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ADMINISTRATIVE ALLOCATION, LEASE MARKETS AND INEQUALITY IN LAND IN RURAL ETHIOPIA: 1995-97

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SUMMARY

Access to farmland is an important factor affecting the well-being of a population in an agricultural country. This paper concentrates on issues of allocation and distribution of land in a predominantly agricultural country, Ethiopia. The reform of 1975 was a major programme that transformed not only the land tenure in Ethiopia but also the political and administrative structure of rural areas. This paper looks at some empirical results and studies in economic history that show important continuities in the land holding system.

A highly equitable land holding system is usually assumed to exist in rural Ethiopia due to the continual distribution and re-distributions of land after the reform. But the paper presents empirical results that show both inter-regional (between villages) and intra-regional (within village) inequalities in land holding are high - compared to some African countries. The reform nationalised all rural land and set-up Peasant Associations (PAs) that effectively function as local governments as well as distribute land on usufruct basis. Since a PA has responsibility of distributing land only to its members, the reform has created an institutional barrier that may have increased inter-regional inequality by discouraging rural-rural migration from densely to sparsely populated areas.

Key words:

Ethiopia, land distribution, land lease markets, inequality

Key reading:

Rahmato, D. (1984), Agrarian Reform in Ethiopia, Uppsala: Scandinavian Institute of African Studies.

INTRODUCTION

Settled agriculture existed for thousands of years in some parts of Ethiopia with remarkably stable tenure structures, the nature of which is slowly being revealed by some recent studies (eg: Crummey, 2000). Even though the current land tenure is mainly the result of the land reform of 1975, there is still much to be studied about its link with previous structures. Much research on the place of the reform in the long-run evolution of tenure structures is required. But most discussions of current land tenure focus only on the radical aspect of the reform, ignoring possible continuities.

The February 1975 proclamation nationalized all rural land and set-up Peasant Associations (PAs) who were entrusted with the allocation and distribution of land. Apart from abolishing big and absentee land-lordship, the administrative structure of rural Ethiopia was fundamentally changed with the reform; PAs effectively become local governments. The nationalisation of land abolished land markets; hence, access to most cultivated land was determined by administrative allocation - a situation quite different from many developing countries. PAs either directly allocate land or implicitly, or explicitly, approve previous holdings and subsequent transfers.

In principle, PAs have to allocate land to households proportional to their family size. In other words, broadly, they should allocate land according to the 'needs' of households - the more people in a household the more land they should be allocated. One of the research issues addressed in this paper is whether actual allocations have followed this rule. The results from a panel regression indicate that allocations generally responded to total household size. But when household members are disaggregated by age and sex, allocations emphasizing the capacity of households to use the land becomes apparent; eg: households with more adult labour got more land, also the size of land did not significantly respond to the number of too young or too old people in the household. In addition, households with more oxen also got more land.

As well as the land directly allocated or approved by PAs, households can get access to land through the lease market. Lease arrangements are either in the form of sharecropping or fixed rents. The socio-economic characteristics of households that sharecropped or rented land are examined in this paper. Results from panel random effects tobit models indicate that availability of adult male labour and oxen are important determinants to lease-in land.

There is a strong perception that land in rural Ethiopia is more equitably distributed than, say, other African/developing countries. But whether the distribution of rural land is highly equitable as perceived has not been systematically examined. Using three inequality measures developed in the income distribution literature - Gini coefficient, Theil entropy index and variance of logarithms - this paper examines the equitability of land distribution in rural Ethiopia. Firstly, significant inter-regional differences exist. This is perpetuated by the institutional arrangement of the land reform program; PAs cater only to farmers that are located within their boundaries and, hence, the chance of people moving from densely to sparsely populated areas is minimal (if not impossible). Secondly, inequalities even within villages (PAs) are also high. Generalized Lorenz curves show that there are regions that enjoy both higher per capita land holdings and lower inequality. The combination of these is likely to have exacerbated regional differences in welfare.

The empirical analyses in Sections 3, 4 and 5 are based on panel data collected by the Ethiopian Rural Household Survey (ERHS). The surveys were conducted by the Department of Economics, Addis Ababa University, the Centre for the Study of African Economies (CSAE), Oxford University and the International Food Policy Research Institute (IFPRI), based in Washington DC. So far five rounds, in 1994-95, 1997 and 2000, have been conducted. This paper uses the data from the third (1995) and fourth (1997) rounds of the survey.

Fifteen villages (PAs) reflecting the main variations in agro-ecological regions of Ethiopia[1] are covered by the ERHS. The survey sites are: Haresaw and Geblen (Tigrai region), Shumsheha, Debre Berhan, Dinki and Yetmen (Amhara region), Imdibir, Aze Deboa, Gara Godo, Domaa and Adado (Southern region), Sirbana Godeti, Terufe Kechema, Adele Keke and Korodegaga (Oromo region).[2]

To put the historical significance of the land reform in context, first a short description of the land tenure system before 1975 is presented. In Section 3, factors affecting the allocation of land by PAs are discussed. While Section 4 examines socio-economic characteristics of households in the lease market, inequality in intra- and inter-regional distribution of per capita land holdings is analysed in Section 5. Section 6 concludes with a summary of the main results and a discussion of some of the policy implications.

[1] But nomadic areas were not covered by the survey.

[2] For a more detailed description of the ERHS and the survey sites see Kebede (2002).

THE EVOLUTION OF LAND TENURE – A SHORT EXCURSION INTO ECONOMIC HISTORY

Soon after the overthrow of Emperor Haile Selassie, the new government started a land reform programme in February 1975; the current land tenure of rural Ethiopia is the direct outcome of that reform. In order to understand the historical significance of the reform and identify its place in the long run evolution of land tenure, an understanding of previous tenure structures is necessary.

Settled agriculture has existed in some parts of Ethiopia for a very long period of time. The agricultural system in the north has been characterized by the cultivation of cereals and the use of the ox-plough. In contrast to permanent crops, cereals are produced in short production cycles. This. on the one hand, leaves the soil devoid of vegetation cover for most part of the year increasing the risk of erosion. On the other hand, the short length of the production cycle in cereal cultivation - as compared to perennial/ permanent crops - influences the nature of contractual and land-use arrangements. For example, the existence of sharecropping, generally a short-term arrangement, in the cereal but not in the *enset*[3] producing areas is probably explained by the short production cycle of cereal cultivation (Kebede and Croppenstedt, 1995). In addition to cereal cultivation, the use of the ox-plough[4] has shaped a large part of Ethiopia's rural landscape. Compared to hoe cultivation, the ox-plough increases labour productivity being one of the reasons for its spread from its traditional areas in the north to southern parts of the country. As one of the consequences of the higher productivity of the ox-plough, more grazing areas are put under the plough. This competitive use of land for cultivation or grazing is one of the fundamental problems in the agricultural system even at the present time. In contrast to hoe cultivation that can be practiced without removing all vegetation cover, the ox-plough requires open space; hence, in addition to the nature of cereal production, the use of the ox-plough also increases the exposure of the soil. The cultivation of cereals, the use of the ox-plough and the existence of settled agriculture in many parts of the country for many centuries have shaped the current agricultural landscape of Ethiopia (McCann, 1995).

[3] *Enset* (*Ensete ventricosum*) is a banana-like tree, the root of which is used as a staple food in many southern parts of Ethiopia.

[4] Farmers were using the ox-plough at least as far back as the first millennium BC (McCann, 1995).

Corresponding to the farm technology, the main features of the land tenure also exhibited persistent stability. The state was always an important actor in land tenure, the *gult* (fief) being the main institution of taxation and tribute. Centralized management of production did not exist[5]; but farmers were obliged to contribute labour or other materials. The *gult* was the main institution through which the state affected the day-to-day lives of ordinary people, starting at least from as far back as the thirteenth century (Crummey, 2000: 5). The overlords controlling the *gult* were also responsible for mobilizing the populace in times of war. Even though *gult* positions were not necessarily hereditary, there were many instances where the same lineage held them from generation to generation. In addition, the amounts of tribute passed over to the central government probably varied over time depending on the relative strengths of the *gult*-holders and the state. Hence, the *gult* may probably be best understood as a borderline case between an administrative position and a form of property (Crummey, 2000: 8-9)[6]. The *gult* has served as the most important institution for the concentration and transfer of resources from independently operating farmers to the nobility and the state for many centuries.[7] With the modernization and strengthening of the state, especially after the Second World War, the role of the *gult* was weakened.

While the *gult* functioned as a resource extracting mechanism for the nobility and the state, the local allocation of land in the north through the *rist* system existed until the land reform of 1975. *Rist* land was in principle 'communally' owned by all members of a lineage. Each individual that can prove his/her membership to that lineage is entitled to part of the *rist* land. Traditionally *rist* land cannot be sold. Individuals can claim land by using their lineage through their father or mother or the parents of their spouse proliferating the potential *rist* rights an individual had. In spite of its 'communal' appearance, the system was characterized by competition. The amount of *rist* right that can be activated was determined by the political and social importance of the individual.[8] Even though political and social power for concentrating larger amounts of land was important, the *rist* system

[5] But in some cases, imperial palaces were managing the agriculture of surrounding areas.

[6] Crummey (2000) favours the interpretation of the *gult* as a form of property.

[7] Many writers have emphasised the peculiarity of the Ethiopian historical experience in the evolution of land tenure vis-à-vis other African countries. But Crummey (2000) argues that the Ethiopian case is similar to many in 'Sudanic Africa'.

