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Property Rights in a Very Poor Country:

Tenure Insecurity and Investment in Ethiopia

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Abstract

This paper provides evidence from one of the poorest countries of the world that the 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 tenure insecurity affect household investment decisions, focusing on trees and shrubs. The panel data estimates suggest that limited perceived transfer rights, and the threat of expropriation, negatively affect long-term investment in Ethiopian agriculture, contributing to the low returns from land and perpetuating low growth and poverty.

This paper—a product of the Agriculture and Rural Development Unit, Sustainable Development Department of the Africa Region (formerly the East Africa Unit (AFTS2) of the Environmentally and Socially Sustainable Department of the Africa Region) in collaboration with Sustainable Rural and Urban Development Team, Development Research Group—is part of a larger effort in the departments to study the relationship between property rights and land-related investments, and to provide Analytical and Advisory Services to client countries. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at mgautam@worldbank.org.

Property Rights in a Very Poor Country: Tenure Insecurity and Investment in Ethiopia

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1. Introduction

The central role of secure property rights in growth has long been recognized (Coase, 1960; Demsetz, 1967; North, 1981). Property rights protect individuals against expropriation by neighbors and other agents, as well as against the state, offering incentives for long-term investments in assets. Institutions such as property rights have been shown to be an important factor in explaining growth and the lack thereof in parts of the world (North and Weingast, 1989; Acemoglu and Johnson, 2003). In this paper, we add to the limited micro-evidence on linking insecure property rights to capital accumulation. We focus on Africa, the region were 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, 1998). More specifically, we study Ethiopia, one of the poorest countries in the world, and the role of insecurity in property rights for land on long-term investment in land-specific assets, such as trees and shrubs. Our study uses longitudinal plot-level and household data to provide micro-level evidence on the link between transfer rights and perceptions of the threat of expropriation, and capital accumulation.

This paper adds to the literature in a number of ways. First, 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 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 both perceptions related to the threat of expropriation, as well as the perceived rights to transfer land to others are important for investment on the land, with crucial efficiency and growth implications. The institutions of property rights matter to understand limited investment and growth, this time based on evidence from one of the poorest countries in the world. Unpacking these institutions, we find that perceived transfer rights, rather than a relatively short-term threat of expropriation, are quantitatively the more important factor explaining relatively low investment.

Land remains a most crucial asset for households in Ethiopia. More than 80 percent 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 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 use rights; land cannot be sold, exchanged or mortgaged. 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 cannot 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)

A number of recent papers have looked at the impact of local tenure arrangements on efficiency. Pender and Fafchamps (2001) 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 investments in agriculture. In this paper, 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 acts 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 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 covering four rounds from the period 1994 to 1999 to assess whether transfer rights land tenure insecurity has affected investment in trees in this period. Using 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 property 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 investments will not be appropriated by government or other agents. This encourages them to make long-term investments on their land (Atwood, 1990; Feder and Feeny, 1991; Besley, 1995)[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 investments. 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 investments since they will be sure to recuperate the present value of the future income that would be generated by the investment.

Several recent studies, however, argue that causality may also run the other way round: investments on land, particularly planting trees, enhance tenure security (Atwood, 1990; Besley, 1995; Otsuka et al., 1997; Brasselle et al., 2002). There have been several empirical investigations

[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 accounting for the irreversibility of these investments can be found in Daniel Ayalew (2003). Deininger et al. (2003) helpfully clarify in a simple model

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 investments, largely confined to Asia (Feder 1988) or Latin America (Carter and Olinto, 2002); Besley (1995) provides evidence of this nature for Ghana. Some recent studies, however, show that land rights have little effect on land improving investments and planting tree crops, not least in Africa (e.g. Migot-Adholla et al. 1994, Pinckney and Kimuyu 1994). In fact, some affirm the existence of reverse causality, i.e., that farmers may undertake land investments in order to enhance tenure security (Sjaastad and Bromley, 1997; Place and Otsuka, 2002; Brasselle et al., 2002). 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 investments. 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 property rights along with a careful empirical investigation of the links between land rights and investment (Besley, 1995).

