a guarantee to farmers that the fruits of their investment will not be appropriated by government or other agents. This encourages them to make long-term investment on their land (Atwood, 1990; Besley, 1995; Feder and Feeny, 1991; Goldstein and Udry, 2008).[1]

The second effect works through the credit market. As pointed out by Feder and Onchan (1987), security of ownership improves chances of obtaining loans to finance agricultural investment. This is because ownership rights facilitate the development of an efficient land market. This reduces information costs for the lender and provides the basis for using land as a collateral asset. Finally, secure tenure rights would allow a relaxation of the impediments to factor mobility and hence enables the allocation of land from the less to the most productive farmers, including via lease markets. Moreover, it allows farmers to make immobile investment since they will be sure to

[1] Theoretical justifications for this relationship are derived in Besley (1995). A dynamic stochastic programming model, allowing for gestation lags in benefiting from the investment as well as accounting for the irreversibility of the investment can be found in Ali (2003). Deininger and Jin (2006) helpfully clarify in a simple model the issue of endogeneity in the relationship between land rights and tree investment alluded to in Bruce (1988) and Besley (1995).

recuperate the present value of the future income that would be generated by the investment.

Other studies, however, argue that causality may also run the other way round: investment on land, particularly planting trees, enhances tenure security (Atwood, 1990; Besley, 1995; Brasselle et al., 2002; Otsuka et al., 1997). There have been several empirical investigations into the relationship between land tenure and investment, but the existing evidence is largely inconclusive (see Brasselle et al., 2002, for the survey of empirical studies in Africa). In spite of the conventional belief, only a few studies have confirmed that tenure insecurity is a serious impediment to land-related investment; largely confined to Asia (Feder, 1988) or Latin America (Carter and Olinto, 2003), Besley (1995) provides evidence of this nature for Ghana. Some recent studies, however, show that land rights have little effect on land improving investment and planting tree crops, not least in Africa (e.g., Migot-Adholla et al., 1991; Pinckney and Kimuyu, 1994). In fact, some affirm the existence of reverse causality, i.e., farmers may undertake land investment in order to enhance tenure security (Brasselle et al., 2002; Place and Otsuka, 2002; Sjaastad and Bromley, 1997). These findings have cast considerable doubt on the need for embarking on ambitious land registration and titling policies. Some authors have even argued that the current traditional tenure systems in Africa have the necessary elements to stimulate small-scale investment. Consequently, they have underscored that developing land rights alone might not be a panacea for problems of low agricultural investment and land productivity. Thus, there still remains a need for proper understanding of the evolution of the land tenure system along with a careful empirical investigation of the links between land rights and investment (Besley, 1995).

In view of this, unbundling the elements of land property rights is necessary to ensure a careful interpretation of findings. Following North (1981), Acemoglu and Johnson (2005) define property rights as the rules and regulations that protect citizens against the power of the government and elites. Contrary to papers that have to rely on interpreting customary laws and the protection they entail, we can rely on two related but empirically distinguishable concepts: transfer rights and the threat of expropriation ("security"). The former are measured at the plot level, and simply consider whether the household head thinks that a plot can be transferred to someone else. We also asked whether households perceived that land reform and redistribution would result in land been taken away from them in the next five years. Both measures are used in the article.

Finally, since land is such a central concern in the policy debate, this issue has attracted precedents in terms of research in Ethiopia. The very few rigorous empirical studies have produced mixed results on the relationship between tenure status and land-attached investment. Using survey data from Central Ethiopia, Gavian and Ehui (1999) did not find any empirical basis to support the hypothesis that land tenure was a constraint on agricultural productivity. Pender and Fafchamps (2006) similarly suggest that variable input use was not affected by the variety of rural tenure contracts under which production takes place. Their results indicated that farmers apply more or less the same amount of inputs on land under informal and less secure contracts (rented, sharecropped, and borrowed) and on lands formally allocated to them via the local authorities. Arguably, the concern in these studies is with variable inputs, and since their returns are captured in the short run, security and transferability are unlikely to be a negative constraint on production decisions.[2] In contrast, Deininger et al. (2008a) find some inefficiency in sharecropping contracts.

Studies focusing on more long-term investment also do not necessarily find negative effects from tenure insecurity. Holden and Yohannes (2002) investigated the planting of perennial crops using data from 15 different sites in Southern Ethiopia. They showed that tenure insecurity has little effect on the decision of farmers to plant perennials. On the other hand, they identified resource poverty as the main factor that has led to underinvestment in tree crops. Based on nationally representative survey data, Deininger and Jin (2006) argued that the impact of tenure insecurity varies across types of investment. In line with this, they found that tenure insecurity has encouraged planting (any) trees while discouraging investment in terraces. There is little or no evidence that resource constraints have adversely affected both types of investment. Gebremedhin and Swinton (2003) suggest that farmers' perceived land tenure security in Tigray was significantly and positively associated with long-term durable soil conservation investment such as stone terraces. Gebremedhin and Swinton (2003) argued from village-level data that perceived tenure security increased land investment.

Many of these studies suffer from specific data or methodological limitations. For example, typically only a cross-section is available, measures of security and transferability are incomplete, and endogeneity of tenure security cannot be appropriately addressed. Deininger and Jin (2006) can account for these issues to some extent, but only observe propensities to invest and only over a limited period of time, and only for broad categories of investment such as "trees" in general. In this article, we can exploit a large household panel data set covering 1997 to 1999, with time-varying information on perceptions of transferability and across different areas and can focus on actual allocations to specific tree crops, rather than propensities to invest. While our data are at the plot level, the data were *not* collected as a *plot*-level panel but as a household-level panel, and plots cannot be perfectly matched and this is not attempted in this article. Our ability to control for household-level heterogeneity is nevertheless an important means to avoid some of the pitfalls of some other studies.