[8] Hoben (1973) is the classic analysis of the *rist* system.

guaranteed access to land for the majority of the farmers avoiding the emergence of widespread landlessness.[9]

The northern and southern parts of the country had an enduring historical interdependence based on trading networks, conquests and population migration that goes back to many centuries. But the southern part of the country was incorporated into the 'modern' Ethiopian state at the end of the nineteenth century. Before the conquest, some regions had centralized kingdoms and others have traditional forms of administration (eg: like councils of elders). With the incorporation of the southern regions, the *gult* system that existed for a long period in the north was extended to the south. Most land that was either common property or unused became state property to be given out for individuals loyal to the state/the emperor. This resulted in significant population movements from the north to the south as well as litigation between the newcomers and local people cultivating land designated to be state property (they were considered as squatters on state land). An important difference between the north and the south was that in the north, due to the dominance of the *rist* system, the power of the state to grant and take away land was limited as compared to that in the south (Wolde-Mariam, 2001). In spite of the conquest and movement of people from the north, most farmers in the south seem to have avoided landlessness before the land reform of 1975.[10]

The land tenure systems were exhibiting all indications of evolving towards private tenure particularly in the second half of the twentieth century. More and more 'state land' was granted to individuals with formal titling. The volume of transactions in land markets was growing. Even in areas with the *rist* system - where selling land is traditionally prohibited – transactions in land were increasing (see Joireman, 2000; Kebede, 2002).

The reform proclamation of 1975, by nationalising all rural land, stopped this evolution towards a private tenure system. The allocation of land to households was entrusted to PAs set up in an approximate area of 800 ha. Family size was generally used as the guiding criterion in the allocation. The next section will examine if actual allocations have closely followed household size; if factors other than household size have played a role is

[9] In addition to *rist*, private free hold was also found in some areas of the north (see Kebede, 2001).

[10] See Kebede (2001) for information collected from respondents indicating that the proportion of tenants in many survey sites in the south was low just before the land reform of 1975. Recent research based on primary documents from government archives by the history department at Addis Ababa University, particularly by Tekalign Wolde-Mariam (2001), also indicates the same results.

also examined. In other words, the 'allocation rule' used by PAs is analysed.

WHAT IS THE 'ALLOCATION RULE'?

The active and direct intervention of the state in the allocation of land was not new in the history of Ethiopia but the reform of 1975 significantly increased it; the socialist ideology espoused by the government also gave a rationale for it. The government consequently implemented major policy initiatives attempting to centralize and control the activities of farm households; these in turn affected land holdings of households.

One major initiative in the second half of the 1980s was villagisation. The declared objective of the program was to create nucleated settlements to facilitate the provision of infrastructure (schools, clinics, electricity, etc). The desire to create a settlement pattern suitable for political control of the rural population surely had played a role. The scale of villagisation was enormous. By 1988 around one-third of the rural population was living in new villages; this is far higher than the Ujamaa programme in Tanzania (McCann, 1995). Apart from other major impacts, at least temporarily, villagisation had significantly affected land holdings. In some cases the new villages were constructed on fertile agricultural land. Since no careful study of water drainage was done, some of the villages become completely impassable during the rainy season. Trees grown near homesteads, particularly *enset*, were destroyed. The changes in settlement in most cases were also accompanied by changes in land holdings of some households (for a detailed discussion of the impacts of villagisation see Lirenso, 1990). Villagisation "brought about further movement and disruption of individuals' land rights and caused many other problems, including environmental degradation, the loss of livestock through disease and reduced access to pasture, poor sanitation and the decapitalization, especially in the southwest, of farms depending on *ensete* (false banana) and tree crops planted near the homestead" (Hoben, 1995). Starting in 1990, with a change in policy towards the promotion of a 'mixed economy', households in the new villages started to go back to their previous neighbourhoods. By 1995, all households in the sampled sites had gone back to their previous locations; the nucleated settlements due to villagisation were no more in existence (Kebede, 2002).

The attempt to collectivise agriculture - setting up producers' cooperatives - was another major policy measure attempting to transform individual farms into 'socialist' enterprises. Producers' cooperatives were set up in ten of the fifteen sites covered by the rural survey. Even though collective farms were

accounting for less than 15% of the agricultural land their impact was more significant. Firstly, the most fertile land was allocated to them. Secondly, most government subsidies, credit and other facilities were directed towards them. Thirdly, farmers that were not members were forced to contribute labour to the producers' cooperatives. In spite of all this support, the producers' cooperatives were inefficient compared to individual farming in term of productivity and resource management (Hoben, 1995). The unpopularity of collectivisation was dramatically illustrated when all 3,732 cooperatives, except a handful, were disbanded within a week of change in government policy in 1990 (Hoben, 1995). But that was not the end of the problem. When disbanded, the distribution of land among former members of the cooperatives' created problems. Firstly, in many cases land per member was larger than average land size in the PAs. Secondly, since more fertile land was allocated to the cooperatives, former members got better than average land. These issues remained contentious in many areas four and five years after the disbandment of the cooperatives (Kebede, 2002).

A huge environmental reclamation initiative that developed into the largest food-for-work programme in Africa was launched after the famine of 1985. In five years, one million kilometres of soil and stone bunds on agricultural land and half a million kilometres of hillside terrace were constructed. Eighty thousand hectares of hillside were closed off to regenerate naturally occurring plants and 300,000 hectares of community woodlots were planted with trees. Much of this effort was wasted or counterproductive (Hoben, 1995). In addition, other government institutions were claiming land, usually without consultation of farmers or proper compensations. For example, the evictions by different central government institutions in the 1980s were: Ministry of Education, 80,000 households (for school-building); Ministry of Coffee and Tea, 15,000 households; water projects, 29,000 households; state farms, over 90,000 households and the Ministry of Agriculture, 38,000 households (for forestry and extension), (Hoben, 1995).

The policy initiatives and active interventions of government institutions show the high level of insecurity and uncertainty in land holding rights after the land reform of 1975. The distribution of land in the study period (1995-97) was definitely affected by the changes brought about by these measures. Our study will not attempt to identify the effects of particular policies.

The pace of implementation of the land reform of 1975 was not uniform in the different regions of the country. Generally it was delayed in the northern parts. In the initial allocation of land after the proclamation, landless people

who received land seem to have benefited the most. Tenants mostly gained from the abolition of obligations to landlords rather than through an increase in the amount of land they cultivated. In addition to the initial allocation following the proclamation, repeated redistributions were implemented until 1990 when the Mengistu[11] regime shifted towards a mixed-economic policy. After the overthrow of the Mengistu regime in 1991, land policy fell under the jurisdiction of the regional governments. No significant change in land policy occurred after 1991.[12]

Rural households access land mainly in two ways: land allocated by PAs and land through leases (sharecropping or fixed rent). The land allocated by PAs can be classified into four. First, some of the land is inherited before the reform. Since households have retained this land during the initial stages as well as subsequent re-distributions, PAs have approved it. Second, some land purchased by the household before the land reform also remains with it. The sum of the two gives us the amount of land households were able to retain from their pre-reform land holdings. The third type is land distributed during the initial stages of the land reform. The fourth constitutes land received during redistributions by PAs or continual transfers (such as from parents and relatives) after the initial distribution following the reform. The sum of the third and fourth gives us the total amount of land directly distributed or approved by PAs after the land reform. In addition to PA allocated/approved land, households can lease in through sharecropping or fixed rent. Others means of acquiring land are less important: land given by a friend or relative either before or after the reform; land belonging to the PA used by household; land given to be looked after by someone, contract with father, etc. Table 1 presents the average percentages of total household land received in the above-described different ways.

Most of the land holdings of households (54% in column 3+4) were acquired through post-reform distributions but on average as high as 36% (column 1+2) were retained from pre-reform inheritance and purchases. This implies an important element of continuity in land distribution before and after the reform. In addition, it casts doubt on the perception that most farmers during the pre-land reform period were tenants. Thirty-six percent is the lower limit since it includes only the land *retained* by households; land *taken* from households after the reform is not included.

[11] The regime that ruled the country from September 1975 up to May 1991 is referred here as the Mengistu regime, even though there were also other heads of state during the period.

[12] The Amhara region had a major redistribution after 1991.

Table 1: Percentages of total household land acquired through different means (1995)

Villages	1	2	1+2	3	4	3+4	5	6	7
Northern villages									
Haresaw	37.3	3.9	**41.2**	40.6	17.9	**58.5**	0.0	0.0	0.3
Geblen	13.3	3.2	**16.5**	53.4	21.9	**75.3**	5.8	0.0	2.3
Dinki	10.8	0.0	**10.8**	63.2	9.9	**73.1**	5.4	1.6	9.1
Debre Berhan	11.6	0.9	**12.5**	33.8	41.1	**74.9**	9.9	0.9	1.9
Yetmen	0.3	6.2	**6.5**	0.0	71.0	**71.0**	22.3	0.1	0
Shumsheha	1.7	1.8	**3.5**	30.4	42.5	**72.9**	21.1	0.9	1.6
Southern villages									
Sirbana Godeti	7.9	1.5	**9.4**	64.4	12.4	**76.8**	3.0	8.8	2.0
Adele Keke	89.9	1.3	**91.2**	2.9	0.5	**3.4**	0.6	1.8	3.0
Korodegaga	8.7	1.6	**10.3**	28.8	56.8	**85.6**	0.9	0.4	2.9
Terufe Kechema	2.4	1.7	**4.1**	28.2	54.7	**82.9**	11.4	0.5	1.1
Imdibir	71.3	16.1	**87.4**	10.4	1.5	**11.9**	0.0	0.0	0.8
Aze Deboa	84.4	0.5	**84.9**	0.9	9.2	**10.1**	3.3	1.7	0.0
Adado	79.4	10.8	**90.2**	3.3	0.4	**3.7**	2.3	0.7	3.1
Gara Godo	49.4	20.5	**69.9**	9.8	10.6	**20.4**	0.0	0.5	9.1
Domaa	8.5	3.4	**11.9**	1.5	83.4	**84.9**	1.4	0.0	1.7
Total	**31.6**	**4.7**	**36.3**	**25.0**	**28.9**	**53.9**	**6.0**	**1.2**	**2.6**

Note: 1 pre-land reform inheritance; 2 pre-land reform purchase; 3 at the time of land reform; during redistribution after land reform; 5 sharecropping; 6 fixed rent; 7 other means.

