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WOMEN'S LAND RIGHTS IN THE TRANSITION TO INDIVIDUALIZED OWNERSHIP: IMPLICATIONS FOR THE MANAGEMENT OF TREE RESOURCES IN WESTERN GHANA

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ABSTRACT

This study explores the impact of changes in land tenure institutions on women's land rights and the efficiency of tree resource management in Western Ghana. We find that customary land tenure institutions have evolved toward individualized systems to provide incentives to invest in tree planting. However, contrary to the common belief that individualization of land tenure weakens women's land rights, these have been strengthened through inter vivos gifts and the practice of the Intestate Succession Law. Investment in tree planting, in turn, is affected not simply by the level of land tenure security, but also by its expected changes, as tree planting strengthens land tenure security. Cocoa yields are lower on allocated family land and rented land under share tenancy due to distorted work incentives. While men and women are equally likely to plant trees, women obtain lower yields on their cocoa plots, suggesting the presence of gender-specific constraints.

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1. INTRODUCTION

While communal land tenure aims to provide equitable access to land for all households in a community, women's land rights within customary land tenure regimes are often weaker than those of men (Lastarria-Cornhiel 1997; Rocheleau and Edmunds 1997).[1] The positive effect of tenure security on investment, which leads to more productive and sustainable use of land, is one of the basic arguments for attention to gender differences in property rights. If women are blocked from certain avenues of investment, the resulting barrier to increased productivity will diminish their incentives to sustain resource use over time (Meinzen-Dick et al. 1997). The negative effect of insecure land rights is likely to be more important in certain areas of Africa where men and women have separate landholdings, than in "family" holdings (e.g., in South Asia, see Agarwal 1994).

Clearing forests is often a way to establish individual land rights under communal land tenure systems in Africa, but it is almost exclusively a male task in most societies. Forest clearance requires large effort and those who clear forests are rewarded by relatively strong individual rights to land. Such individually rewarded land rights are further strengthened if those individuals make long-term or permanent improvements in the land. Women often obtain usufruct rights to family land, for example, but do not

[1] Johnson (1972, 270-271) defines that a communal system is one in which land is held in common and allocated on a first-come-first-served basis. In our observation of communal systems, this is true for forestland. Land which has been cleared for cultivation, however, is controlled by the extended family whose members have cleared village forestland.

possess inheritance rights (Lastarria-Cornhiel 1997).[2] It is generally accepted that incentives to invest in land and tree resources under such land tenure rules will be thwarted due to unclear and uncertain individual rights (Johnson 1972; Besley 1995).

Communal land tenure works when land is abundant. As population increases, however, village forestland is exhausted and land resources become scarce. In consequence, the fallow period under shifting cultivation declines and the relative profitability of intensified land use increases (Boserup 1965). Investment in land improvement, such as tree planting and terracing, is often required for intensification of agriculture. Yet, distortions to individual incentives under traditional land tenure institutions will prevent investment in land. Customary land tenure institutions, however, may evolve towards greater individualization and more secure individual land rights (Ault and Rutman 1979; Bassett 1993; Bruce and Migot-Adholla 1993). For example, relatively strong individual ownership rights are granted to those who plant trees (e.g., Shepherd 1991; Otsuka, Suyanto, and Tomich 1997). Under such institutional rules, an individual community member who has acquired family land through inheritance and allocation may have strong incentives to plant trees in order to obtain secure individual land rights. The extent to which uncertain and unclear land rights under customary land tenure institutions are an important obstacle to investment in land is an empirical question

[2]A daughter tends to have cultivation rights to a parcel of her family's land, even after she marries. However, she does not have inheritance rights, and loses all rights to the land when her father dies, unless it is given to her as a gift (Lastarria-Cornhiel 1997, 1323).

(Barrows and Roth 1990; Bruce and Migot-Adholla 1993).[3] Whether these rights also differ between men and women may also have important consequences for equity and the efficiency of forest resource management.

This study attempts to explore the impact of evolutionary changes in land tenure institutions on women's land rights and the efficiency of tree resource management in Western Ghana, where cocoa is the dominant crop. Traditionally, uterine matrilineal inheritance has been practiced in Akan households in this region, in which land is transferred from the deceased man to his brother or nephew (sister's son) in accordance with the decision of the extended family or matriclan.[4] This implies that wives do not have secure rights to their husbands' land in the case of death or divorce. Recently, however, land has often been transferred from the husband to his wife and children as an inter vivos gift, after planting trees. The distinction between gifts and postmortem bequests is less important in non-Akan households, where patrilineal inheritance, in which land is transferred simply from father to sons, is prevalent. We postulate that the

[3] Using a data set collected in Western Ghana, Besley (1995) statistically demonstrates that stronger land rights brought about the higher incidence of tree planting. As is forcefully argued by Brasselle, Gaspart, and Platteau (1998), however, Besley's methodology of simply counting the number of rights (e.g., rights to rent out and sell) to measure tenure security without considering the relative importance of each right is problematic. Also problematic is the lack of distinction between patrilineal and matrilineal inheritance rules and between female household heads and female plot managers in male-headed households, and the use of tree planting dummy with no consideration of the intensity of tree planting and the productivity of cocoa fields.