2. Land rights in Ethiopia

The land tenure system in Ethiopia has its own peculiarities. After ousting the imperial regime, the military government (the

[2] Indeed, there would be incentives related to tenure insecurity to overexploit the soil in the short run, leading to higher productivity in the short run.

Derg) nationalized land in 1975 and subsequently distributed use rights to cultivators through local peasant associations using family size as the main criteria. This system strictly prohibited private ownership of land, and transfer of land by sale, lease, or mortgage. Periodic land redistribution was also based primarily on family size. This was to accommodate the needs of new claimants, but as a result widespread land tenure insecurity was instigated in the rural areas. For example, in the data set used in this article, more than a third of the households reported having lost land at one point or another during this period.

After the fall of the Derg regime in 1991, land redistribution was temporarily suspended without any provision to address the needs of the landless and the land hungry. The practice of repeated land redistribution had been already frozen in 1989, as part of the market-oriented reforms undertaken by the Derg. But the land policy has basically stayed the same and the 1995 constitution has simply reiterated the previous policy with just minor amendments. It has restated that land remains the collective property of the state and the peoples of Ethiopia and a mandate is given to regional governments for its administration. Accordingly, a farmer who wants to make a livelihood from farming is entitled to have a plot of land free of charge (Federal Republic of Ethiopia, 2002). In line with this guiding principle, the policy provides usufruct rights to rural households while strictly prohibiting sale, exchange for other property, or mortgage. As land redistribution is not appreciated, it is not clear how farmers will have access to land except through inheritance to immediate family member. However, a major improvement is that land leasing to a third party is allowed under the current system.[3]

But the policy is still unclear and land redistribution has taken place in some areas to provide land to new claimants. An instance of this is the 1997 land redistribution in the Amhara region. This redistribution affected land covered by perennials, and contrary to the stated policy compensation was not paid to the former owners (Holden and Yohannes, 2002). This has created fear among farmers that they will be subjected to possible land redistribution without compensation at any time in the near future. Based on a nationally representative survey of farm households, Deininger and Jin (2006) found that 9% of the farmers were affected by land redistribution in the 1991–1998 period. Also, less than a third of the farmers expected that there would not be land redistribution in the near future even though no more land redistribution was a federal government policy intention even at that time. In the data set used in this article, these results are reiterated: about 7% of households in 1999 lost land during land redistribution in the last five years, while 11% of households expected to lose land themselves in the next five years due to land reform, and 10% expected to gain.

Policy makers appear to state regularly that secure usufruct rights are crucial and some efforts have been made to formalize this, such as in the form of land certification exercises in Tigray, even during the period of our study (Deininger, Ali, Holden, et al., 2008; Holden et al., 2009). But definitely at the time of the study and data collection, the overall perception remains that recurring land reform is here to stay, contributing to substantial insecurity of tenure.

3. The data

This article exploits household panel data from the Ethiopian Rural Household Survey (ERHS) covering the period 1997 to 1999. The survey initially covered about 1470 households in 18 Peasant Associations in 15 Woredas throughout the country, and has collected data over seven rounds between 1994 and 2007. The villages were initially selected to reflect some of the diversity in agro-climatic conditions in Ethiopia. Geographically, these Woredas are located in Tigray (2), Amhara (4), Oromiya (4), and SNNP (5). Fig. 1 depicts the location of the 15 villages on the map of Ethiopia.

During 1997 and 1999, two rounds of data gathering collected detailed information on land allocation to different crops. For the purposes of this article, we focus, first, on the share of each plot allocated to coffee. Coffee is a tree crop requiring a long-term investment perspective. Coffee trees only start yielding about three to four years after planting, reaching full potential only after eight years. Then, trees can maintain high production levels for several decades. Cutting down trees yields virtually no return, so this is a clear irreversible investment. For the purposes of our analysis, only four PAs in Woredas in SNNP have agro-climatic conditions conducive to growing coffee.[4] The second crop to focus on is eucalyptus. This tree crop is rather different in that it can yield a return after only a few years, either by cutting it down entirely or simply by cutting branches, and hence is more of a medium-term investment. It would be possible to recoup a reasonable part of the investment; still, it is likely to have to occur at a suboptimal time for the household. It is in general grown both for providing "subsistence" firewood as well as for cash particularly from the sale of timber and poles for construction. To measure the impact of security and transferability on the share of land allocated to eucalyptus we use data from the same villages as for coffee. Finally, we consider chat. Chat (or q'at) is a relatively drought-resistant evergreen shrub, somewhat resembling tea plants, and cultivated as a cash crop. The young leaves of this plant are widely appreciated in Ethiopia and neighboring countries for their effects as a stimulant with mild narcotic impact, resembling the effects of amphetamines. The shrub is a perennial that starts yielding substantial return after about two to three years. As a shrub, it only has limited use as a source of firewood or building material when cut down. Eucalyptus and chat do not have similar sunk costs and long gestation periods as coffee;

[3] Informal arrangements in the form of sharecropping or fixed rent tenancy were taking place even during the Derg regime at the risk of losing land.

[4] They are Imdibir (Cheha woreda in Gurage), Aze Deboa (Kedida woreda in Kembata), Adado (Bule woreda near Dilla in Sidamo), and Gara Godo (Boloso woreda about 30 km from Sodo).