An interesting result emerges from the figures of individual villages. As indicated in Section 2, the 'modern' Ethiopian state expanded into southern areas at the end of the nineteenth century. A general perception that most of the farmers in the southern areas have been turned into tenants was created with this and subsequent historical events. The figures in Table 1 suggest that this is not probably true for all the villages. In southern sites like Korodegaga, Sirbana Godeti and Terufe Kechema, only less than 11% of the land of households in 1995 was from pre-reform inheritance and purchases.[13] Unless the PAs were particularly targeting pre-reform inherited and purchased land for distribution - which is unlikely - the figures suggest that the level of tenancy probably was high in these areas. But all the five highest percentages for pre-reform inheritance and purchase (column 1+2) are in southern sites. In two of the villages, Adele Keke and Adado, more than 90% of the area of land held by the sampled households was retained from pre-reform inheritance and purchases. These villages seem to be only marginally affected by post-reform distributions. The results in Table 1 are reinforced by information gathered from farmers on the level of tenancy before the land reform in the fifteen survey villages.[14] These findings highlight important continuities that are generally ignored in discussions of the land reform since most discourses focus on the radical aspects of the change.

Household size was used as a criterion for allocation by PAs (Rahmato, 1984; Amare, 1994). In other words, the 'allocation rule' can be stated as an attempt to equalize land among households in a PA given family size.[15] Guaranteeing households' access to land to cover their needs (the number of 'mouths to be fed') is the principle behind this 'allocation rule'.[16] This principle tallied with the socialist ideology of the regime. If this 'allocation rule' had been strictly implemented, only household size will appear as the significant variable in a regression of PA allocated land on characteristics of households. If household members are classified into different age/sex

[13] The relatively low figure for Domaa is due to the fact that most households were resettled in the area only after the land reform.

[14] For the estimates of farmers on the levels of tenancy at the villages covered by the ERHS before the land reform see Kebede (2002). See also Wolde-Mariam (2001) for research depending on government archival materials.

[15] Since the jurisdiction of a PA does not extend into other PAs, significant differences in land allocation can in principle still exist between different regions. This inter-regional inequality is discussed in the Section 5.

[16] Incidentally, the underlying logic of most traditional forms of land tenure is also the same.

groups, the coefficients on all the groups are expected to be significant and positive; with an addition household member PAs allocate more land.[17]

Table 2 presents the results from a panel random effects regression of total PA allocated land to household on socio-economic characteristics. To test whether the correlation between household-level fixed effects and the explanatory variables significantly affects the coefficients, the Hausman specification test was conducted. The resulting chi-squared statistic of 19.31 at a p-value of 0.2531 indicates that the differences between the coefficients of the random and fixed effects regressions are not systematic.[18] In addition, the Breusch and Pagan Lagrangian multiplier test for random effects (var (u) = 0) rejects the null hypothesis with a chi-squared value of 28.62 (p = 0.0000); this supports the random effects model as compared to the pooled OLS.

The total amount of PA allocated land to each household in hectares is regressed on three sets of variables: household demographics and education, location represented by village dummies and other variables. To examine how the age and sex structure of households affected land allocations, the numbers of people in different age/sex categories are included - number of males and females in the age ranges 0-4, 5-14, 15-54 and 54 plus. This enables us first to examine if allocations responded to household size and second whether these allocations are more sensitive to the number of people in a certain age/sex group. Age of the household head (and its square), dummy variables for female-headed households, for heads and wives that completed primary education are the other demographic and education variables. In addition to the site dummies that control for village level fixed effects, the total amount of land owned by parents of the spouses, number of oxen owned by the household, percentages of 'fertile' and flat land from total household land holdings and dummies for households that sharecrop and rent land are included.

Indeed the amount of land allocated responded to household size at 5% level of significance; the joint significance test for all the sex/age variables has a chi-squared statistics of 4.58 with p-value of 0.0324. Testing for different combined effects of all the sex/age variables indicated that a unit

[17] If different weights are assigned to the age/sex groups (adjustment towards adult equivalents), the coefficients are expected to differ from each other but all are still expected to be positive.

[18] The fixed effects regression was also estimated. The fixed effects regression was not significant at all with an F-value of 1.16 (p = 0.2942).

increase in total household size increases PA allocated land by an amount between 0.03-0.68 hectares.

Even though the household size variables are jointly significant as indicated above, all the sex/age variables are not individually significant - only those for males and females between 5 and 54 years are significant. All sex/age variables would have positive and significant coefficients if actual allocations were based on the 'needs' of households. If PAs were allocating land according to the number of 'adult equivalents', the coefficients would have decreased for children as compared to adults. The regression results show that all coefficients for household members below five and above 54 years are not significant. This strongly suggests that allocations were emphasizing the capacity of households to use the land than their 'needs'. Since children start to work early, even those in the upper range of the age group of 5-14 years contribute to production. In addition, there could also be dynamic considerations. Allocating land proportional to those above 54 years does not make sense since they quickly get too old. Allocating land proportional to those below four years can be 'too early'. On the other hand, if PAs were allocating according to the 'needs' of households, the results imply that they were giving zero weights to individuals below five and above 54 years of age - which is unlikely.

Table 2: Random effects regression of land allocated by PAs on socio-economic characteristics household (1995-1997)[19]

	Random-effects GLS regression					
	Co-efficient	Std error	z	P>|z|	95% conf. interval	
Household demographic and education variables						
Males 0-4	0.0039	0.0566	0.07	0.946	-0.1071	0.1148
Males 5-14	**0.1057**	**0.0336**	**3.14**	**0.002**	**0.0398**	**0.1715**
Males 15-54	**0.0988**	**0.0303**	**3.26**	**0.001**	**0.0394**	**0.1585**
Males 54+	0.0358	0.1022	0.35	0.726	-0.1644	0.2361
Females 0-4	-0.0555	0.0547	-1.01	0.311	-0.1627	0.0517
Females 5-14	**0.0994**	**0.0343**	**2.90**	**0.004**	**0.0323**	**0.1666**
Females 15-54	**0.0709**	**0.0307**	**2.31**	**0.021**	**0.0107**	**0.1311**
Females 54+	-0.0030	0.0777	-0.04	0.969	-0.1553	0.1493
Age of Head	**0.0335**	**0.0147**	**2.28**	**0.022**	**0.0048**	**0.0623**
Age of head squared	**-0.0003**	**0.0001**	**-2.02**	**0.043**	**-0.0006**	**-8.6e-06**
Female-headed	**-0.2998**	**0.0972**	**-3.08**	**0.002**	**-0.4903**	**-0.1092**
Primary educ of head	0.0353	0.1354	0.26	0.794	-02301	0.3006
Primary educ of spouse	0.3703	0.2591	1.43	0.153	-0.1376	0.8782
Land of parents	-0.0014	0.0009	-1.56	0.119	-0.0031	0.0003
Other variables						
Number of oxen	**0.1624**	**0.0281**	**5.77**	**0.000**	**0.1072**	**0.2176**
Percentage of flat land	-0.1697	0.1015	-1.67	0.094	-0.3686	0.0291
Share-Cropping	**-0.3901**	**0.1020**	**-3.82**	**0.000**	**-0.5901**	**-0.1902**
Renting	0.0263	0.1966	0.13	0.893	-0.3589	0.4115
Site dummies and constant						
Haresaw	**-1.5041**	**0.2268**	**-6.63**	**0.000**	**-1.9486**	**-1.0596**
Geblen	**-1.9099**	**0.2472**	**-7.73**	**0.000**	**-2.3943**	**-1.4254**
Dinki	**-0.8458**	**0.2263**	**-3.74**	**0.000**	**-1.2894**	**-0.4022**
Debre Berhan	**1.4949**	**0.1959**	**7.63**	**0.000**	**1.1108**	**1.8789**
Yetmen	-0.2731	0.2392	-1.14	0.254	-0.7420	0.1958
Shumsheha	**-0.5186**	**0.2052**	**-2.53**	**0.011**	**-0.9208**	**-0.1134**
Terufe Kechema	**-1.3100**	**0.2068**	**-6.34**	**0.000**	**-1.7152**	**-0.9048**
Sirbana Godeti	**-1.1602**	**0.2155**	**-5.38**	**0.000**	**-1.5827**	**-0.7378**
Adele Keke	**0.9054**	**0.2119**	**-4.27**	**0.000**	**-1.3208**	**-0.4901**
Korodegaga	**0.8188**	**0.2031**	**4.03**	**0.000**	**0.4206**	**1.2169**
Imdibir	**-2.0358**	**0.2317**	**-8.79**	**0.000**	**-2.4900**	**-1.5817**
Aze Deboa	**-1.6579**	**0.2234**	**-7.42**	**0.000**	**-2.0958**	**-1.2199**
Adado	**-0.9510**	**0.2030**	**-4.69**	**0.000**	**-1.3489**	**-0.5531**
Gara Godo	**-1.7291**	**0.2091**	**-8.27**	**0.000**	**-2.1389**	**-1.3193**
Constant	**0.9906**	**0.3883**	**2.55**	**0.011**	**0.2295**	**1.7518**

Note: Coefficients significant at 5% level are given in bold.