[4] The preferred order of inheritance if a man dies intestate is first, his uterine brother; second, if there is no uterine brother, the son of a uterine sister. The third option is one of the sons of the deceased mother's sister. If a woman dies intestate, the preferred order is first, her mother, if she is still alive, or a uterine sister. In the absence of either, a daughter (and, in some cases, a son) becomes next in line to inherit (Awusabo-Asare 1990, 7).

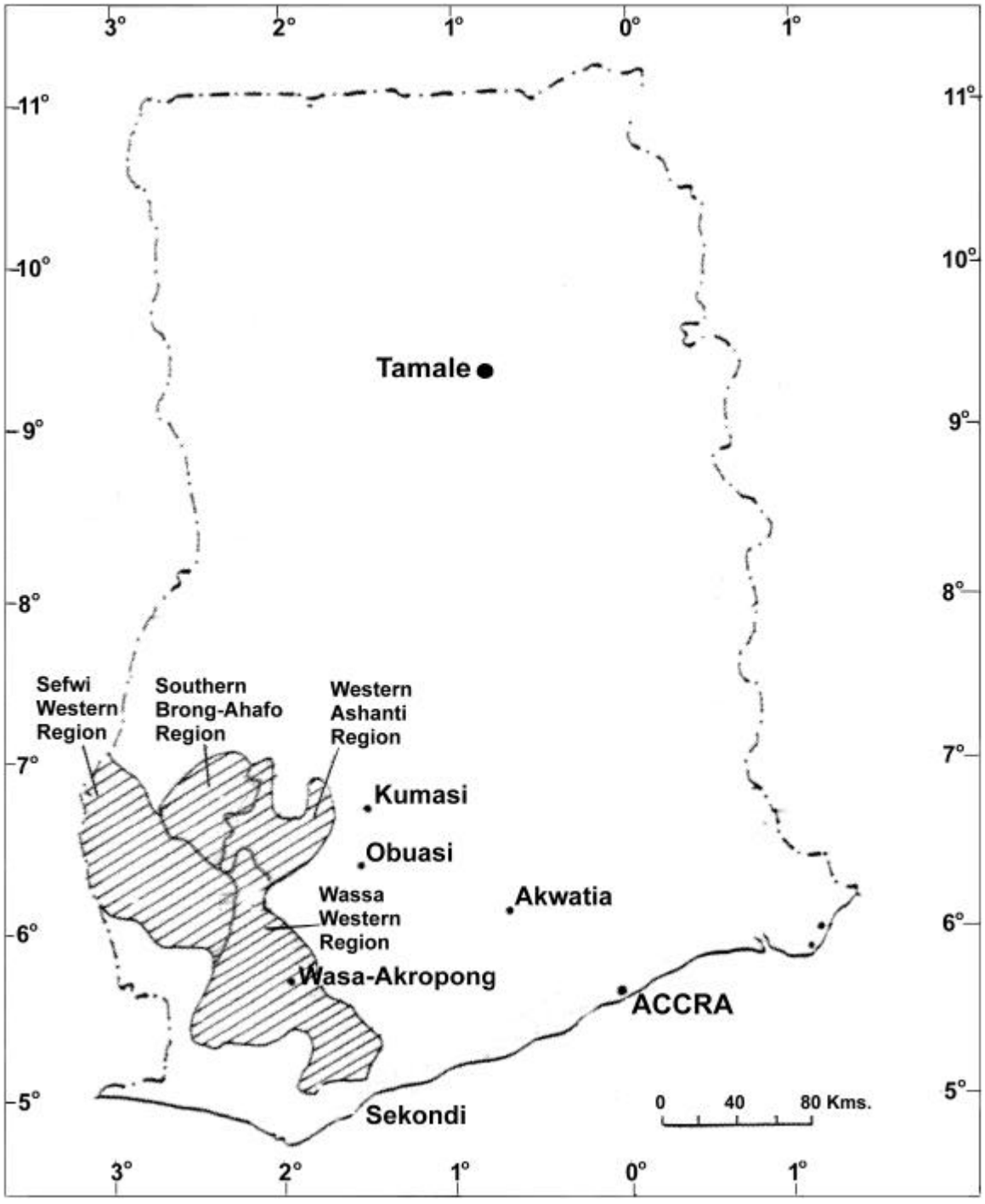
incidence of gifts increases in areas where population pressure is high and matrilineal inheritance is practiced, in order to strengthen individual land rights.

The organization of this paper is as follows. Section 2 provides a brief background on prevailing land tenure institutions, land use, and the distribution of land between men and women in our study sites. Hypotheses are tested using village-level data on the relative importance of various land tenure institutions in Section 3, using household-level data on the manner of land acquisition in Section 4, and using parcel-level data on cocoa tree planting and cocoa yields in Section 5. A summary of findings and their implications are discussed in Section 6.