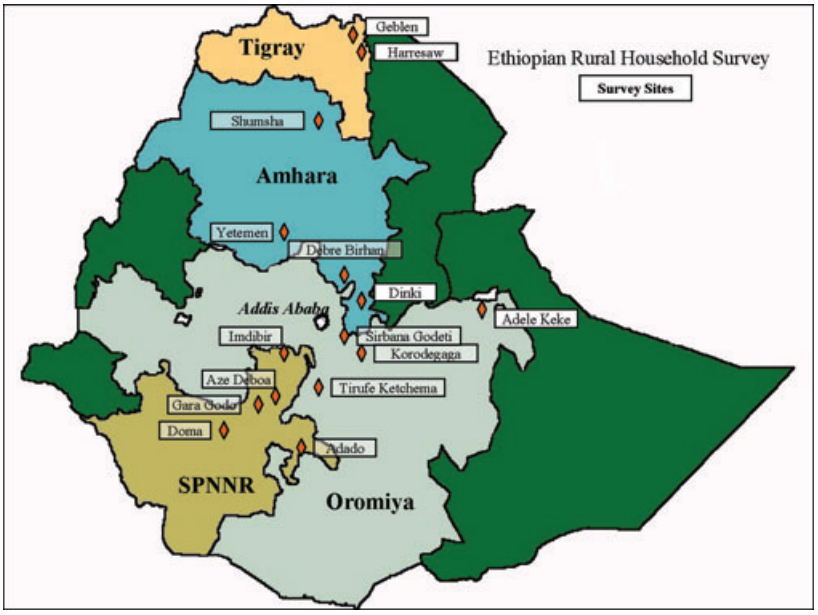

Fig. 1. The Ethiopian Rural Household Survey Sites.

still, they are an investment with medium-term horizon. Secure property rights are likely to be relevant for all these investment.

Tenure security and transfer rights are likely to matter for investment in these crops. Obviously, other factors will matter as well—including whether it is profitable to do so irrespective of security concerns, requiring any regression analysis to appropriately control for other factors. Planting trees may also have other effects beyond direct profitability concerns. Tree cover has further environmental effects, including increasing biomass and providing ground cover. In most of the coffee-growing areas—typically with relatively high rainfall and fertile land suitable for permanent and rather intensive cropping—these benefits are helpful but possibly as yet not a crucial issue. In the case of eucalyptus, the environmental benefits and also costs need to be looked at more carefully, not least since it can be grown in most parts of the country, including on land of relatively low fertility.

The planting of eucalyptus trees used to be largely confined to state-owned plantations and community woodlots, but increasingly it is also grown on household farms (Jagger and Pender, 2000). It is considered a better-performing species than many indigenous sources of wood, since it grows fast and is rather resilient, providing a helpful source of woody biomass, and contributes to limiting erosion and land degradation. Nevertheless, it also has proven negative externalities on crop production on nearby plots, and partly for this reason the regional government of Tigray has even banned eucalyptus on land suitable for crop production, even though there is little or no evidence of enforcement of this ban. Some researchers, e.g., Jagger and Pender (2000) have questioned the magnitude of these ecological risks, arguing that the potential ecological and income benefits far outweigh these costs. In any case, in many areas where eucalyptus is not banned, it can provide a ready source of cash income, and tenure security may well influence the decision to plant trees, allowing us to use it as an example for assessing the impact of transferability and security on investment decisions.

We have access to detailed plot-level data. One particular feature of the available data should nevertheless be highlighted here. The data were collected as a household-level panel, not a plot-level panel, so that the plot numbers were not identical across rounds. Matching of plots *ex post* has proved difficult and is not attempted for the purposes of this article. In each round, households were asked to give us details about their plots. Questions were asked without specific reference to past information gathered. Since this part of the questionnaire always proved one of the most difficult parts to complete, the respondents' own concept of the plots they cultivate at present dominates. Furthermore, the analysis is conducted using an unbalanced panel. Attrition at the household level has been relatively small (only about 4% between 1997 and 1999), but in each round, a sizeable number of plots contained incomplete information (again reflecting the difficulties collecting information on land in our setting). The net result has been that the number of plots is lower in 1999 than in 1997, but different households have a different number of plots in each round with complete information.[5]

Descriptive statistics on the plot-level data are given in Table 1. A plot is defined as a clearly identifiable piece of land, as the farmer himself or herself decides to demarcate it, and in the data the mean plot size is about 0.261 ha (standard deviation of 0.5). To identify land tenure security and transferability, a

[5] Limiting the sample to those households with exactly the same number of plots in both rounds is not a real option, as it reduced the sample so considerably (even though the correlations and significance remain broadly the same) that we choose to proceed with the analysis with as many plots as we have available and therefore allow for different numbers of plots for each household in each round.

Table 1
Plot-level variables descriptive statistics: selected villages from ERHS

Variable	1997 ($N = 1113$)		1999 ($N = 927$)	
	Mean	SD	Mean	SD
Plot inherited	0.797	0.402	0.716	0.451
Plot purchased	0.063	0.243	0.124	0.330
Plot allocated	0.101	0.301	0.091	0.287
Plot sharecropped in/rented in[a]	0.033	0.179	0.060	0.238
Other mode of acquisition[b]	0.006	0.079	0.009	0.093
Share of land allocated to coffee[c]	0.210	0.306	0.274	0.311
Share of land allocated to chat	0.049	0.171	0.069	0.245
Share of land allocated to eucalyptus	0.081	0.247	0.061	0.238
Land with at least some coffee (dummy = 1)[d]	0.403	0.491	0.559	0.497
Chat land (dummy = 1)	0.119	0.325	0.061	0.240
Eucalyptus land (dummy = 1)	0.112	0.316	0.083	0.276
Number of years plot owned	30.619	15.605	33.595	16.895
Good soil fertility[e]	0.545	0.498	0.653	0.476
Medium soil fertility	0.370	0.483	0.271	0.445
Poor soil fertility	0.084	0.278	0.077	0.266
Flat plot	0.653	0.476	0.635	0.482
Sloppy plot	0.304	0.460	0.348	0.477
Steep plot with ravines	0.043	0.203	0.016	0.126