[19] Number of observations = 2608; Number of groups = 1354; Observations per group: Minimum = 1; Average = 1.9; Maximum = 2; Random effects u_i ~ Gaussian Correlation (u_i, X) = 0 (assumed); R-sq: Within= 0.0072; Between = 0.4757; Overall = 0.3479; Wald $chi^2(33)$= 1234.50 Prob > chi2= 0.0000

The hiring of labour was prohibited for long after the reform and labour markets are thin in most localities. Household size is probably a real constraint for the amount of labour households can mobilize. The allocation by the PAs seems to intelligently take this institutional/market constraint into account.

It is also interesting to note that the sex/age coefficients that are significant are very close to each other (ranging from 0.07 to 0.11); all pair-wise tests of equality are accepted. This implies that PAs gave equal weights to male and female members reflecting the equal rights of women provided by the reform (Amare, 1994). Even though this seems to be upheld in cases where women are in married households, the allocation to female-headed households is different. The coefficient on the dummy variable for female-headed households is highly significant as well as large; controlling for other factors, on the average female-headed households have 0.30 hectares less than male-headed households. The most likely reasons for the anomaly between the 'equal' status of women in married households but 'lower' status of female-headed relative to male-headed households in land allocation are given by Amare (1994) in his case study of an area in central highlands of Ethiopia. First, patrilocal marriages imply that the women move to the husband's PA and women usually go back to their original neighbourhood after divorce; when moving back they would lose the right to claim land in their former husband's PA. Second, elders and PA officials often give most of the land to the husband during divorces as he is considered the primary producer; in addition, if she is coming from another PA, the wife is also considered as an outsider. Third, even though women are legally entitled to claim an equal part of the household's land, this generally reduces their chance of remarriage; a woman that has claimed her share of land during divorce reportedly frightens off prospective husbands. In addition, the social stigma against men "coming into a woman's house" may be strong in many cases (Amare, 1994).

In interpreting the sex/age regression coefficients, a possible estimation problem is simultaneity bias; the amount of land households get from PAs may affect their household size. First, since land allocation generally depends on household size, this can encourage households to have more children - encouraging pro-natal behaviour. But it is unlikely that the land reform has done that. Information from demographic and health surveys (DHS) show that fertility is declining (CSA/ORC Macro, 2001). Secondly, and more directly, those households with larger amounts of land may bring more people that are not immediate family members in order to get more land. In this case, instead of household size determining the amount of land

PAs allocate to households, the amount of land will affect the number of people living in the household. If this is true, the number of household members that are not immediate family will be correlated to the size of land. To test for this we added the number of household members that are not immediate family on the above regression. In addition, regressions with dummy variable for people that are not immediate family and interactive terms with the sex/age variables were run. In all cases, the variables were not statistically significant indicating that our results are not biased by this simultaneity problem.

The interpretation that PAs allocated land according to the capacity of households to use it is reinforced by the large and highly significant coefficient on the number of oxen; households with an additional ox are allocated 0.16 more hectares. Since most regions heavily depend on oxen for ploughing, this result is another indication that the 'allocation rule' has emphasized the capacity of households to use land. There are traditional ox sharing and similar arrangements that improve the access of households to more ox power. Imperfections in traditional ox sharing arrangements probably explain why households that own ox do better; access to ox power from traditional sharing arrangements is not a perfect substitute for ownership.

Correlation between the number of oxen and variables that are not included in the regression can be a source endogeneity (omitted variable) bias. The result of the Hausman specification test indicates that the correlation between the fixed effects and included variables is not important since the coefficients for the random and fixed effects estimates are not significantly different from each other. In addition, even in the fixed effects model, even though the equation as a whole is not statistically significant, the coefficient on oxen is positive and significant at 5%. Hence, the coefficient on the number of oxen is expected to be unbiased.

The age of the household head is significantly and positively - with an ultimate negative effect – correlated to the land allocated by PAs (the joint significance test for age of household head and its square has a chi-squared statistics of 5.23 and a p-value of 0.0222). If we solve for the age of the household head that maximizes land allocated to households given other variables it is 55.88 years. It is interesting to note that this age coincides with the starting age of the oldest sex/age group; we have seen that the number of people in this age group does not affect land allocated to the household. This finding further reinforces that PAs are considering capacity to use as a more important criterion than 'needs'.

The size of land owned by parents of spouses was included to examine if inter-generational land holdings are correlated. The coefficient is not statistically significant. The land reform seems to have halted the transfer of inequality in land over generations. Without the land reform, children of households with larger land are expected to have larger land holdings given other factors.

The primary education of the household head and the wife were not statistically significant; PAs did not take completion of primary education into account when allocating land. In addition, the result seems to imply that 'educated' people did not manipulate land allocation.

The dependent variable, the size of land allocated to a household, does not take the quality of land into account. If quality is taken consistently into consideration by PAs while allocating land, those households with higher quality will be allocated smaller sizes; in other words, there will be a systematic correlation between size and quality of land confounding our results. Smaller size of allocated land will also be more fertile and hence the dependent variable will no more reflect inequality in allocations. To control for this, two measures of the quality of land are included in the regression. In most parts of rural Ethiopia the fertility of land is roughly categorized by farmers into three; *leum* (fertile), *leum-teuf* (semi-fertile) and *teuf* (infertile). The percentage of *leum* land from total household land holdings is entered as one variable. In addition to soil fertility, the slope of a plot of land is an important feature determining quality of land. Plots of farmland were classified into *medda* (flat), *dagethama* (gentle slope) and *gedel* (steep slope). The proportion of *medda* (flat) land from total household land holdings is the other quality variables included. If the allocation of land had systematically adjusted to the quality of land, the coefficients on quality would be significantly and negatively correlated to total land size. But both variables are not statistically significant at conventional levels. Thus the results from the regression analysis using quality unadjusted land holdings is not distorted.

All the dummy variables for the survey villages - except that for Yetmen - are large and highly significant.[20] This reflects the significant inter-regional inequality in land holdings. Even though inter-regional inequality is not a

[20] All the significant dummy variables are negative except that for Debre Berhan and Korodegaga. This is due to the fact that the excluded village, Domaa, is a recent settlement in a relatively remote area, where population density is lower and household land holdings are higher than in most of the other villages.

result of the reform, the institutional set-up created by it most likely has contributed to its perpetuation. Since PAs cater for only their members, it is very difficult - probably practically impossible - for farmers to move from densely to sparsely populated areas and to get land; PAs in sparsely populated areas have no legal responsibility for those coming from other areas. Compared to the land tenure before the reform this has constrained rural-rural movement of people. Because of the fluidity and proliferation of *rist* rights northern people probably had a better chance of movement in the old system. In areas where land markets were developing fast before the land reform - both in the north and south - the same was true.[21]

Finally, dummy variables for households that sharecrop or rent in land are included. Even though the coefficient for households that rent is not statistically significant, that for sharecropping is highly significant and negative; households that sharecrop in land are allocated 0.39 hectares less. Sharecropping seems to compensate for shortfall in PA allocated land. The next section discusses the characteristics of households that are involved in the land lease market.

LAND LEASE - SHARECROPPING AND FIXED RENT

The land reform generally outlawed leases in land until the change of policy towards a 'mixed economy' in 1990 but the elderly and female-headed households without adult labour were excluded from this restriction. In addition, people who do not have sufficient seed and draft power made secret rental arrangements, usually with relatives (Amare, 1994). In 1990 the government legalized leases in land and the lease market became a significant means of getting access to land.

Land lease transactions are either in the form of fixed rents or sharecropping.[22] In the former case, tenants pay a fixed amount - either in cash or in kind - that does not depend on output. In contrast, in sharecropping the rent is a percentage of the output; hence, risks are spread between tenant and land 'owner'. In a risk-ridden environment as rural Ethiopia, popularity of sharecropping relative to fixed rent is expected.

[21] The inter- and intra-regional inequalities in the distribution of land are discussed in Section 5.

[22] In addition to lease, some households also transfer land in the form of gifts or by borrowing. Gift fields are given free of charge for an indefinite time period or until the peasant association re-distributes land. Borrowed land is given for a specified period of time (Gavian and Teklu, 1996). These are included in 'other' in our case.

As the figures in Table 1 indicate, while on the average 6.0% of land holdings are from sharecropping only 1.2% is from fixed rent. These aggregate figures gloss over significant regional/inter-village variations. Households in Yetmen and Shumsheha get more than 20% of their land from sharecropping, but no one reported sharecropping in the three villages of Haresaw, Imdibir and Gara Godo. The two villages where sharecropping is not reported, Imdibir and Gara Godo, are found in the *enset* farming system that is heavily dominated by the production of perennials than annuals. Sharecropping is generally a short-term contract and hence its absence in areas dominated by permanent crops is understandable. All the survey villages with higher than the average percentage of sharecropped land are found in areas that are dominated by cereal production.[23]

Studies examining efficiency on leased and PA allocated land have generally found no significant difference between them. Gavian and Ehui (1999) and Pender and Fafchamps (2001) found that efficiency on leased land is the same as that on PA allocated land. Results in Section 3 indicate that households with lesser PA allocated land tend towards sharecropping-in. Hence, the combination of the results implies that the lease market may have decreased inequality without decreasing efficiency. An examination of the effect of the lease market on land inequality is left for Section 5. This section will focus on analysing the characteristics of households that rent in land.

Table 3 presents the coefficients and marginal effects of a random effects tobit. The size of sharecropped land by households is regressed on different socio-economic characteristics. The tobit model is opted for due to censoring since many households do not sharecrop. The test for the pooled tobit against the panel random effects strongly supports the latter.[24]

From all the demographic and education variables only three are statistically significant. Households with larger number of males between the ages of 15 and 54 sharecrop in more land; an additional male member in this age group increases sharecropped land by 0.03 hectares on average. On the other hand, households with more females with ages between 5 and 14 sharecrop less land, an additional female in this age group decreasing sharecropped land by 0.02 hectares on the average. Adult male labour

[23] For more information on sharecropping using data from the Ethiopian Rural Household Survey (ERHS) see Kebede and Croppenstedt (1995).