2. LAND TENURE AND LAND USE IN WESTERN GHANA

We conducted an extensive survey of sixty villages in the most active cocoa growing regions in Ghana, i.e., the Western Region, the Brong Ahafo Region, and the Ashanti Region (Figure 1). In the Western Region, two areas were surveyed covering two districts each, the Wassa area and the Sefwi area. Sefwi and Wassa have different migration and settlement histories and are administratively and linguistically distinct, although the languages are related. Cocoa cultivation has historically spread from the Eastern Region toward the Ashanti and Brong-Ahafo Regions in the 1940s and 1950s and further toward the frontier area of the Western Region during the 1950s and 1960s (Berry 1963). The diffusion of cocoa to Wassa and Sefwi continued in the 1970s and 1980s. The whole area is under customary land tenure system, and all land is ultimately

Figure 1 Map of Survey Area Ghana



controlled by the village chief on behalf of the community, as in other cocoa growing areas of Ghana (Asenso-Okyere, Atsu, and Obeng 1993). We randomly selected 15 villages in the Brong-Ahafo and Ashanti Regions, and 15 each in Wassa and Sefwi, of which 9 are predetermined to be indigenous villages and 6 are migrant villages. The dominant ethnic group in these villages is the Akan (87 percent of our sample households); also present, although in smaller numbers, are the Ewe (2.7 percent), Ga-Adange (5.4 percent), Northerners and other non-Akans (4.9 percent). A group interview with village leaders and other members was conducted to obtain information about land rights under different land tenure institutions, among other things.[5] Population census data collected in 1984 were also obtained for 58 villages.[6] Data on village land area, total as well as cultivated and uncultivated areas, however, are not available. In order to construct indicators of population pressure at the village level, we conducted a survey of seven randomly selected households in each village.[7] We also obtained information

[5] Since people seldom consider the land rights under different land tenure institutions explicitly and systematically, it took considerable time to arrive at consensus on each question. This experience led us to believe that it is not feasible to obtain accurate information on land rights from interviews with individual households.

[6] As the migrant population increased, migrants, who tend to live in the periphery of indigenous villages, eventually formed new villages. Two of our migrant villages had not yet been established by 1984. Although we attempted to compute population growth rate at the village level from 1970 to 1984, it was not possible to do so, because of the establishment of new villages and associated changes in village areas.

[7] We had previously conducted a survey of fifteen households in each village. Due to the extreme complexity of land tenure institutions, the use of local and varying measurement units for land areas, and inexperience of enumerators, this data set suffered from inaccuracy manifested in unbelievably large numbers and the lack of information about land parcels owned by female household members. Therefore, we subsequently conducted another survey of seven households in each village and paid more careful attention to consistency and plausibility of replies by our respondents and to ownership of land by women.

about the manner of land acquisition and cocoa planting and yields from these sample households.

The area is characterized by undulating land and cocoa is the dominant crop grown mainly on mildly sloping parcels. While virgin forests have largely disappeared, annual crop fields and fallow areas under shifting cultivation, including secondary forests, exist along with cocoa fields (Benneh 1987). Table 1 summarizes the land use patterns, average farm size, man-land ratio, and gender of the household head in Akan and non-Akan households. The majority belong to the Akan ethnic group which has traditionally practiced uterine matrilineal inheritance, whereas a number of inhabitants in migrant villages belong to non-Akan ethnic groups, which are generally subject to the patrilineal inheritance system.[8] The correspondence between Akan ethnicity and matrilineal inheritance is not one-to-one, however, as will be shown in the next table.

Akan households tend to have larger farm sizes, a lower man-land ratio, and a large area devoted to bush-fallow land. Cocoa area per farm is also slightly higher among Akan households. A slightly higher percentage of Akan households (14.1 percent) is headed by women, compared to 11.3 percent among non-Akans. A fifth of total parcels (21.1 percent) is also owned by women in Akan households, compared to only 11.7 percent among non-Akans. Such differences may be attributed to the difference in

[8]Migrants to our study area consist both of Akans, who migrate for relatively short distances, and non-Akans, who tend to be long-distance migrants.

Table 1 Land use pattern, farm size, and man-land ratio in 1997 in selected villages in Western Ghana[a]

Ethnic group of head of household	Number of households	Bush-fallow cum forest area per farm (hectare)	Cocoa area per farm (hectare)	Total farm size (hectare)	Man-land ratio (persons /hectare)	% Female-headed house-holds	% Female-held parcels
Akan	355	4.92 (42.2)	5.24 (52.2)	11.47 (100.0)	1.13	14.1	21.1
Non-Akan	53	2.62 (39.0)	4.57 (57.7)	7.42 (100.0)	1.84	11.3	11.7

[a] Based on survey of seven households in each village. Numbers in parentheses pertain to the average percentages of cocoa and bush-fallow cum forestland to total farm area.

inheritance systems and associated differences in land tenure security between Akan and non-Akan households.