Source: Ethiopian Rural Household Survey.
[a]By far the dominant rental contract is sharecropping, but a small proportion is rented against cash. For our purposes, we use them as one category.
[b]These are plots acquired via a variety of other means such as collateral from an informal loan.
[c]This gives the average proportion of each plot area cultivated with coffee.
[d]This gives the proportion of the plots with some coffee.
[e]Soil fertility variables are based on local well-known terms to describe land with lem, lem-teuf, and teuf meaning good, medium, and poor quality.

number of variables are available. First, we have plot-level data for each of the two rounds on the mode of acquisition (i.e., whether the plot was bought before land reform, acquired from the state during land redistribution, rented or sharecropped in, or inherited). Overall, 76% of plots in the sample are inherited. Land purchases largely refer to pre-land reform of 1975 purchases (after which it became illegal although some sales have been reported in some of the villages studied), and only constitute a small percentage overall (about 10%). About 5% of plots are sharecropped,[6] and just over 9% of plots were allocated by the government as part of land reform.

Inherited land relative to land allocated or sharecropped may appear surprisingly high in the overall context of Ethiopia. In the full countrywide data set (of which the data in this article are a subsample), inherited land only constitutes about a quarter of the land, while government allocated land is about 55% and sharecropped land is most of the remainder. These figures are not dissimilar to those found in other data sets (such as Deininger and Jin, 2006). The south of the country in general had a substantially different land tenure system before land reform in 1975, and land reform allowed many households in the south to cultivate land they were farming at the time and had inherited from their families, while in the more central and northern regions (especially Amhara, Tigray, and Oromiya) the traditional Rist system meant that large land-owning families cultivated at times vast areas, and reform meant an effective transfer for many. If anything, this would suggest that the areas studied in this article have enjoyed historically relatively more secure tenure, and thus this subsample provides a tougher test of the impact of tenure security.

Table 1 also shows that comparing 1999 to 1997, there are more plots with some coffee, while fewer with some eucalyptus and chat. The average area allocated to coffee also increased. As mentioned before, one will have to be cautious as each round has somewhat different number of plots with complete information, but it is also a reflection of an overall expansion of coffee in this period in Ethiopia, possibly linked to the rising world (and local auction) coffee prices for Arabica in that period, with prices between the two survey rounds increasing by about 30% higher than around the first round data-collection period, and considerably higher than in the first few years after the new regime came to power in 1991. It highlights the importance of accounting for such price and other economy-wide changes in the analysis below.

Mode of acquisition may provide some information on transfer rights, but there is by no means a simple direct mapping. We have a direct measure at the plot level whether the household perceives that the specific plot of land can be passed on to someone else (including via inheritance) for the 1997 and 1999 round of data collection. Table 2 summarizes these data. A few interesting features emerge. First, households perceive that only about 60% of plots they cultivate could be transferred to others,

Table 2
Descriptive statistics—plot-level variables—selected villages ERHS

Variable	1997	1999
Transfer rights (dummy = 1 if yes)[a]	0.65	0.53
transfer rights on inherited plots	*0.71*	*0.57*
transfer rights on purchased plots	*0.83*	*0.50*
transfer rights on allocated plots	*0.69*	*0.53*
transfer rights on sharecropped plots	*0.00*	*0.25*
Share of total land (sum of plots in ha) with transfer rights[b]	0.66	0.48
Number of plots	1113	927

[a]The difference in transfer rights between 1997 and 1999 is statistically significant in all but one case at the 99% level, the exception is for allocated plots, where the significance level is 95%.
[b]66% of total land size (measured by the sum of the size of all the plots in ha) had perceived transfer rights in 1997, while this percentage declined to 48% in 1999.

[6] A very small percentage of these are in fact "rented" plots, but sharecropping is the dominant form of rental contract in this area, and in Ethiopia in general, so we refer to them as sharecropped plots.

including via inheritance, despite the fact that more than 80% of plots were either purchased or inherited. Indeed, even though farmers may have been allowed to keep land despite periods of land reform, they do not perceive that the usufruct rights will be perpetual. It is also striking that perceived transfer rights are statistically significantly lower in 1999 compared to 1997.

The second data point is after the news on the new land reform in Amhara region will have filtered through, and even though the villages in the sample are outside this region, it might have affected people's perceptions. Finally, transfer rights do not map directly into modes of acquisition. For example, people perceive transfer rights on allocated plots, and, in 1999, even on some sharecropped plots (although the number of plots involved for sharecropping is rather small so these numbers are sensitive to relatively few plots recorded incorrectly). The decline in perceived transfer rights on nonrented plots is also occurring irrespective of mode of acquisition.

Data on transfer rights can be relatively straightforwardly collected per plot. Land tenure insecurity is likely to be different: it refers to a specific perception that land may be lost via land reform. To measure this we have access to a history of land reform (i.e., did the household lose or gain any land during the pre-1991 land reform episodes), land losses during recent land reform during the data collection period, as well as questions on whether the household expects to lose land in the next five years and how. Jacoby et al. (2002) use data on land lost in a hazard model to get at the risk of expropriation. Perception data, since they are by their nature forward-looking, are arguably more appropriate to think about investment decisions: the beliefs and expectations of the potential investors matter most. While rational expectations may be reasonable to expect (so that no systematic errors are made), in this low information environment and given the experiences of many households in preceding decades, using subjective beliefs would seem appropriate. These data were collected in the 1999 round, except for the data on pre-1991 land losses during land reform. Table 3 suggests substantial insecurity, whichever way used to measure it. Quite a few households (21%) lost land during land reform, although few did so in the most recent period, between 1994 and 1999.[7] Land sharing, losing land to other family members is also an important concern (30%). About 5% perceive that they will lose land in land reallocation in the next five years.