[24] Look at the results at the top of Table 3; the values of rho and chi-square indicate that the panel–level variance component is important.

seems to be the crucial factor; however, it is not clear why, given adult male labour, the number of female children between the ages of 5 and 14 years decreased the amount of sharecropped land.

Female-headed households are sharecropping on average 0.08 hectares of land less than male-headed households, even after controlling for adult male labour. Remember, female-headed households are also allocated lesser land from the PA; female-headed households seem to be marginalized both in administrative allocations and lease markets.

All the other demographic and education variables are not significantly correlated with the amount of sharecropped land. Neither the number of people in other age categories (other than males between 15 and 54 and females between 5 and 14), nor the age of the household head was significant. In addition, primary education of the household head and the spouse were not significant.

Table 3: Household random effects tobit regression of Sharecropped land on socio-economic characteristics (1995-1997)[25]

	Random-effects tobit regression				
	Coefficient	**Standard error**	**z**	**dy/dx***	**Standard error**
Household demographic and education variables					
Males 0-4	-.0683	0.1012	-0.68	-0.0100	0.0154
Males 5-14	-0.0243	0.0633	-0.38	-0.0035	0.0093
Males 15-54	**0.2346**	**0.0574**	**4.09**	**0.0342**	**0.0114**
Males 54+	-0.2268	0.1967	-1.15	-0.0330	0.0317
Females 0-4	0.1458	0.0957	1.52	0.0212	0.0143
Females 5-14	**-0.1588**	**0.0669**	**-2.37**	**-0.0231**	**0.0121**
Females 15-54	0.0087	0.0643	0.14	0.0013	0.0094
Females 54+	-0.1085	0.1535	-0.71	-0.0158	0.0228
Age of head	-0.0154	0.0286	-0.54	-0.0023	0.0040
Age of head squared	0.0000	0.0003	0.07	2.82e-06	0.0000
Female-headed	**-0.8289**	**0.2137**	**-3.88**	**-0.0832**	**0.0310**
Primary educ of head	-0.2755	0.2420	-1.14	-0.0355	0.0300
Primary educ of spouse	0.3347	0.4096	0.82	0.0565	0.0815
Other variables					
Number of oxen	**0.1967**	**0.0429**	**4.59**	**0.0287**	**0.0106**
PA allocated land	**-0.0920**	**0.0351**	**-2.62**	**-0.0134**	**0.0067**
Percentage of fertile land	**-0.5208**	**0.1745**	**-2.98**	**-0.0759**	**0.0359**
Percentage of flat land	0.0739	0.1976	0.37	0.0108	0.0292
Renting	0.2454	0.2743	0.89	0.0399	0.0507
Site dummies and constant					
Haresaw	-12.7063	899215	0.00	-0.1317	0.0459
Geblen	**-1.1030**	**0.5145**	**-2.14**	**-0.0982**	**0.0484**
Dinki	0.2914	0.3823	0.76	0.0483	0.0631
Debre Berhan	**0.6773**	**0.3404**	**1.99**	**0.1325**	**0.0642**
Yetmen	**1.6040**	**0.3681**	**4.36**	**0.4513**	**0.1170**
Shumsheha	**1.3713**	**0.3416**	**4.01**	**0.3542**	**0.0850**
Terufe Kechema	0.3265	0.3559	0.92	0.0549	0.0598
Sirbana Godeti	**-0.8328**	**0.4075**	**-2.04**	**-0.0835**	**0.0464**
Adele Keke	**-1.5446**	**0.4934**	**-3.13**	**-0.1139**	**0.0459**
Korodegaga	-0.6848	0.3861	-1.77	-0.0733	0.0464
Imdibir	-12.9722	972847	0.00	-0.1317	0.0459
Aze Deboa	-0.5996	0.4114	-1.46	-0.0667	0.0493
Adado	-0.3477	0.3770	-0.92	-0.0433	0.0488
Gara Godo	-12.9663	807866	0.00	-0.1317	0.0459
Constant	**-1.1009**	**0.7195**	**-1.53**		

* dy/dx are the marginal effects for unconditional expected value at median values.
Note: Coefficients and marginal effects significant at 1% and 5% are given in bold.

[25] Number of observations = 2608; Number of groups = 1354; Observations per group: Minimum = 1; Average = 1.9; Maximum = 2 Random effects u_i ~ Gaussian Log likelihood = -1215.5316; Wald $chi^2(31)$ = 221.38; Prob > chi2 = 0.0000; Sigma u = 1.1403; Sigma e = 1.3376; Rho = 0.4209; Sigma u=0; $chibar^2(1)$=51.33; prob>$chibar^2$=0.000

The amount of sharecropped land is negatively related to PA allocated land supporting the result from the previous section; on average, when the latter increased by one hectare, sharecropped land decreased by 0.01 hectare. Sharecropping had an equalizing effect. Households seem to use sharecropping to compensate for shortfalls in PA allocated land.

The number of oxen is significantly and positively correlated to the amount of sharecropped land; one more ox on average increases the amount of sharecropped land by 0.03 hectare. The previous section showed that ownership of oxen significantly increased the amount of PA allocated land. The two results illustrate the much-improved position of households with oxen. Given sharecropping - represented by the dummy variable in the regression of Section 3 - households with more oxen are allocated more land by the PAs. Given the amount of PA allocated land, households with more oxen also sharecrop-in more land.

Finally, the dummy variables for the survey villages indicate regional variations in the amount of sharecropped-in land. It is interesting to note that the number of significant dummy variables is smaller as compared to the regression in Section 3. The regional variation in terms of sharecropping seems to be less pronounced than that of administratively allocated land.

Similar random effects tobit for the amount of land rented in (fixed rent) by households is run. Since the number of observations as well as the size of rented land is small, the coefficients and marginal effects are also very small (results are given in the Appendix). Even in the case of fixed rent, males 15 to 54 years old and oxen are the only significant variables - except two village dummies. The availability of adult male labour and ox draft power seems an important factor determining access to both administratively allocated land as well as land accessed through the lease market. This result is a very different scenario from that implied by the underlying principle of the land reform, as well the popular conception of land distribution in rural Ethiopia.

The results, so far, indicate that differences in adult labour and oxen significantly affect land holdings. Hence, since households have different adult labour and oxen, inequality in land holdings is also expected. In Section 5, this is more explicitly examined by using inequality indices developed in the income distribution literature.

INEQUALITY IN LAND DISTRIBUTION – TWO DECADES AFTER REFORM

Section 3 has shown that PA allocations were emphasizing the capacity of households to utilize land. Allocating land according to adult labour and oxen of households does not necessarily result in an inequitable distribution, if the two are equitably distributed among households. This section focuses on whether the land reform has succeeded in creating a highly equitable distribution as usually assumed. Firstly, the size distribution of household and per capita land holdings are examined. Secondly, within - and between - village inequalities are analysed by using indices from the income distribution literature.

Table 4 presents the average total and per capita land holdings of households by survey villages. These include PA allocated, leased and land accessed through other means. Generally, the land holding of households is very small; on average a household has only 1.72 hectares (or a median of 1.13 ha.). In per capita terms, this is only 0.33 hectares (median of 0.20 ha.). But these mean figures gloss over significant differences between villages. For example, in terms of total land size the village with the largest (Debre Berhan) has eleven times the mean land holding of the lowest (Imdibir); in per capita terms, the ratio increases to 16.[26] Ranking the survey sites by using total or per capita land holdings is very similar; Spearman's rank correlation coefficient between the two is 0.9464 (with p value of 0.0000). This correspondence implies that the inter-regional inequality is mainly due to differences in total land rather than differences in household size. The villages with very low per capita land holding are characterized by high population density (Imdibir and Gara Godo), or by agro-ecological conditions limiting the supply of farmland (Geblen).

[26] In terms of the median total land size Debre Berhan is 25 times that of Imdibir; in per capita terms the ratio rises to 33!

Table 4: Total and per capita land holding of households by survey villages-1995/97 (in hectares)

Site	Total land		Per capita land	
	Mean	**Median**	**Mean**	**Median**
Haresaw	0.5747	0.50	0.1743	0.10
Geblen	0.3315	0.25	0.0617	0.05
Dinki	1.2799	1.34	0.3115	0.25
Debre Berhan	3.8517	3.50	0.7780	0.66
Yetmen	1.8989	1.87	0.3972	0.34
Shumsheha	1.9026	1.50	0.4433	0.33
Sirbana Godeti	1.5206	1.50	0.2534	0.23
Adele Keke	1.4351	1.25	0.2705	0.21
Korodegaga	3.0470	3.00	0.5339	0.46
Terufe Kechema	1.3133	1.09	0.1979	0.17
Imdibir	0.3303	0.14	0.0467	0.02
Aze Deboa	0.9929	0.75	0.1342	0.09
Adado	1.3118	0.47	0.2279	0.10
Gara Godo	0.8180	0.50	0.1245	0.08
Domaa	2.3016	2.00	0.4715	0.33
All sites	**1.7228**	**1.13**	**0.3343**	**0.20**

The mean and median land size figures reported in Table 4 do not show the range of land holdings inside and between survey villages. Table 5 reports the cumulative percentage of households with per capita land sizes below one hectare classified by intervals in 1997. Except Debre Berhan and Domaa, 90% or more of the households have less than 1 hectare per capita. Even in Debre Berhan, with the highest per capita land holding, around 70% of the households have less than one hectare of land per capita. In Imbidir, which has the lowest per capita land size, 98% of the households have less than one hectare, and in Geblen all households have less than 0.2 hectares per capita.