Table 2 presents differences in patterns of inheritance between Akan and non-Akan households.[9] While Akans have traditionally followed matrilineal inheritance, the mode of land transfer has been evolving over time. When virgin forests were abundant, forests were appropriated primarily by young males before marriage mainly for production of food crops. Relatively strong land rights were granted in return for the substantial labor input required to clear forest. Traditionally, in the Akan matrilineal system, this type of land was either bequeathed to nephews or allocated to other male members of the extended family, in accordance with the decision of the family head. Wives and children were left with no rights to a man's property if he were to die intestate (Brydon 1987).

[9] We used data obtained from 408 households rather than the full sample of 420, due to missing and inconsistent data from twelve households.

Table 2 Distribution of currently adopted inheritance rules by gender of head of household, Akan versus Non-Akan households (percent)[a]

	Number of sample households	Intestate succession law[b]		
		Matrilineal		Patrilineal
Akan households	355	43.9	40.6	16.5
Male	305	43.0	39.3	17.7
Female	50	50.0	48.0	2.0
Non-Akan households	53	5.7	13.2	81.1
Male	47	4.3	8.5	87.2
Female	6	16.7	50.0	33.3

[a] Based on survey of seven households.
[b] One-third equal sharing among spouse, children, and maternal family.

Uncultivated fallow land was often allocated temporarily to members of the extended family, who possessed small land areas. More recently, appropriated village land is increasingly being transferred directly to one's wife and children, and even family land is often transferred to them with the consent of the family members, particularly after the land was planted either wholly or partially with cocoa trees. Such inter vivos transfers are termed "gifts" in our study areas and individual rights on such land are firmly established.[10] Land rights have been more clearly individualized among migrants, who either have nuclear families or practice patrilineal inheritance in which a relatively small number of sons within a single family is qualified to inherit their father's land.

[10] Such inter vivos gifts are formalized by the husband's presenting ritual drinks to family elders. This ritual, in which family elders and other members are present as witnesses, is crucial so that the transfer of land rights by gift will not be contested in the future.

The process of individualization of land tenure institutions was strengthened by the passing of the Intestate Succession Law (PNDCL 111) in 1985, which provides for the following division of the farm: three-sixteenth to the surviving spouse, nine-sixteenth to the surviving children, one-eighth to the surviving parent, and one-eighth in accordance with customary inheritance law (Awusabo-Asare 1990). Thus, the law allows children and wives to gain access to land which they were previously denied under traditional law. According to our informal interviews, although women sometimes received a small proportion of husband's land even before the passage of the Intestate Succession Law (ISL), they more often received larger areas after that. Unlike the formal provision of the ISL, the law's common interpretation is one-third each among spouse, children, and maternal family.

Table 2 shows that among the traditionally matrilineal Akans, the percentage of households reporting that they follow the ISL is quite high (about 40 percent) but some Akan households report the practice of patrilineal descent. In contrast, among non-Akans, the predominant pattern of inheritance is patrilineal (81.1 percent) and only 13.2 percent of households follow the ISL. Among Akan households, matrilineal inheritance and the ISL are equally important modes of inheritance. In contrast, patrilineal inheritance is dominant among non-Akans. On the aggregate, only a small proportion of non-Akan households follow the ISL, since land tenure systems are inherently more individualized in patrilineal systems. However, among the small number of non-Akan female-headed households, the ISL is the predominant means for inheriting land.

Table 3 presents the distribution of land by manner of acquisition in Akan and non-Akan households, by gender of the household head. For both Akans and non-Akans, land received as gift accounts for the largest proportion of land acquired, even larger than inherited land. Transfer of land to sons as gift has been practiced historically (Hill 1963), but its incidence seems to have increased in recent periods. The larger share of gift land would reflect a shift to individualized property rights, reducing the matriclan's control over land. Among Akan female-headed households, gifts are the most important manner of acquiring land. In Akan households, the share of temporarily allocated family land is also larger than inherited land; temporary allocation is the second most important mode of acquisition by female heads. This suggests that family allocations are more important than post-mortem inheritance.

Appropriated village forestland is more important among non-Akan households, but the most important categories for non-Akans, who tend to be migrants to this area, are purchase or current rental agreements. Hill (1963) observed that the chiefs were glad to seize the opportunity of selling land outright to enterprising migrants. As uncultivated forestland has disappeared, renting land under share tenancy arrangements, called *abusa* (one-third of cocoa output for tenant) and *abunu* (50:50), have become major means for migrants to acquire access to land (Robertson 1982; Boadu 1992). In these tenancy contracts, tenants are requested to plant cocoa trees usually on bushland and manage cocoa trees until the whole field is planted to cocoa, at which time land ownership, rather than output, is usually divided between tenant and landowner (Asenso-Okyere, Atsu, and

Table 3 Distribution of area under different land tenure regimes by gender of head of household, Akan and Non-Akan households (percent)[a]