In view of this, unbundling the institutions of property rights is necessary to ensure a careful interpretation of findings. Following North (1981), Acemoglu and Johnson (2003) 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 paper.

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

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the issue of endogeneity in the relationship between land rights and tree investment alluded to in Bruce (1988) and Besley (1995).

mixed results on the relationship between tenure status and land-attached investments. Using survey data from Central Ethiopia, Gavin and Ehui (1999) did not find any empirical basis to support the hypothesis that land tenure was a constraint on agricultural productivity. Fafchamps and Pender (2001) 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]

Studies focusing on more long-term investments also do not necessarily find negative effects from tenure insecurity. Holden and Hailu 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 under investment in tree crops. Based on nationally representative survey data, Deininger et al. (2003) argued that the impact of tenure insecurity varies across types of investments. In line with this, they found out 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 investments. Gebremedhin and Swinton (2001) suggest that farmers' perceived land tenure security in Tigray was significantly and positively associated with long-term durable soil conservation investments such as stone terraces. Gebremedhin et al. (2003) argued from village level data that perceived tenure security increased land investments.

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 et al. (2003) can account for these issues to some extent, but only observe propensities to invest and only over a

[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.

limited period of time, and only for broad categories of investments such as 'trees' in general. In this paper we can exploit a large plot level four-round panel data set covering 1994 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.

In the next section, we first give an overview of the recent experience with land rights and security in Ethiopia, as well as any evidence on its consequences. In section 3, we present the data available and in section 4 we explain the modelling approach. In section 5 we present the results. A discussion of the policy implications of these results concludes the paper.

2. Land rights in Ethiopia

The land tenure system in Ethiopia has its own peculiarities. After ousting the imperial regime, the military government (the Derg) nationalized land in 1975 and subsequently distributed use rights to cultivators through local peasant associations. This system strictly prohibited private ownership of land, and transfer of land by sale, lease or mortgage. Periodic land redistribution was 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 paper, 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. 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 Hailu 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 et al. (2003) found out that 9 percent of the farmers were affected by land redistribution in the 1991-98 period. Also, less than a third of the farmers expected that there would not be land redistribution in the near future even though there is an intent for policy to discourage such practices. In the data set used in this paper, these results are reiterated: about 7 percent of households in 1999 lost land during land redistribution in the last five years, while 11 percent of households expected to loose land themselves in the next five years due land reform, and 10 percent 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 titling exercises in Tigray. But the overall perception remains that recurring land reform is here to stay, contributing to substantial insecurity of tenure.

3. The Data

This paper exploits household panel data from the Ethiopian Rural Household Survey (ERHS) covering the period 1994 to 1999. The survey initially covered about 1470 households in 18 Peasant Associations in 15 Woredas throughout the country. 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).

[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.

During this period, four rounds of data gathering collected detailed information on land allocation to different crops. For the purposes of this paper, 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 3-4 years after planting, reaching full potential only after 8 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 cutting by 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 sub-optimal time for the household. It is in general grown both for providing 'subsistence' firewood as well as for cash. 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 2-3 years. As a shrub, it only has limited use as a source of firewood or building material when cut down. It would appear that eucalyptus and chat do not have similar sunk costs and long gestation periods as coffee; still, they are investments with medium-term horizon. Secure property rights are likely to be relevant for all these investments.

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

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

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 pats 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 (2001)) 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 part 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 (2001) 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 were 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.

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.[5] To identify land tenure security and transferability, a number of variables are available. First, we have plot level data for each of the four 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). Table 1 also gives data on this for our sample. About 72 percent of plots are inherited. Land purchases largely refer to pre-land reform of 1975 purchases (after which

[5] One particular feature of the available data should be highlighted here. The data were collected as a household level panel, not a plot level panel. Matching of plots has proved difficult and is not attempted for the purposes of this paper. 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 it cultivates at present dominates. Furthermore, the analysis is conducted using an unbalanced panel. Attrition (although only about 7 percent between 1994 and 1999) will have reduced the number of plots in the sample while newly added plots increased the sample.

it became illegal although some sales have been reported in some of the villages studied), and only constitute a small percentage overall. About 5 percent of plots are sharecropped, and about 10 percent of plots were allocated by the government as part of land reform.