Table 3
Descriptive statistics of land tenure insecurity at the household level: selected ERHS villages (measured in 1999 unless explicitly stated)

Variable	1999
Land Reform and Reallocation Experience	
Land lost at the time of land reform and land reallocation (based on round 1, 1994, recall data) (%)	21
Lost land during the last five years due to land redistribution (%)	1
Lost land during the last five years due to land sharing among family (%)	9
Perception of Land Insecurity in the Coming Five Years	
Decrease in land size due to land reallocation (%)	5
Decrease in land size due to sharing among family members (%)	30
Number of household observations	366

4. Method and econometric model

We have detailed plot-level information on land allocated to different perennial crops. We also have detailed information on the mode of acquisition and the perceived transfer rights at the plot level. Furthermore, we have information at the household level of perceived land tenure insecurity and land redistribution history. The core research question is whether transfer rights, i.e., the perceived right to pass on a specific piece of land, and land tenure security (the perceived sense of security) matter for investment in coffee, eucalyptus, and chat. Equation (1) describes the general model guiding our analysis, given the data available:

$$K_{iht} = a_h + b.Z_h + c.W_h + d.S_h + e.P_{ih} + f.T_{iht} + g.X_{ht} + k.V_{ht} + e_{iht}, \quad (1)$$

where *iht* refers to plot i cultivated by household h in period t and K is some "capital" good on land (e.g., trees), here used as the share of land allocated to tree crops. In Eq. (1), a_h are fixed unobservable household characteristics, Z_h are observable fixed household characteristics, W_h are fixed community characteristics, and S_h are household-level tenure security variables. P_{ih} are fixed plot characteristics (soil quality, slopes) and T_{iht} are time-varying plot-level transferability indicators. Finally, X_{ht} are time varying household-level characteristics and V_{ht} are time-varying community characteristics.

Many factors affect a household's decision to invest in land. A central concern will be to estimate any relevant effects related to transfer rights and tenure security as carefully as possible. One key part of our strategy will be that if there is any effect potentially identified at the plot level, we will do so at this level.[8] In particular, to estimate the impact of the perceived rights to transfer a particular plot, the estimation of this effect will first be done controlling for household-level fixed effects, so that any unobservable household-level effect missing from the model (such as a tendency of some *households* to either overstate or understate the ability to transfer plots when asked about it) will not bias the coefficient of the impact of transfer rights. In particular, defining θ_h as a household fixed effect, the model estimated will be

$$K_{iht} = \theta_h + e.P_{ih} + f.T_{iht} + g.X_{ht} + k.V_{ht} + e_{iht}. \quad (2)$$

[7] This is again less than elsewhere in the country. The full sample of the ERHS suggested that about 34% lost land during land reform, and 7% lost land in the last five years. This is consistent with other data reported earlier related to land reform.

[8] Recall, however, that our data set is a household-level panel data set, and a not plot-level panel data set: plots cannot be matched over time.

In this model, V_{ht} will be controlled for using time-varying village dummies, thereby avoiding the need to include variables such as agro-climatic conditions or prices, which would surely affect investment into trees but are not variables of interest in this particular article. Equation (2) will form the basis for the three regressions reported in the next section. First, a regression using "mode of acquisition" variables (such as whether the plot was government allocated, inherited, bought, rented, or sharecropped, etc.), controlling for plot characteristics, time-varying household characteristics, and village-level time-varying fixed effects, estimated using household-level fixed effects. Second, a regression in which T_{iht}, the (self-reported) perceived "transfer rights" related to the particular plot are added, and dropping the "mode of acquisition" variables, and otherwise identical to the previous regression.

Finally, a regression as the previous one is run, but in which T_{iht} is treated as endogenous, using the mode of acquisition (purchased, inherited, allocated, or sharecropped) and the years of cultivating this particular plot as identifying instruments. The latter regression allows then an investigation of whether households plant trees to try to strengthen their ownership rights (as in Besley, 1995). If one reason that, relatively speaking, more trees are planted on a particular plot is to increase perceived transfer rights on this plot, then one would expect that, after instrumenting, the coefficient on transfer rights would go down, in line with standard simultaneity bias effects. However, instrumenting will also remove the effect of any measurement error in the subjective measure of transfer rights that would have biased the coefficient downwards. The implication is that *a priori*, it is hard to say which effect will dominate.[9]

All fixed household-level characteristics on investing in trees are perfectly captured by θ_h. This estimated variable will contain many different observable and unobservable household fixed characteristics, including the general sense of land tenure security of the household. Since we have some measured variables informing us about this perception at the level of the households, two routes are possible. First, introducing these perception variables into (2), effectively estimating a version of (1) and dropping the household fixed effects. The alternative route used here is to "unpack" θ_h by first retrieving these fixed effects (which are a perfect index of all household-level time-invariant factors affecting investment) from the resulting regressions and then regressing it on a set of household fixed characteristics, including the household-level means of some of the plot-level variables. Note that while θ_h may well be measured with error if only based on a relatively small sample, by putting it on the left-hand side of a regression, this is in itself not a problem, not least since by assumption it is an unbiased estimate of the fixed effects.