Tables 4 and 5 show, first, that the land holdings of households are very small and, second, as implied in the previous sections, significant differences between villages exist.

Table 5: Cumulative percentages of households with per capital land size below one hectare by survey villages – 1997

Intervals of Per Capita Land Size in Hectares:										
Site	**<.1**	**.1-.2**	**.2-.3**	**.3-.4**	**.4-.5**	**.5-.6**	**.6-.7**	**.7-.8**	**.8-.9**	**.9-1.0**
Haresaw	58.97	91.03	94.87	97.44	97.44	98.72	98.72	100.00		
Geblen	89.06	100.00								
Dinki	22.89	37.35	59.04	67.47	77.11	85.54	90.36	92.77	95.18	96.39
Debre Ber.	2.31	2.89	6.36	12.72	20.81	32.37	43.35	51.45	61.85	69.36
Yetmen	25.86	32.76	46.55	62.07	81.03	93.10	94.83	94.83	94.83	94.83
Shumsheha	20.30	30.83	46.62	55.64	64.66	75.19	82.71	86.47	90.23	90.98
Sirbana G.	26.60	38.30	74.47	88.30	90.43	93.62	96. 81	98.94	98.94	98.94
Adele Keke	12.90	44.09	67.74	84.95	91.40	95.70	95.70	95.70	95.70	95.70
Korodegaga	7.48	10.28	15.89	33.64	46.73	64.49	80.37	84.11	88.79	89.72
Terufe K.	25.25	61.62	84.85	92.93	96.97	98.99	98.99	98.99	98.99	98.99
Imdibir	98.46	98.46	98.46	98.46	98.46	98.46	98.46	98.46	98.46	98.46
Aze Deboa	44.59	87.84	93.24	95.95	95.95	95.95	95.95	95.95	97.30	100.00
Adado	29.27	52.03	66.67	69.92	74.80	83.74	86.18	88.62	91.06	91.87
Gara Godo	55.32	90.43	96.81	97.87	98.94	98.94	98.94	98.94	98.94	98.94
Domaa	9.23	15.38	30.77	46.15	56.92	64.62	73.85	80.00	80.00	81.54
All sites	**30.58**	**47.61**	**60.37**	**68.50**	**74.55**	**81.18**	**85.67**	**87.88**	**90.59**	**92.02**

To further examine intra- and inter-village inequalities, three inequality indices are used: Gini coefficient, Theil entropy index and variance of logarithms. The motivation for using more than one inequality index is that each has weaknesses and strengths. The Gini coefficient has much to recommend it because it considers the differences between all pairs and avoids the arbitrary squaring formula used in many inequality indices. But it is not more sensitive to transfers at lower levels; sensitivity to transfers at lower levels can be an advantage if the focus is on lower/poorer segments of the distribution. Theil's entropy index is difficult for intuitive understanding. The variance of logarithms, unlike the Gini coefficient, gives more weight to transfers at lower than at higher levels; this is a positive feature of the index. But it only considers the difference of each income - land size in our case - from its (log) mean value and not the difference for each pair as in the Gini coefficient; it also depends on an arbitrary squaring formula.[27] Table 6 presents Gini coefficients, Theil entropy indices and variance of logarithms for PA allocated per capita land by sites. The table also reports the bootstrap estimates of the standard errors with 1000 replications. All the standard errors (except two) are low relative to the estimates of the inequality indices indicating high levels of significance.

[27] For definitions and discussion of these measures of inequality see Sen's (1997) classic book.

Table 6: Gini coefficients, Theil entropy measures and variance of logarithms of per capita household land allocated by PAs by survey villages (1995-1997)

Village	Gini Coefficient		Theil entropy measure		Variance of logarithms	
	Gini	Std. error	Theil	Std. error	Var of logs	Std. error
Haresaw	0.5961	0.1229	1.2732	0.4849	20.0362	7.7362
Geblen	0.4510	0.0779	0.5659	0.2350	36.3530	9.8316
Shumsheha	0.4781	0.0208	0.4166	0.0380	73.8506	8.7695
Debre Berhan	0.3898	0.0163	0.2718	0.0231	33.9353	6.8162
Dinki	0.5307	0.0382	0.5715	0.1024	104.2437	9.8163
Sirbana Godeti	0.3688	0.0274	0.2888	0.0427	75.9263	10.4205
Yetmen	0.4622	0.0650	0.5401	0.1589	42.7470	11.7578
Imdibir	0.7607	0.1009	1.9476	0.4048	11.3725	5.9383
Aze Deboa	0.3829	0.0338	0.2882	0.0622	3.9148	3.5119
Gara Godo	0.4783	0.0414	0.5073	0.0907	31.2222	7.8622
Domaa	0.4376	0.0259	0.3349	0.0381	22.4462	9.3038
Terufe Kechema	0.3686	0.0400	0.3113	0.0895	16.1966	5.9661
Adado	0.6703	0.0215	0.8435	0.0725	25.2295	6.0165
Adele Keke	0.3924	0.0308	0.3040	0.0578	36.6961	9.2495
Korodegaga	0.3409	0.0317	0.2577	0.0597	27.3887	7.6295
All	**0.5840**	**0.0317**	**0.6323**	**0.0784**	**40.5775**	**7.4656**

Note: The standard errors are bootstrap standard errors with 1000 repetitions.

The mean Gini coefficient for all sites (0.58) is relatively high. Probably, surprisingly, this is not only a result of inter-regional variations (a result of the large difference in mean per capita land holdings of households located in different parts of the country). Even the Gini coefficients for individual villages are high; the lowest Gini for Korodegaga is 0.34. Four villages - Haresaw, Dinki, Imdibir and Adado - had Gini coefficients higher than 0.5 – which is a relatively high figure. These are high figures relative to some developing countries. For example, the Gini coefficient for farm size in the study areas in Uganda reported by Baland, et al (2000) was 0.47; in our case, six villages have greater Gini coefficients than this.[28]

[28] The Gini coefficient from Baland, et al, (2000) is for total, not per capita, farm size.

The levels as well as the ranks of the sites in terms of the Gini and Theil indices are very similar to each other. The simple and Spearman rank correlation coefficients for the Gini and Theil indices are respectively 0.8918 and 0.9294 (with p value of 0.0000). On the other hand, the variance of logarithms is poorly correlated with the two indices. The simple correlations of the variance of logarithms with the Gini and Theil indices are -0.0915 and -0.2510. The corresponding Spearman rank correlation coefficients are: 0.0088 (with p-value of 0.9741) and -0.0353 (0.8968). As indicated above, the variance of logarithms gives smaller weights to the inequality among higher per capita land holdings. Those villages on the highest inequality measures using Gini and Theil (Imdibir, Adado and Haresaw) fell down in terms of variance of logarithms almost to the bottom; if we focus on the inequalities among the lower per capita land holdings, their inequality is relatively low. On the other hand, Dinki, Sirbana Godeti and Shumsheha move to the top for variance of logarithms; inequality among the lower per capita land holdings is relatively high.

The figures in Table 6 show inequality indices computed by considering only PA allocated land. In addition to the land from PAs, households rent some from the lease market either in the form of sharecropping or fixed rent. Does access to land through the lease market affect the distribution of per capita land? Table A2 in the appendix presents the three inequality indices for per capital land holding that includes PA allocated, sharecropped and rented land. The t-statistics for testing whether the inequality indices decline is given in Table 7.[29]

On the aggregate the inclusion of sharecropped and rented land decreases all the inequality indices. In four out of the fifteen villages, Shumsheha, Debre Berhan, Dinki and Adele Keke, all the three inequality indices significantly fell. The Theil and variance of logarithms indices fell for Yetmen. It is worth noting that the incidence of sharecropping is the highest in Yetmen and Shumsheha compared to the other villages (see Table 1). On the other hand, in testing for *increases* in the inequality indices (see Table A3 in the appendix) in no case was it accepted for the variance of logarithms. This is an indication that the transfers in the lease market are mainly affecting smaller land sizes and are equalizing (rather than differentiating). But in three cases, for Terufe Kechema, Sirbana Gode and Aze Deboa, the increase in the Gini and Theil indices are accepted. While

[29] The results for the complement of this test, whether the inequality indices have increased with the inclusion of sharecropped and rented land, are given in Table A3 in appendix.

sharecropping is not widespread, Sirbana Godeti has the highest incidence of fixed rent. Both sharecropping and fixed rent are limited in Aze Deboa. Probably, the real exception to the rule is Terufe Kechema where sharecropping provides a non-negligible part of land.

The above results imply that the lease market generally – probably with the exception of Terufe Kechema - decreases inequality both at the aggregate and village levels. This tallies with some empirical work already undertaken (Gavian and Teklu, 1996; Pender and Fafchamps, 2001).[30]

Table 7: Tests for decreases in inequality of per capita land with sharecropped and rented land

Village	Gini Coefficient		Theil entropy measure		Variance of logarithms	
	t-stat	p-value	t-stat	p-value	t-stat	p-value
Haresaw	0.000	0.5000	0.0000	0.5000	0.0000	0.5000
Geblen	-0.5039	0.6926	0.6486	0.2586	5.4965	0.0000
Shumsheha	15.1200	0.0000	13.9146	0.0000	14.6444	0.0000
Debre Berhan	20.4058	0.0000	23.9706	0.0000	43.1345	0.0000
Dinki	11.0088	0.0000	9.3536	0.0000	15.4368	0.0000
Sirbana Godeti	-4.2649	1.0000	-1.9082	0.9714	5.4199	0.0000
Yetmen	-0.8693	0.8072	2.7497	0.0032	2.2552	0.0125
Imdibir	0.0000	0.5000	0.0000	0.5000	0.0000	0.5000
Aze Deboa	-4.0388	1.0000	-5.3702	1.0000	-0.1056	0.5420
Gara Godo	0.3022	0.3813	0.2336	0.4077	-0.0108	0.5043
Domaa	14.2515	0.0000	-21.7895	1.0000	-0.0536	0.5213
Terufe Kechema	-6.4689	1.0000	-4.2475	1.0000	-0.4779	0.6835
Adado	4.3343	0.0000	4.1757	0.0000	-0.1932	0.5766
Adele Keke	4.8768	0.0000	3.8727	0.0001	5.5796	0.0000
Korodegaga	1.0990	0.1362	1.2860	0.0996	-0.0868	0.5346
All	**12.0583**	**0.0000**	**14.2919**	**0.0000**	**32.3091**	**0.0000**

Note: The null hypothesis asserts that the indices for PA allocated land and for all land in per capita terms are equal. The alternative hypothesis is indices for the former are greater than the latter, ie: inequality in per capita land decreases when sharecropping and fixed rent is considered. Those significant at 5% are given in bold.