Table 1: Descriptive Statistics – plot level variables – selected villages from ERHS

Variable	Mean	Standard Deviation
Plot size (ha)	0.232	0.436
Share of land allocated to coffee*	0.214	0.290
Share of land allocated to chat	0.056	0.194
Share of land allocated to eucalyptus	0.075	0.245
Land with at least some coffee (dummy=1)**	0.448	0.497
Chat land (dummy=1)	0.104	0.305
Eucalyptus land (dummy=1)	0.107	0.309
Plot inherited %	0.717	0.451
Plot purchased %	0.104	0.305
Plot allocated %	0.096	0.294
Plot sharecropped in/rented in %	0.045	0.207
Number of years plot owned	31.667	15.711
Good soil fertility %	0.521	0.500
Medium soil fertility %	0.370	0.483
Poor soil fertility %	0.099	0.299
Flat plot %	0.620	0.485
Slopy plot %	0.327	0.469
Steep plot with ravines %	0.041	0.198

Note: Data on 3364 plots. Pooled data from four rounds of data (1994, 1995, 1997, 1999). Data on 'Numbers of years plot owned' not available for 1995 round.
*The shares of total farm land allocated to coffee, chat and eucalyptus (i.e., at the household level) are 0.22, 0.035 and 0.049, respectively. Average farm size (cropped area) is 0.70 Ha.
**Some plots are intercropped and this has been taken into account for share of plots allocated with particular crops. So while 44.8 percent of plots have some coffee, the average share of each plot is only 21.4 percent.

Inherited land relative to land allocated or sharecropped may appear surprisingly high in the overall context of Ethiopia. In the full country-wide data set (of which the data in this paper are a sub-sample), inherited land only constitutes about a quarter of the land, while government allocated land is about 55 percent and sharecropped land is most of the remainder. These figures are not dissimilar to those found in other data sets (such as Deininger et al., 2003). Permanent crop areas and 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

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 paper have enjoyed historically relatively more secure tenure, and thus this sub-sample provides a tougher test of the impact of tenure security.

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), although in this case only 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 percent of plots they cultivate could be transferred to others, including via inheritance, despite the fact that more than 80 percent 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.

Table 2: Descriptive Statistics – plot level variables - selected villages ERHS

Variable	1997	1999
Transfer rights (dummy=1 if yes)*	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**	0.66	0.48
Number of plots	1212	939

*The difference in transfer rights between 1997 and 1999 is statistically significant in all but one cases at the 99% level, the exception is for allocated plots, where the significance level is 95%. ** 66 percent of total land size (measured by the sum of the size of all the plots in ha) had perceived transfer rights in the 4th round, while this percentage declined to 48 percent in the 5th round.

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 surely will 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 non-rented 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 loose land in the next 5 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. 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 percent) lost land during land reform, although few did so in the most recent period, between 1994 and 1999[6]. Land sharing, losing land to other family members is also an important concern (30 percent). Most importantly for our discussion, and about 5 percent perceive that they will lose land in land reallocation in the next five years.

Table 3: Descriptive statistics of household level variables: land tenure security: 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) (%)	0.21
Lost land during the last five years due to land redistribution (%)	0.01
Lost land during the last five years due to land sharing among family (%)	0.09
Perception of Land Insecurity in the Coming Five Years	
Decrease in land size due to land reallocation (%)	0.05
Decrease in land size due to sharing among family members (%)	0.30
Number of household observations	366

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

4. Method and econometric model

We have detailed plot level information on land allocated to different perennial or tree 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, i.e. 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:

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

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 equation (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_{ih} are fixed 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 households' 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.[7] 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, the model estimated will be:

[7] 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.