	Akan			Non-Akan		
	Male	Female	Total	Male	Female	Total
Allocated family land	15.9	3.1	19.0	3.3	-	3.3
Inherited family land	14.4	1.6	16.0	3.6	-	3.6
Appropriated village forestland	14.5	0.4	14.9	18.3	-	18.3
Purchased village forestland	4.1	0.5	4.6	1.4	1.7	3.1
Received as gift	23.5	7.2	30.7	26.3	2.2	28.5
Privately purchased	3.1	0.3	3.4	10.8	2.5	13.3
Acquired through renting	1.0	0.2	1.2	8.4	-	8.4
Currently renting	7.9	0.8	8.7	18.7	1.3	20.0
Others	1.4	0.2	1.6	1.3	0.2	1.5
Total	85.7	14.3	100.0	92.1	7.9	100.0

[a] Based on survey of seven households in 60 villages. Numbers pertain to percentages in areas within the Akan and Non-Akan categories.

Obeng 1993).[11] The fact that renting is widely practiced with ultimate division of land ownership between the contracting parties strongly suggests that land ownership rights have been strongly individualized so as to allow alienation of land formerly to be transferred to other family members. This inference is reinforced by the nonnegligible incidence of private land purchase, which has traditionally been prohibited.[12]

[11] The major harvesting season of cocoa extends from October to January. We suspect that the major reason for dividing land rather than sharing output lies in the difficulty for the owner to check cocoa output accurately. If output cannot be measured accurately, the tenant may be able to cheat the owner. See Hayami and Otsuka (1993) and Otsuka, Chuma, and Hayami (1992) for recent surveys of share tenancy literature.

[12] Since we did not anticipate the prevalence of private land purchase, we failed to ask about land rights on privately purchased land in our formal group interviews. However, informal interviews suggest that strong rights, comparable to those of gifts, are conferred to individuals who purchase land using their own funds. If purchase is financed by a group of extended family members, however, individual land rights are rather weak.

In order to measure strength of land rights under different land tenure institutions, we asked through group interviews whether the following six rights exist: the right to (1) plant and replant trees; (2) rent out land; (3) pawn; (4) bequeath; (5) give; and (6) sell. The numbers in Table 4 show the average number of cases in which farmers have rights without approval from family members or the village chief. We use the percentage of Akans in the population to proxy the range of inheritance regimes, with matrilineal inheritance more widely practiced the larger the proportion of Akans in the population. The weakest land rights are observed in temporarily allocated family land, in which even tree planting is not allowed. Thus, if land tenure security at the time of tree planting determines investment incentives, we expect to observe that cocoa trees are seldom planted in allocated family land. Land rights are also weak in inherited land among matrilineal Akan households, which is in contrast to the case of non-Akan patrilineal households bestowed with fairly strong rights on inherited land. It seems that land rights are more easily individualized in patrilineal society, as the interests in the same piece of land are shared primarily by a small circle of individuals, consisting of a father and his sons.

Strong land rights are also observed in formerly village forestland, both appropriated by indigenes and purchased by migrants. The rights are somewhat stronger for land purchased by migrants presumably because migrants are less subject to the tradition of the family ownership of land. Strong land rights accrue on cleared forestland, because efforts to clear forest are rewarded by strong individual land rights. The

Table 4 Index of land rights under different land tenure regimes by percentage of Akans in population[a]

	Less than 50% Akan	50% to 80% Akan	80% Akan or higher
Temporarily allocated family land			
Food-crop land from father	0.33	.06	.05
Food crop land from family	0.50	.13	.53
Inherited family land			
Akan inheritance	0.83	1.06	1.08
Non-Akan inheritance (equal division)	5.67	4.63	2.32
Village forestland			
Appropriated by indigenes	3.67	3.38	3.00
Purchased by migrants	5.17	3.19	3.16
Tree planted land transferred as gifts			
Gift from father	6.00	5.00	4.97

[a] Based on group interviews. The following six rights are considered: (1) plant or replant trees; (2) rent out; (3) pawn; (4) bequeath; (5) give; and (6) sell. The numbers in this table show the average number of cases in which farmers have rights without approval from family members or village chief.

strongest land rights are observed in tree-planted land received as gift. Gifts are usually made by a father to his sons and sometimes to his wife, after seeking consensus from members of the extended family. The strong rights are conferred as rewards to effort to plant and grow trees. This observation indicates that incentives to plant trees on allocated family land and inherited land may be strong, if the individual land rights are strengthened by planting trees.

3. DETERMINANTS OF LAND TENURE AT THE VILLAGE LEVEL

Following the evolutionary model of farming systems by Boserup (1965), a theory of property rights developed by Demsetz (1967) and Alchian and Demsetz (1973), and a

theory of induced institutional innovation developed by Hayami and Ruttan (1985) and Hayami (1997), we postulate that population pressure on land induces changes in customary land tenure institutions from family ownership (e.g., acquired through allocation and inheritance) to individualized ownership (e.g., through gift). As is implied by Boserup, population pressure enhances the relative profitability of perennial tree crop cultivation over shifting cultivation. In order to realize higher profits of tree crop cultivation, the individualization of land tenure must take place to provide sufficient incentives to invest in trees. We hypothesize that the advent and wide-spread adoption of gifts serves the role of providing such incentives. As is emphatically argued by Platteau (1996), however, this autonomous process of evolution of land rights institutions will not lead to the establishment of a complete private ownership system with land titling, which completely internalizes externalities associated with incomplete or insecure land ownership.