This approach allows us to make many improvements relative to previous work. First, by using data on actual investment (rather than dummy variables on whether an investment has taken place), we can make statements on the *levels* of investment potentially forgone due to problems related to land rights and tenure security, rather than propensities to invest. Second, we are able to exploit the fact that we have plot-specific data that allows us to estimate models with household fixed effects, exploiting differential security of different plots (as in Besley, 1995), at least for those measures directly related to plots rather than the household (i.e., those linked to actual tenure status, not related to the household's history and perception of security). Furthermore, by exploiting the properties of the estimated household fixed effects, we can go beyond Besley's analysis by conducting a household-level impact analysis of tenure insecurity as well. Finally, the panel data and the detailed plot-level history of each plot also allow us to address the possible endogeneity of transfer rights and tenure insecurity.

This does not mean that no serious econometric problems remain to be solved. First, the left-hand side variable in models (1) and (2) contains a significant number of zero observations, for example, about half for coffee and more for the other crops, so we need to explore how censoring affects the findings. Unfortunately, in standard nonlinear models, such as the probit model, the fixed effects cannot be treated as incidental parameters without biasing the other model coefficients (as long as $N > T$) (Hsiao, 1996). By implication, the tobit fixed effects model is also considered problematic. However, Greene (2003) noted that there was surprisingly little theoretical and empirical evidence on the behavior of the maximum likelihood estimator on which to base this conclusion. His Monte Carlo simulations lead him to suggest that the problems are much less important than usually assumed for the tobit model: more specifically, the bias in the slope parameters are very small for T larger than 5. The bias is also smallest when the degree of censoring is approximately 50% (which is satisfied for coffee but not for the other crops). The standard errors may, however, be underestimated leading to overoptimistic inference.

Given that we estimate household fixed effects on plot-level data, our T is in fact the number of plots per household—on average about 3 per round, so in all our estimations T tends to be above 5. As a consequence, we base our analysis on estimating a fixed effect tobit model based on (2), and use the retrieved fixed effects as in (3). However, to investigate robustness of our estimated variables of interest, we will also use a Chamberlain (1980) tobit random effects model (Wooldridge, 2001). In this approach, the problem related to the inconsistency of incidental fixed household characteristic is solved by using the mean value of the left-hand side variable as a sufficient statistic of identifying the household-level effects and specify the more standard random effects tobit with a full set of household-level means of all the time-varying regressors.

5. Econometric analysis and results

This section presents the results based on the regressions described above. The plot-level regressions include a number of

[9] This argument is formally shown for our type of specification in Besley (1995).

Table 4
Coffee: panel tobit regression

	(1) Share allocated to coffee Fixed effects	(2) Share allocated to coffee Fixed effects	(3) Share allocated to coffee Fixed effects IV[a]	(4) Share allocated to coffee Fixed Effects IV[b]	(5) Share allocated to coffee Random Effects IV[a]
Inherited plot?	0.136**				
	(2.524)				
Purchased plot?	0.064				
	(0.920)				
Sharecropped plot?	−0.559***			−0.540***	
	(6.472)			(5.193)	
Transfer right?		0.128***	0.819***	0.280**	0.578***
		(3.444)	(8.857)	(1.995)	(6.465)

Note: Absolute value of (robust in the case of fixed effects models) *t*-statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%. All regression controls for plot size, land relative to mean in village, total land owned per adult, livestock owned per adult, plot quality (high quality, medium quality, and low quality), slope (flat, sloping, steep), number of male adults, number of female adults, sex of head, age of head and age head squared, time varying village dummies. The base group in (1) for plot mode of acquisition is land allocated by government. The number of observations in each regression is 2,040 parcels operated by 410 households.

[a]Full IV, transfer rights endogenous with modes of acquisition (inherited, purchased, allocated, sharecropped, and other) and number of years plot used by this household—see Table 5.

[b]Full IV, but second stage controls for sharecropped plots.

control variables: plot size in hectares, land quality (measured by dummies of three different qualities based on local perceptions, using poor quality as the base group), plot slope (flat, sloping with strongly sloping as the base group), a number of time-varying household characteristics (livestock values, total land owned, female adults, and male adults), and a vector of time-varying village-level dummies.[10]

Table 4 reports the results for the share of land allocated to coffee. We report the fixed effects tobit regression results, as well as the random effects tobit findings. Table 5 presents a probit with robust standard errors and a random effects probit, explaining perceived transfer rights at the plot level. This regression is used subsequently as the first stage regression in Table 4 for instrumenting transfer rights. The first regression in Table 4 shows that modes of acquisition matter. Relative to the base group, i.e., land allocated by the government, farmers are growing about 56% less coffee on sharecropped plots. The latter result may seem self-evident, but in the data sharecropped plots often still have coffee on them. While nonsharecropped plots have about 22% of the land allocated to coffee on average, sharecropped plots have on average about 9% of land with coffee.[11] Furthermore, and most important for our analysis, farmers grow about 14% more coffee on inherited plots, than in government allocated plots.