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

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 paper. 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. Secondly, a regression in which T_{ih}, 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_{ih} 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 any measurement error bias that would have biased the coefficient downwards. The implication is that a priori, it is hard to say which effect will dominate.[8]

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

[8] This argument is formally shown for our type of specification in Besley, 1995.

estimating a version of (1) and dropping the household fixed effect. The alternative route used here is to 'unpacking' θ_h by first retrieving this fixed effect 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 effect. Our next regression then becomes:

$$\theta_h = a_h + b.Z_h + c.W_h + d.S_h + u_h \quad (3)$$

in which S_h includes variables such as the household level perception regarding future land redistribution.

This approach allows us to make many improvements relative to previous work. First, by using data on actual investments (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. Secondly, we are able to exploit the fact that we have plot specific data 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 effect, 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 is 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 logit and probit model, the fixed effects cannot be treated as incidental parameters without biasing the other

model coefficients (as long as N > T) (Hsiao, 1986). 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 percent (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, 2002). 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 effect and specify the more standard random effects tobit with a full set of household level means of all the 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 control variables: plot size in hectares, land quality (measured by dummies of different quality 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 time-varying village level dummies.[9]

[9] The tables only report key variables of interest, and not the control variables. A version with full regression results is available upon request.

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 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, land allocated by the government, farmers are growing about 49 percent 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 non-sharecropped plots have about 22 percent of the land allocated to coffee on average, sharecropped plots have on average about 9 percent of land with coffee.[10] Furthermore, and most important for our analysis, farmers grow about 9 percent 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 farmer grow typically 13 percent 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 right data available for the two latest rounds used in the analysis. Identifying instruments used are modes of acquisition (sharecropped, inherited, purchased and 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.[11] The predicted values of the random effects model are

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

[11] Marginal effects show for example that 10 years longer use or ownership of a plot increases perceived transfer rights by 4 percent and an inherited plot was 9 percent more likely to be perceived to be transferable, relative to a plot allocated by the government.

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.

Table 4: Coffee: Panel Tobit Regression (t-value in brackets)

	(1) Share allocated to coffee Fixed effects	(2) Share allocated to coffee Fixed effects	(3) Share allocated to coffee Fixed effects IV*	(4) Share allocated to coffee Fixed Effects IV**	(5) Share allocated to coffee Random effects IV*	(6) Share allocated to coffee Random Effects IV**
Inherited plot?	0.087 (2.53)					
Purchased plot?	0.029 (0.63)					
Sharecropped plot?	-0.493 (7.88)			-0.411 (4.92)		-0.326 (3.95)
Transfer right?		0.129 (3.32)	0.696 (9.96)	0.315 (3.05)	0.588 (8.31)	0.315 (3.22)

Note: All regression controls for plot size, 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. Base group in (1) for plot mode of acquisition: land allocated by government.

* 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.

** Full IV, but second stage controls for sharecropped plots.

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 31 percent 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 and, with and without a control for sharecropped plots. As can be seen, the estimated coefficients are extremely close to those in the fixed effects version, suggesting that the estimates and the conclusions derived from them are very robust.

Table 5: Transfer rights: Probit regressions (t-value in brackets)

	Probit with robust standard errors		Random effects probit regression	
	coefficient	(t-value)	Coefficient	(t-value)
Sharecropped	-1.067	(4.91)	-1.996	(6.72)
Inherited	0.242	(2.35)	0.340	(1.94)
Purchased	0.413	(2.90)	-0.125	(0.46)
Other mode	0.456	(1.13)	0.095	(0.17)
Years owned	0.010	(3.83)	0.020	(3.74)
Plot size	-0.104	(1.48)	-0.101	(0.89)
Relative land	-0.096	(2.43)	0.002	(0.02)
Land per aeu	0.402	(1.27)	1.427	(2.81)
Livestock per aeu	-0.001	(3.50)	-0.001	(2.64)
High quality land	-0.102	(0.86)	-0.525	(2.37)
Medium land	-0.076	(0.61)	-0.234	(1.11)
Flat plot	-0.702	(3.35)	-1.309	(3.69)
Slopy plot	-0.472	(1.45)	-1.318	(3.64)

Note: 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.