[30] In addition to this equalizing effect, efficiency on rented land is not lower than PA allocated land (Gavian and Teklu, 1996; Pender and Fafchamps, 2001). In other words, more equal distribution of land through land lease market does not seem to be attained at the cost of lower efficiency.

The existence of significant regional differences both in the size and the distribution of per capita land logically leads to the last question pursued. Some villages may have higher mean per capita land as well as lower inequality. If so, they will enjoy both the larger sizes of land as well as the more equitable distribution – this is similar to the case where higher mean income and lower inequality are taken as definite improvements in social welfare in the income distribution literature. The relationship between the size and distribution of per capita land can more systematically be examined by using the idea of generalized Lorenz dominance (Shorrocks, 1983). If the generalized Lorenz curve - the Lorenz curve scaled up by the mean income - of one distribution is completely above another then welfare is definitely higher in the former (mean income is higher as well as inequality is lower). Similarly, villages with larger per capita land holdings and lower inequality in PA allocated land can be considered to be in a better position.

Figure 1 in the appendix presents the generalized Lorenz curves of per capita PA allocated land of each village with that of the whole sample. Compared to the whole sample, households in Debre Berhan, Domaa, Korodegaga and probably Yetmen have larger PA allocated land per capita as well as lower inequality - their generalized Lorenz curve dominates that of the whole sample. On the other hand, Adado, Gara Godo, Geblen and Imdibir have smaller per capita PA allocated land and higher inequality as compared to the aggregate. The rest of the curves intersect, or are almost identical to the whole sample – note the curves for Dinki and Sirbana Godeti. Alternatively, the generalized Lorenz curves of every couple of sample villages can be graphed.[31] There are many instances where some sites' generalize Lorenz dominate others, even though they are relatively near each other; Debre Berhan over Dinki, Domaa over Gara Godo and Korodegaga over Terufe Kechema are cases in point. Debre Berhan generalize Lorenz dominates all other sites.

The above results imply that the land reform in addition to perpetuating inter-regional inequalities have also failed to bring about an equitable intra-regional distribution. The lease market seems to have helped to decrease this inequality. In addition, as the generalized Lorenz curves indicate, some regions have higher per capita holdings as well as lower inequality – enjoying the best of both worlds.

[31] All pair wise combinations of the fifteen villages add up to 105.

CONCLUSIONS

The land reform of 1975 was an important landmark in the socio-economic evolution of rural Ethiopia, not only as an economic but also as a political-administrative measure. It came as a culmination of a popular movement against the legacy of a political-economic system that ended with the rule of Emperor Haile Selassie. The political-administrative shape of rural areas was radically changed by the reform with the establishment of PAs. Instead of an administrative system dominated by the nobility, a potentially more democratic institutional framework for local governance was created. Unfortunately the state used the PAs as instruments of control rather than allowing them to develop into genuine local governments.

The results presented in this paper show that the allocation of land by PAs was emphasizing the capacity of households to use it rather than their 'needs', while the underlying principle of the reform apparently seems to be the latter. Actual allocations of land by PAs favoured households with a better supply of adult labour and oxen. Even though this 'allocation rule' seems to go against the principle of the land reform, it reflects institutional and market constraints in rural areas of Ethiopia. For a long period after the reform, employment of labour was outlawed. Giving more land to households without sufficient supply of labour would not be reasonable as leasing out land was also prohibited.

The 1990 'mixed economic policy' allowed leases in land. This has become an important means of access to land either in the form of sharecropping or fixed rent. The results in this paper show that generally the lease market has decreased inequality in land as compared to the distribution of the PAs. In addition, results from other studies indicate that this decrease in inequality was attained without loss of efficiency.

Economically, the reform's most important immediate impact was in terms of abolishing the obligations of tenants to landlords and giving land to landless people. In terms of decreasing the inequality in the distribution of land, much less than the usually assumed seems to have been achieved. Firstly, even before the land reform, freeholder farmers probably were more numerous than usually is supposed; hence, inequality in land distribution may not have been as high as generally believed. Secondly, the institutional framework of land allocation after the reform has most likely perpetuated regional inequalities by making rural-rural mobility extremely difficult. Thirdly, the relatively high inequality indices for sampled villages

indicate the existence of significant intra-regional inequality. Even twenty years after the proclamation of the reform, and with the continual distribution of land, equitable distribution still seems far away.

Probably, a more important economically negative effect of the land reform –not addressed in this paper - is a result of nationalization. Firstly, this stopped the evolution of land tenure towards private property; even in traditionally *rist* areas the volume of transactions in land was on the increase prior to the reform. Secondly, it undermined security of tenure. Thirdly, it gave a powerful leverage for the state to intervene in many aspects of rural life; villagisation, collectivisation and other measures undertaken by the Mengistu regime are probably unthinkable with private property.

With the current direction of policy, privatisation of land seems the logical next step. In addition to minimizing the risks listed in the paragraph above associated with the current system, privatisation may even help decrease inequality in land distribution. Particularly, inter-regional inequalities in land are likely to be significantly affected by the creation and strengthening of a rural land markets. For example, Baland, et al (2000) found that regions with active land markets had lower inequality in the distribution of land in Uganda. Obviously, privatisation is a challenging process that needs to be handled with great care; but no other alternative seems to fit with the current market-oriented economic policy.

Appendices

Table A1: Household random effects tobit regression of rented land on socio-economic characteristics (1995-1997)[32]

	Random-effects tobit regression				
	Coefficient	**Standard error**	**z**	**dy/dx**	**z**
Household demographic and education variables					
Males 0-4	0.1999	0.1938	1.03	1.85e-13	1.03
Males 5-14	0.1015	0.1123	0.90	9.45e-14	0.90
Males 15-54	**0.3104**	**0.938**	**3.31**	**2.89e-13**	**3.31**
Males 54+	0.3584	0.3455	1.04	3.34e-13	1.04
Females 0-4	0.1432	0.1921	0.75	1.33e-13	0.75
Females 5-14	-0.2250	0.1341	-1.68	-2.09e-13	-1.68
Females 15-54	0.0732	0.1057	0.69	6.81e-14	0.69
Females 54+	-0.5908	0.3307	-1.79	-5.5e-13	-1.79
Age of head	0.0735	0.0622	1.18	6.84e-14	1.18
Age of head squared	-0.0008	0.0006	-1.33	-7.55e-16	-1.33
Female-headed	-0.7970	0.4575	-1.74	-2.61e-13	.
Primary educ of head	0.2526	0.4607	0.55	3.65e-13	.
Primary educ of spouse	0.0401	0.7441	0.05	3.98e-14	.
Other variables					
Number of oxen	**0.2064**	**0.0837**	**2.47**	**1.92e-13**	**2.47**
PA allocated land	0.0203	0.0640	0.32	1.89e-14	0.32
Percentage of fertile land	0.1645	0.3767	0.44	1.53e-13	0.44
Percentage of flat land	0.2127	0.4618	0.46	1.98e-13	0.46
Sharecropping	0.5345	0.3282	1.63	1.33e-12	.
Site dummies and constant					
Haresaw	-4.1957	1.4e+07	0.00	-2.79e13	.
Geblen	-4.0480	1.52e+07	0.00	-2.79e-13	.
Dinki	**9.9123**	**1.8143**	**5.46**	0.0041	0.84
Debre Berhan	**10.8577**	**1.6814**	**6.46**	0.0145	1.61
Yetmen	**10.7461**	**1.7500**	**6.14**	0.0126	1.23
Shumsheha	**10.2431**	**1.7662**	**5.80**	0.0065	1.24
Terufe Kechema	**10.9255**	**1.6785**	**6.51**	0.0158	1.45
Sirbana Godeti	**12.0642**	**1.6386**	**7.36**	**0.0584**	**2.13**
Adele Keke	**11.7440**	**1.6388**	**7.17**	**0.0413**	**1.88**
Korodegaga	**11.0735**	**1.7167**	**6.45**	0.0190	1.73
Imdibir	-4.6996	1.51e+07	0.00	-2.79e-13	.
Aze Deboa	**11.4123**	**1.6721**	**6.83**	0.0284	1.69
Adado	**10.6465**	**1.7016**	**6.26**	0.0111	1.24
Gara Godo	**9.3715**	**1.9164**	**4.89**	0.0018	0.73
Constant	-17.9751	.	.		

Note: dy/dx are the unconditional marginal effects at median values.
Coefficients and marginal effects significant at 1% and 5% are given in bold.