Note that in order to transfer land through gift, the agreement of the lineage head (*abusuapanin*) and other members of the extended family or lineage (*abusua*) must be obtained. Thus, the incidence of gifts is determined not only by the characteristics of the household that received land but also by those of the extended family. It is therefore appropriate for our hypothesis testing to use village-level data on population pressure and the incidence of gifts and other land tenure systems. Thus, we constructed estimates of the proportions of land under (1) family ownership (i.e., allocated and inherited land), individualized ownership acquired by (2) gift, (3) forest clearance, and (4) private

purchase and renting, using data from survey of seven households per village. Specifically, we estimated the following reduced-form functions explaining the incidence of the four types of land tenure institutions using a common set of explanatory variables:

$$S_i = a_{0i} + a_{1i}\,(\text{man-land ratio}) + a_{2i}\,(\text{proportion of migrant population}) + a_{3i}\,(\text{indigenous village dummy}) + a_{4i}\,(\text{a vector of other village characteristics}) + a_{5i}\,(\text{regional and area dummies}),$$

where S_i stands for the proportion of ith type of land (i = 1, .., 4), a_{ji} are parameters, and all explanatory variables are village-specific except for regional dummies. Since the sum of S_i is unity, it is redundant to estimate the four share functions except to show the significance of coefficients directly. We hypothesize that the man-land ratio, which is supposed to reflect population pressure, and the indigenous village dummy have positive effects on the incidence of gifts at the expense of family land.

We considered distance to the nearest market town, proportion of nonfarm households, and school attendance ratio as other village characteristics (Table 5). We also included the percentage of Akan households in the population and the percentage of households headed by women.

Since some land tenure categories were nonexistent in some villages, their respective proportions would be equal to zero. We thus applied the Tobit estimation method and the estimation results are exhibited in Table 6. We also included the percent

Table 5 Means of other explanatory variables for village-level regression analysis on land tenure choice

	Mean
Distance to town (kilometers)[a]	15.8
Proportion of nonfarm households in 1984 (percent)[b]	6.9
School attendance ratio in 1984 (percent)[b]	24.0
Proportion of migrant population in 1995[a]	53.8
Percent of female-headed households	13.7
Percent of Akans in population[a]	76.4
Percent of Akan households[c]	87.0

[a] Based on group interviews.
[b] Based on population census.
[c] Based on extensive survey data

of female-headed households and the percent of Akan households in each village among the regressors, but none of these variables were significant and regressions with these variables are not reported in Table 6. It is possible that there is not much variation in these variables across villages; gender differences in household structure and inheritance practices are more likely to affect household-level outcomes.

It is remarkable to find that the coefficients of man-land ratio are positive and highly significant in the gift equation and negative and significant in the family land equation, which provides clear support for our hypothesis that population pressure induced institutional innovation towards individualized land tenure. The incidence of gifts is also positively affected by the indigenous village dummy, which is consistent with our hypothesis that gifts are the way to circumvent the traditional inheritance rule in matrilineal society. Patrilineal ethnic groups do not need to use inter vivos gifts to increase individual rights, since they do not follow uterine matrilineal inheritance which

Table 6 Determinants of proportions of areas under different land tenure institutions at the village level: Tobit regression[a]

	Family land [b]	Gift	Village forestland	Acquired nonforestland[c]
Intercept	0.814***	-0.023	0.306	-0.217
	(3.808)	(-0.138)	(1.259)	(-1.080)
Man-land ratio	-0.126**	0.149***	-0.022	-0.006
	(-1.868)	(2.837)	(-0.274)	(-0.103)
Proportion of migrant population	-0.342***	0.152*	-0.529***	0.345***
	(-2.490)	(1.415)	(-2.458)	(2.684)
Indigenous village dummy	-0.073	0.197**	-0.522***	0.021
	(-0.723)	(2.475)	(-3.051)	(0.240)
Distance to town	-0.005**	-0.001	0.012***	-0.002
	(-1.705)	(-0.471)	(3.726)	(-0.793)
Proportion of nonfarm households	-0.135	0.140	0.119	0.013
	(-0.777)	(1.023)	(0.594)	(0.075)
School attendance ratio in 1984	0.102	-0.249	0.252	0.437
	(0.260)	(-0.833)	(0.482)	(1.264)
Wassa dummy	-0.094	-0.003	0.242**	0.013
	(-1.002)	(-0.041)	(2.297)	(0.148)
Sefwi dummy	-0.132*	0.017	0.129	0.075
	(-1.341)	(0.226)	(1.170)	(0.815)
Brong-Ahafo dummy	-0.007	-0.029	0.023	0.046
	(0.071)	(-0.402)	(0.198)	(0.537)
Log Likelihood	-0.363	15.286	-7.507	-4.250
Chi-square	18.58	15.69	43.35	20.23
p-value	0.03	0.07	0.00	0.02
Number of observations	58	58	58	58

[a] *t*-statistics in parentheses. ***indicates significance at 1 percent level, ** at 5 percent level and * at 10 percent level; one-tailed tests

[b] The sum of inherited and allocated family land areas.