Column (2) shows the impact of using perceived transfer rights, rather than the more indirect route of modes of acquisition, to discuss the impact on coffee growing. It can be seen that transfer rights make a difference, and farmers typically grow 13% more coffee on plots with reported transfer rights relative to one without these rights. This regression uses, however, the uninstrumented transfer rights. Both the reverse causality bias (endogeneity of transfer rights since tree planting may increase rights) as well as measurement error may affect this estimate, so we decided to instrument this variable. Table 5 presents probit regressions, one with robust standard errors and another one with random effects, explaining transfer rights. Recall that we have plot-level transfer rights data available for the two latest rounds used in the analysis. Identifying instruments used are modes of acquisition (sharecropped, inherited, purchased, and

Table 5
Transfer rights: probit regression

	Probit estimates		Random effects probit regression	
	Coefficient	(*t*-value)	Coefficient	(*t*-value)
Sharecropped	−1.067***	(4.91)	−1.942***	(6.09)
Inherited	0.242**	(2.35)	0.364*	(1.76)
Purchased	0.413***	(2.90)	0.057	(0.19)
Other mode	0.456	(1.13)	−0.001	(0.00)
Years owned	0.010***	(3.83)	0.019***	(3.54)
Plot size	−0.104	(1.48)	−0.124	(0.95)
Relative land	−0.096**	(2.43)	0.108	(1.22)
Land per aeu	0.402	(1.27)	1.046	(1.63)
Livestock per aeu	−0.001***	(3.50)	−0.001**	(2.33)
High quality land	−0.102	(0.86)	−0.587**	(2.08)
Medium land	−0.076	(0.61)	−0.341	(1.24)
Flat plot	−0.702***	(3.35)	−1.225***	(3.62)
Sloppy plot	−0.472	(1.45)	−1.218***	(3.56)

Note: Absolute value of (robust in the simple probit) *t*-statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%. Village dummies interacted by time included but not reported, as is age head, age head squared, sex head, female adults, and male adults. Aeu is adult equivalent units based on nutritional equivalence scales. The number of observations in each regression is 2,040 plots operated by 410 households.

[10] The tables only report key variables of interest, and not the control variables. A version with full regression results is available upon request. Descriptive statistics on all household-level variables included are reported in the appendix.

[11] This is not so in the case of eucalyptus or chat, with less than 1% of land with these crops if the plot is sharecropped.

Table 6
Chat and eucalyptus: panel tobit regression

	(1) Share land to chat Fixed effects	(2) Share land to chat Fixed effects IV[a]	(3) Share land to chat Random effects IV[a]	(4) Share land to eucalyptus Fixed effects	(5) Share land to eucalyptus Fixed effects IV[a]	(6) Share land to eucalyptus Random effects IV[a]
Transfer right?	0.264**	1.366***	0.823**	−0.046	0.295	−0.021
	(2.212)	(3.110)	(2.074)	(0.268)	(0.641)	(0.048)

Note: Absolute value of (robust in the case of fixed effects models) *t*-statistics in parentheses; ** significant at 5%; *** significant at 1%. All regression controls for plot size, land relative to mean in village, total land owned per adult, livestock owned per adult, plot quality (high quality, medium quality, and low quality), slope (flat, sloping, steep), number of male adults, number of female adults, sex of head, age of head and age head squared, village times time dummies. The base group in (1) for plot mode of acquisition is land allocated by government. The number of observations in each regression is 2,040 parcels operated by 410 households.
No fixed effects regressions with instrumented transfer rights and sharecropped plots are shown since no convergence could be obtained.
[a]Full IV, transfer rights endogenous with modes of acquisition (inherited, purchased, allocated, sharecropped) and number of years plot used by this household—see Table 5.

a very small number of other means of acquisition, all defined relative to land allocated by the government) as well as the number of years the plot has been used or owned. We observe significant effects on sharecropped plots (as expected, reducing perceived transfer rights), and inherited plots and the number of years the plot has been owned (both raising transfer rights), besides a number of other characteristics.[12] The predicted values of the random effects model are used and it is clear that while sharecropping matters to explain transfer rights, identification will not exclusively depend on this more obvious source of absence of transfer rights.

Columns (3) and (4) give the fixed effects tobit regression explaining land allocated to coffee, using the instrumented transfer rights. In column (3), all the modes of acquisition restrictions have been dropped and used as identifying instruments. However, it could well be argued that in the case of sharecropped plots, this may not be an appropriate exclusion restriction, since investment decision may well be mediated by the contractual issues surrounding sharecropping, in quite a different way from land that is inherited or given by the government. In this way, excluding the sharecropped plot variable may not be correct. Column (4) gives the results, including the sharecropped plot variable. Both in (3) and (4), the coefficient on perceived transfer rights is strongly significant and higher than in (2), suggesting that measurement error dominates the reverse causality (endogeneity) of land rights argument. The sharecropped plot variable is also strongly significant in (4), reducing the transfer right variable effect, and suggesting that it should not be excluded. The interpretation is that if a plot has complete transfer rights, one would expect a share allocated to coffee that is about 28% higher than for a plot without perceived transfer rights.

As was discussed before, the use of the fixed effects tobit regression is not without controversy. Greene's (2003) arguments would, however, be supportive for using it in our case: a reasonably large number of plots per household, and a degree of censoring not far from about half the sample. Nevertheless, for robustness, we also estimated the model using a random effects tobit model. We report regressions using the instrumented transfer rights variable as before. As can be seen, the estimated coefficients and their significance levels are in the same range as those in the fixed effects version, suggesting that the conclusions derived are robust.

Table 6 reports the results for chat and for eucalyptus. Column (1) shows the uninstrumented fixed effects tobit regression for chat showing significant effects for transfer rights. A fixed effects regression with instrumented transfer rights is given in column (2), and as before, the coefficient is significant and higher. Recall, however, that the fixed effects tobit regression may be more problematic in this case (given the more substantial censoring). The random effects regressions broadly confirm the results with positive and significant effects. Controlling for sharecropped plots does not substantially change the results. This pattern of results is, however, not confirmed for eucalyptus given in columns (4) to (6).[13]

Since these crops are often also competing crops, we also ran the regressions for the overall impact of the transfer rights on either of these crops, by considering the total share of land allocated to coffee, eucalyptus, and chat (Table 7). Since coffee by far dominates, the regressions reflect the results for coffee, in terms of point estimates, and, except for column (3), significance. These regressions show a strong impact of transfer rights on the medium and long-run investment in coffee and chat in this sample, based on people's perceived transfer rights. We also have data on more general land tenure insecurity, in the form of a perceived "threat" to government expropriation, as distinct from perceived transfer rights. To investigate this further, we retrieved the household fixed effects from the coffee land allocation regression and from the overall tree and shrub allocation regression, and regressed these onto a number of household characteristics, the insecurity variable and

[12] Marginal effects show for example that 10 years longer use or ownership of a plot increases perceived transfer rights by 5% and an inherited plot was 11% more likely to be perceived to be transferable, relative to a plot allocated by the government.