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 in (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, however, with strongly positive and significant effects. Controlling for sharecropped plots does not substantially change the results, and sharecropped plots are not significant in (4). This pattern of results is broadly confirmed in column (5) to (8), this time for eucalyptus, and the regression using instrumented transfer rights showing strongly positive and significant effects.

Table 6: Chat and Eucalyptus: Panel Tobit Regression (t-value in brackets)
Dependent variables: share of land allocated to particular crops

	(1) Share land to chat Fixed effects	(2) Share land to chat Fixed effects IV*	(3) Share land to chat Random effects IV*	(4) Share land to chat Random Effects IV**	(5) Share land to eucal. Fixed effects	(6) Share land to eucal Fixed effects IV*	(7) Share land to eucal Random effects IV*	(8) Share land to eucal Random Effects IV**
Sharecropped plot?				-5.856				-0.472
				(0.00)				(1.43)
Transfer right?	0.263	0.435	0.742	0.606	-0.042	0.387	0.651	0.503
	(2.10)	(2.42)	(4.72)	(3.61)	(0.24)	(1.85)	(3.37)	(2.32)

Note: All regression controls for plot size, 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. Base group in (1) for plot mode of acquisition: land allocated by government.
No fixed effects regressions with instrumented transfer rights and sharecropped plots are shown since no convergence could be obtained.
* Full IY, transfer rights endogenous with modes of acquisition (inherited, purchased, allocated, sharecropped) and number of years plot used by this household – see table 5.
** Full IY, but second stage controls for sharecropped plots.

The results so far show that the impact of limited transfer right is surprisingly similar and large for all three crops considered. 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. Column (3) shows that full transfer rights

would increase tree and shrub cultivation by about 24 percent compared to no transfer rights – and only a slightly larger effect is observed using the random effects regression.[12]

Table 7: All trees and shrubs: Panel tobit regressions (t-value in brackets)
Dependent variables: share of land allocated to particular crops

	(1) Share allocated to shrubs and Trees Fixed effects	(2) Share allocated to shrubs and trees Fixed effects IV*	(3) Share allocated to shrubs and trees Fixed Effects IV**	(4) Share allocated to shrubs and trees Random effects IV*	(5) Share allocated to shrubs and trees Random Effects IV**
Sharecropped plot?			-0.5 12 (5.90)		-0.443 (5.27)
Transfer right?	0.130 (3.46)	0.703 (9.84)	0.238 (2.26)	0.659 (9.29)	0.297 (3.03)

Note: All regression controls for plot size, 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. Base group in (1) for plot mode of acquisition: land allocated by government.
* 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.
** Full IV, but second stage controls for sharecropped plots.

These regressions show a consistently strong impact of transfer rights on the medium and long-run investment in trees and shrubs 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 mean values of the right hand side variables of the first stage regression.

[12] In table 6, the coefficient on sharecropped plots for chat is -5.856, which is extremely large, but it is totally insignificant. Only a handful of plots in the data are both sharecropped and have chat on them, so that the coefficient simply fits a very small number of observations.

Table 8 OLS regression, with retrieved fixed effects from coffee regression as left hand side variable (instrumented version with sharecropping), based on model 3

	Coefficient	(t-value)
Insecurity?	-0.132	(3.10)
Land relative to mean in village	-0.083	(3.46)
Transfer rights (mean per hh.)	-0.056	(1.51)
Land per adult	0.785	(4.28)
Livestock per adult	-0.000	(2.84)
Sex head	0.129	(3.08)
Females	-0.025	(2.06)
Males	-0.009	(0.72)
Age head	-0.022	(3.71)
Age head squared	0.000	(3.67)
% quality of plot high	0.596	(0.98)
% quality of plot medium	0.476	(0.78)
% quality of plot low	0.63 1	(1.03)
% flat plot	-0.140	(0.25)
% sloped plot	0.085	(0.15)
% steep plot	-0.072	(0.13)
Constant	0.526	(1.77)
N=356 R-squared=0.347		