[c] The sum of areas purchased, rented, and acquired through past renting.

involves decisionmaking by the influential members of the extended family together with the family head. As would be expected, the proportion of migrant population is negatively associated with the share of family land.

The negative effect of migrant population on the share of village forestland indicates that migrants had less access to village forestland. They acquired cultivation rights mainly by renting in land or sometimes purchasing land from indigenes, as is indicated by positive coefficient of the proportion of migrant population in the acquired nonforestland equation. The indigenous village dummy has a negative coefficient in the village forestland equation, because primary forestland had been exhausted earlier in older settlement of indigenous villages than in migrant villages. The above findings indicate that indigenes in migrant villages have acquired large tracts of village forestland.

Other variables are insignificant except in two cases. First, distance to town has a positive effect on the proportion of formerly forestland, which indicates that forestland remained primarily in remote villages. Second, the Wassa area dummy also has a positive effect on the proportion of forestland, simply because this region is the final destination of the westward geographical movement of cocoa area from the Eastern Region (Hill 1963).

Recall that the man-land ratio and shares of land areas under different land tenure institutions were estimated from data obtained from interviews of seven households in each village. In all likelihood, due to the small number of observations per village, they are subject to measurement errors. Nonetheless, it is remarkable to find significant

effects of population pressure and matrilineal inheritance tradition as proxied by the indigenous village dummy on the emergence and widespread adoption of gifts in customary land areas.

4. DETERMINANTS OF LAND ACQUISITION AT THE HOUSEHOLD LEVEL

While the reduced form estimation enabled us to identify the effects of exogenous forces on the choice of land tenure institutions, we could not assess how households choose among different land tenure institutions and how these choices are interrelated. In this section, we use household-level data to analyze the behavior of households regarding the acquisition of land. While it is reasonable to assume that the acquisition of village forestland, rented land, and purchased land reflects choices made by an individual household, the acquisition of land through inheritance, allocation, and gifts is determined primarily by the extended family.

Table 7 shows the average year of land acquisition by land tenure, together with proportion of cocoa area before acquisition and in 1997, disaggregated by the gender of the head of household.[13] Several important observations can be made. First, village forestland was acquired in the earliest years. This is partly because village forest was acquired primarily by young unmarried males—for whom cleaning land to establish one's own farm is a rite of passage—and partly because forestland had been exhausted mostly

[13] Note that it is possible to have female parcel-owners in male-headed households.

Table 7 Proportion of area planted to cocoa trees before acquisition and in 1997 and average year of land acquisition by land tenure type in Western Ghana[a]

	Average year of land acquisition	Proportion of cocoa area (%)	
		Before acquisition	1997
Acquired village forestland:			
Akan			
Male	1970	0	64.26
Female	1965	0	60.56
Non-Akan			
Male	1974	0	78.3
Female	1950	0	50.0
Inherited land:			
Akan			
Male	1980	37.93	44.11
Female	1971	6.97	16.97
Non-Akan			
Male	1985	56.00	44.17
Allocated family land:			
Akan			
Male	1985	19.04	43.26
Female	1984	13.33	36.19
Non-Akan			
Male	1982	28.00	47.62
Land received as gifts:			
Akan			
Male	1982	20.29	52.78
Female	1981	41.14	68.93
Non-Akan			
Male	1982	22.71	67.22
Female	1991	51.72	87.83
Acquired land though renting:			
Akan			
Male	1980	13.74	62.28
Female	1989	26.98	60.32
Non-Akan			
Male	1976	3.33	84.77
Rented-in land:			
Akan			
Male	1989	1.93	52.05
Female	1990	0.00	70.09
Non-Akan			
Male	1991	5.43	50.27
Female	1991	0.00	66.67
Purchased land from nonfamily:			
Akan			
Male	1983	3.98	54.36
Female	1996	0.00	62.50
Non-Akan			
Male	1982	4.29	60.34

[a] Based on survey of seven households.
[b] Production per farm land planted to cocoa (kilogram/hectare).

in the 1970s.[14] Second, the transfer of family land through inheritance, allocation, and gift took place more or less a decade later in the early 1980s. Since the average age of our respondents was 46 years as of 1997, they were 25 years of age on the average when they acquired family land. That corresponds roughly to the time of marriage. Third, except for the case of land acquisition through land rental in migrant villages where migrants acquired cultivation rights in earlier years, the acquisition of land through renting and private purchase generally occurred in later years.[15]

The above observations indicate that a man follows a sequential decision making process with respect to land acquisition over his life cycle: if forestland is available, he acquires forestland through clearance when he is young, acquires the family land through inheritance, allocation, and gift when he gets married, and later acquires the additional land through renting and private purchase.[16] It is therefore reasonable to specify a recursive system of equations in which, first, the acquisition of forestland is determined by exogenous forces; second, the acquisition of family land is explained by the amount of forestland acquired as well as the exogenous forces; and finally, the acquisition of land through market transactions is accounted for by the entire set of predetermined land areas

[14] Some female parcel owners do report having acquired village forestland, but it is unlikely that they undertook land clearing themselves.