[13] Only a handful of plots in the data are both sharecropped and have chat or eucalyptus on them, affecting inference in the models with sharecropping.

Table 7
All trees and shrubs: panel tobit regressions

	(1) Share allocated to shrubs and trees Fixed effects	(2) Share allocated to shrubs and trees Fixed effects IV[a]	(3) Share allocated to shrubs and trees Fixed effects IV[b]	(4) Share allocated to shrubs and trees Random effects IV[a]
Sharecropped plot?			−0.665***	
			(−6.214)	
Transfer right?	0.130***	0.809***	0.149	0.576***
	(3.565)	(9.026)	(1.083)	(6.571)

Note: Absolute value of (robust in the case of fixed effects models) *t*-statistics in parentheses; *** significant at 1%. All regression controls for plot size, land relative to mean in village, total land owned per adult, livestock owned per adult, plot quality (high quality, medium quality, and low quality), slope (flat, sloping, steep), number of male adults, number of female adults, sex of head, age of head and age head squared, village times time dummies. The base group in (1) for plot mode of acquisition is land allocated by government. The number of observations in each regression is 2,040 parcels operated by 410 households.
[a]Full IV, transfer rights endogenous with modes of acquisition (inherited, purchased, allocated, sharecropped) and number of years plot used by this household—see Table 5.
[b]Full IV, but second stage controls for sharecropped plots.

mean values of the right-hand side variables of the first stage regression. We also investigated the same relationship in the models as in Table 4, but without the household fixed effects and entering the insecurity variable directly. Strikingly, we cannot detect any significant effect of perceiving a threat of losing land in the next five years, in any of these regressions. Recall that only 5% of households expect that this may happen. This surely affects inference, but it also suggests that transfer rights appear the predominant concern. Once we control for transfer rights, general insecurity is not likely to affect investment further.

6. Conclusion and policy implications

This article used detailed plot-level data set to investigate the impact of limited transfer rights and perceived land tenure insecurity on investment in coffee, chat, and eucalyptus. We find strong evidence that the share of land allocated to coffee increases if transfer rights are present, while we cannot detect a further effect of expectations of losing land in the next five years due to land reform. Chat is also strongly responsive to transfer rights.

How significant is this effect for policy? A simple extrapolation suggests that the effects are substantial. On average in this period, only 59% of plots have a full transfer right. Moving this to 100%, and using a possibly conservative estimate of the marginal impact, based on the most conservative point estimate from the instrumented fixed effects tobit model (0.28), this would suggest that about 10 percentage points more land would be cultivated with coffee—or an increase by about half on the 22% share of land allocated at present. Overall, not many farmers appear to fear an immediate expropriation of their land, but it does not mean at all that they perceive to have secured transfer rights. Transfer rights insecurity is a major drag on efficiency and growth, even if the threat of immediate expropriation is relatively low. The challenge for the current land policy is that it needs to succeed in offering transfer rights to farmers that would allow a more long-term planning orientation of farmers.

These results are also indicative—they show for very specific investment decisions that the lack of transfer rights is important. Extending this impact to other investment decisions would mean that the overall impact may be very large indeed (e.g., soil conservation measures, other land and productivity enhancing investment). Another interpretation of the results that directly follows from these results on cash/commercial crops is that the current policy appears to be pushing farmers back into low return, subsistence production by keeping their time horizons short and focused on single period crops. This is directly contradictory and inconsistent with the government strategy of trying to commercialize agriculture and improve the welfare of farmers.

The main policy implication from this analysis is that limited transfer rights have a significant negative impact on long-term investment, such as in coffee. While the existing evidence suggests that the impact of the control regime on land tenure may not have large implications for variable input use and short-run efficiency, this article has shown that it may have substantial implications for growth in agriculture via its negative incentives for long-term investment.

As was discussed in the introduction, more secure and transferable land rights would promote investment in at least three ways: secure rights provide a guarantee to farmers that the fruits of their investment will not be appropriated; they allow credit markets to develop further using land as collateral; and they allow factor mobility and efficiency via land sales and rental. The lack of rights to use land as formal credit collateral or to sell land, and the insecurity surrounding land tenure makes the first of these channels, access to the fruits of investment, dominate current concerns in Ethiopia. While we cannot quite quantify the specific contribution of each channel of causation, the nature of the data on land rights available would suggest that we offer a proximate answer to the first channel.

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Appendix 1: Household-level descriptive statistics: selected ERHS villages relevant for regressions

Variable	Mean	
	Round 4 1997	Round 5 1999
Number of female adults	1.75	1.78
Number of male adults	1.70	1.58
Age of household head	49.67	49.61
Age of household head square	2691.38	2687.01
Adult equivalent units (aeu)	5.53	5.40
Land owned in hectare per aeu	0.19	0.10
Land owned relative to mean in village	1.01	1.01
Value of livestock per aeu	167.49	144.05
Number of plots	3.50	2.57
Number of households	346	366

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