The regression results in table 8 shows a number of characteristics contributing to explain the fixed effects from the coffee tobit regression. The fixed effects can be interpreted as a fixed household level share of land allocated to coffee. Those with more land allocate higher shares, as do male headed households (who allocate 13 percent more than female headed households). Having female adults in a household reduces the share allocated to coffee. Two factors stand out in their impact on reducing the household level share of land allocated to coffee: those with high land holdings relative to the mean in the village (possibly suggesting that they may fear land redistribution more), and those that expressed directly a fear that their land will be taken away in the next five years (the insecurity variable). The latter effect is direct evidence of the role of insecurity: those expecting to lose land allocate on average 13 percent less land to coffee. Similar effects can be found by focusing on land allocated to all tree and shrub crops together.

6. Conclusion and policy implications

This paper used a detailed plot level data set to investigate the impact of limited transfer rights and perceived land tenure insecurity on investments in coffee, chat and eucalyptus. We find strong evidence that the share of land allocated to coffee increases if transfer rights are present, while expectations of losing land in the next five years due to land reform reduces coffee planting. Eucalyptus and chat are also strongly responsive to transfer rights. We show that the institutions of property rights matter for efficiency, investment and growth, with clear evidence from one of the poorest countries in the world.

How significant is this effect for policy? A simple extrapolation suggests that the effects are substantial. On average in this period, only 59 percent of plots have a full transfer rights. Moving this to 100 percent, and using a possibly conservative estimate of the marginal impact, based on the instrumented fixed or random effects tobit model (0.3 15), this would suggest that about 10 percentage points more land would be cultivated with coffee – or an increase by more than a third on the 27 percent share of land allocated at present. The threat of expropriation (in the next five years) has substantial effects for those fearing that land will be taken away, although because only about 5 percent expressed this fear in 1999, the impact on average coffee holdings is only about 1 percentage points less land allocated to coffee. 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 secure transfer rights. Transfer right insecurity is a major drag on efficiency and growth, even if the threat of immediate expropriation is currently relatively low. A deficiency of the current land policy is that it does not succeed in offering transfer rights to farmers that would allow a more long-term planning orientation of farmers.

The increases implied by the coefficients on transfer rights for eucalyptus and chat are even (relatively) higher. Overall, the regression using the total share to coffee, eucalyptus and chat, the increase would be about 9 percentage points, or still an increase by more than a quarter. While this expansion of coffee, eucalyptus and chat would occur at the expense of other crops, the fact that this effect is directly linked to tenure insecurity and transfer rights suggests a major efficiency loss. In these farming systems, alternative crops are limited and much land is devoted to low return

staple food crops, such as enset (a root crop, sometimes called 'false banana'). Crops constitute more than half of incomes in these settings, and coffee and chat are main the cash crops, so that increases in plantings of trees and shrubs are likely to have substantial net income effects as well.

These results are also indicative – they show for very specific investment decisions that insecurity and lack of transfer rights are 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 investments). 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 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 and poor tenure security have an important negative impact on long-term investments, such as coffee and other tree or shrubs. 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 paper has shown that it may have substantial implications for growth in agriculture via its negative incentives on long-term investment.

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ANNEX 1: Descriptive statistics – household level variables – selected ERHS villages relevant for regressions

Variable	Mean			
	Round 1 1994	Round 3 1995	Round 4 1997	Round 5 1999
Number of female adults	2.11	2.14	1.75	1.78
Number of male adults	1.85	1.87	1.70	1.58
Age of household head	49.11	49.10	49.67	49.61
Age of household head square	2666.41	2667.79	2691.38	2687.01
Adult equivalent units (aeu)	5.74	5.83	5.53	5.40
Land owned in hectare per aeu	0.09	0.10	0.19	0.10
Land owned relative to mean in village	0.99	0.96	1.01	1.01
Value of livestock per aeu	119.57	119.97	167.49	144.05
Number of plots	2.78	3.34	3.50	2.57
Number of households	348	340	346	366