[32] Number of observations = 2608; Number of groups = 1354; Observations per group: Minimum = 1; Average = 1.9; Maximum = 2; Random effects u_i ~ Gaussian Log likelihood = -352.77085; Wald chi^2(31) = 2709.87; Prob > chi2 = 0.0000 Sigma u = 0.0962001; Sigma e = 2.190069; Rho =0.0019257; sigma_u=0: chibar2(01)= 0.04 Prob>=chibar2 = 0.420

Table A2: Gini coefficients, Theil entropy measures and variance of logarithms of per capita household land (including sharecropped and rented) by survey villages (1995-1997)

Village	Gini Coefficient		Theil entropy measure		Variance of logarithms	
	Gini	Std. error	Theil	Std. error	Var of logs	Std. error
Haresaw	0.5961	0.1172	1.2732	0.4717	20.0362	7.5643
Geblen	0.4557	0.0712	0.5475	0.2186	29.7720	9.3186
Shumsheha	0.4505	0.0213	0.3720	0.0359	62.5107	9.0881
Debre Berhan	0.3652	0.0154	0.2320	0.0205	14.4348	4.9250
Dinki	0.4852	0.0371	0.4731	0.0888	86.5129	11.0744
Sirbana Godeti	0.3807	0.0267	0.2970	0.0406	70.0717	10.5250
Yetmen	0.4690	0.0536	0.4896	0.1178	39.2893	11.5945
Imdibir	0.7607	0.1145	1.9476	0.4641	11.3725	5.7783
Aze Deboa	0.4022	0.0473	0.3451	0.1129	3.9575	3.4447
Gara Godo	0.4770	0.0420	0.5051	0.0919	31.2309	7.8202
Domaa	0.4356	0.0246	0.3294	0.0364	22.5071	9.0259
Terufe Kechema	0.3957	0.0433	0.3542	0.1104	16.4879	6.1624
Adado	0.6617	0.0225	0.8159	0.0741	25.3349	6.0816
Adele Keke	0.3771	0.0297	0.2815	0.0542	31.5186	8.6375
Korodegaga	0.3375	0.0323	0.2506	0.0544	27.4533	7.7641
All	0.5736	0.0329	0.6025	0.0778	34.6106	6.3222

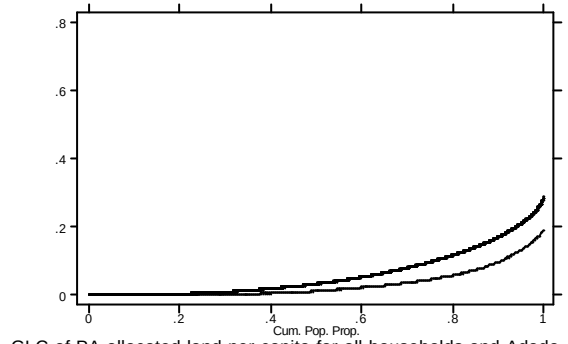
Note: The standard errors are bootstrap standard errors with 1000 repetitions.

Table A3: Tests for increase s in inequality of per capita land with sharecropped and rented land (2)

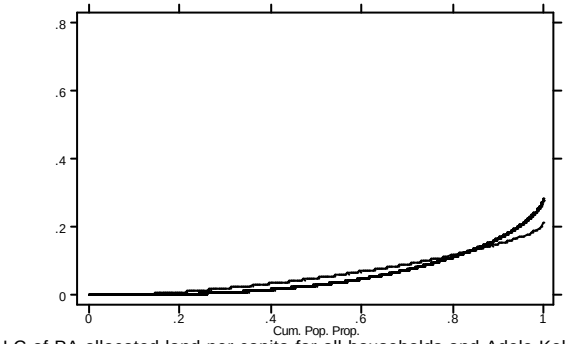
Village	Gini Coefficient		Theil entropy measure		Variance of logarithms	
	t-stat	p-value	t-stat	p-value	t-stat	p-value
Haresaw	0.0000	0.5000	0.0000	0.5000	0.0000	0.5000
Geblen	-0.5039	0.3074	0.6486	0.7414	5.4965	1.0000
Shumsheha	15.1200	1.0000	13.9146	1.0000	14.6444	1.0000
Debre Berhan	20.4058	1.0000	23.9706	1.0000	43.1345	1.0000
Dinki	11.0088	1.0000	9.3536	1.0000	15.4368	1.0000
Sirbana Godeti	**-4.2649**	**0.0000**	**-1.9082**	**0.0286**	5.4199	1.0000
Yetmen	-0.8693	0.1928	2.7497	0.9968	2.2552	0.9875
Imdibir	0.0000	0.5000	0.0000	0.5000	0.0000	0.5000
Aze Deboa	**-4.0388**	**0.0000**	**-5.3702**	**0.0000**	-0.1056	0.4580
Gara Godo	0.3022	0.6187	0.2336	0.5923	-0.0108	0.4957
Domaa	14.2515	1.0000	**-21.7895**	**0.0000**	-0.0536	0.4787
Terufe Kechema	**-6.4689**	**0.0000**	**-4.2475**	**0.0000**	-0.4779	0.3165
Adado	4.3343	1.0000	4.1757	1.0000	-0.1932	0.4234
Adele Keke	4.8768	1.0000	3.8727	0.9999	5.5796	1.0000
Korodegaga	1.0990	0.8638	1.2860	0.9004	-0.0868	0.4654
All	12.0583	1.0000	14.2919	1.0000	32.3091	1.0000

Note: The null hypothesis asserts that the indices for PA allocated land and for all land in per capita terms are equal. The alternative hypothesis is indices for the former are lesser than the latter, i.e., inequality in per capita land increases when sharecropping and fixed rent is considered. Those significant at 5% are given in bold.

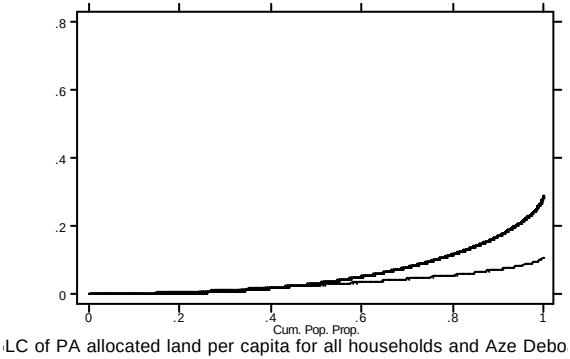
Figure 1: Generalized Lorenz curves of PA allocated per capita land size for all and each site



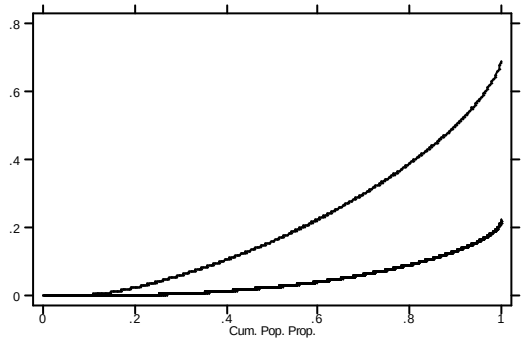
GLC of PA allocated land per capita for all households and Adado



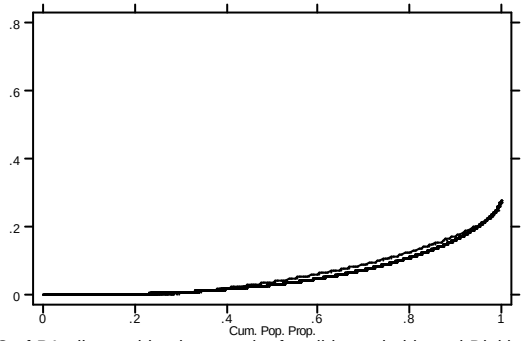
LC of PA allocated land per capita for all households and Adele Kek



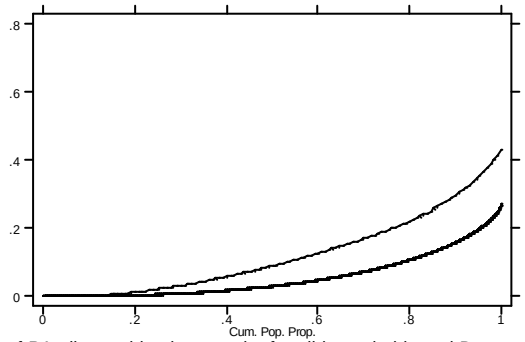
LC of PA allocated land per capita for all households and Aze Debo



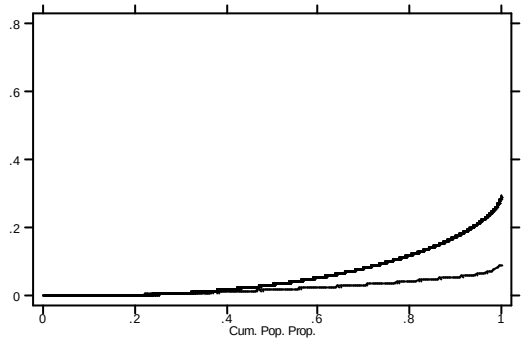
GLC of PA allocated land per capita for all and Debre Berhan



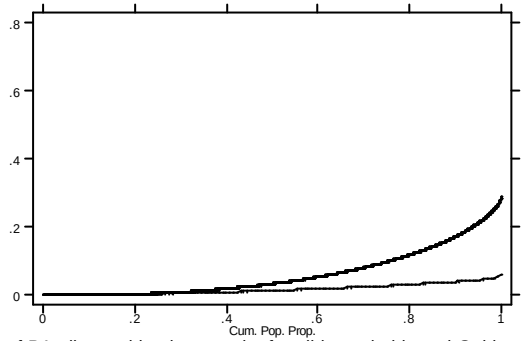
GLC of PA allocated land per capita for all households and Dinki



GLC of PA allocated land per capita for all households and Domaa



GLC of PA allocated land per capita for all households and Gara God



GLC of PA allocated land per capita for all households and Geblen

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