[15] Renting-in land is a traditional practice for migrant households; the proportion of rental in indigene villages may be due to migrant households who have moved to predominantly indigene villages. Many early migrants who could not afford to purchase land engaged in share tenancy contracts; the recent increase of renting among indigene farmers may indicate the exhaustion of other traditional modes of acquiring land.

[16] While women may also be parcel managers, they control a small proportion of total area (see Table 3).

under different land tenure institutions and other exogenous factors. The exogenous variables in our estimation include the gender of the household head, the age of household head, the year of marriage (a proxy for the start of farming), years of schooling, a dummy for patrilineal household, and a dummy for having been born outside the village (or being a migrant to the village).

We hypothesize that the egalitarian motive of customary land tenure institutions leads to reduction in the amount of family land transferred to a household, if the latter has already acquired village forestland. The transfer of family land will be also smaller in the case of patrilineal households as land tenure institutions are more clearly individualized. We also hypothesize that if land acquired through forest clearance and transfer of family land is insufficient, additional land will be acquired through renting and purchase. In other words, increased scarcity of land induces the development of land rental and sale markets.

Since certain types of land are not observed in a number of sample households, and because unobservable characteristics of villages may affect land acquisition decisions, we applied Honore's (1992) Tobit estimation method with village fixed effects.[17] The results are shown in Table 8. The first column shows the determinants of forest area acquisition by households. The age of the household head has positive and highly significant effect, which is consistent with our life-cycle hypothesis of land acquisition. The dummy for a

[17] This estimator is preferred since it is both consistent and asymptotically normal under suitable regularity conditions and assumes neither a particular parametric form nor homoscedasticity.

Table 8 Determinants of land acquisition at the household level: Tobit regression with village fixed effects[a]

	Forestland	All family land[b]	Acquired nonforestland
Forestland		-0.09	-0.41**
		(-0.44)	(-1.84)
Family land			-0.71**
			(-2.02)
Age of household head	7.65***	0.15	0.15
	(2.96)	(0.35)	(0.62)
Year of first marriage of household head	-0.98	-0.54	-0.35
	(-0.55)	(-1.15)	(-1.30)
Dummy for household head born outside of village	54.39**	-27.44**	9.41**
	(2.13)	(-1.66)	(2.37)
Years of schooling of head	-6.42**	1.90***	0.39*
	(-2.02)	(2.69)	(1.51)
Dummy for female-headed household	-65.08	-18.17	-16.98
	(-2.34)**	(-1.34)*	(-2.28)**
Dummy for patrilineal household	-87.20***	-13.36**	0.90
	(-2.66)	(-1.75)	(0.23)
Log likelihood			
Chi-square	30.4	30.0	30.3
p-value	0.0	0.0	0.0
Number of observations	386	386	386

[a] *t*-statistics in parentheses. ***indicates significance at 1 percent level, ** at 5 percent level and * at 10 percent level, one-tailed tests.

[b] Family land includes allocation, inheritance and gifts.

migrant household has a positive effect on acquired forestland.[18] This may reflect migrant households' stronger desire to acquire land for cultivation than indigenes, given the availability of forestland in the village.[19] Both the dummy for a female-headed household and the dummy for a patrilineal household have a negative effect on forest acquisition. This may reflect women's relative disadvantage in acquiring land through forest clearance, since forest clearance is a male activity. Patrilineal households, who are usually long-distance non-Akan migrants, have no rights to clear forests, unlike short-distance Akan migrants.

The second column displays the estimation results of the function accounting for the acquisition of family land including gifts. While we hypothesized that the prior acquisition of forestland would have a negative coefficient, in line with the view that communal land tenure institutions are designed to achieve equitable distribution of land, this coefficient is not significantly different from zero. Thus, egalitarian motives do not appear to offset efforts to clear forests. Patrilineal households and those who have migrated to their current villages of residence also have smaller areas of family land since they do not inherit family land in the area of relocation. These coefficients, however, are significant only at the 10 percent level. The coefficient of years of schooling is positive,

[18] In an earlier version with regional fixed effects, the coefficient of the migrant dummy was negative but insignificant.

[19] This result may appear inconsistent with the negative effect of the proportion of migrant population on the share of acquired forestland reported in Table 6. The results from Table 8 suggest that the positive effect on forest clearance of being born outside the village is outweighed by the negative effect of patrilineal long-distance migrant households. Note, however, that the availability of forestland in the village is controlled for in the fixed-effects regression.

which may be taken to imply that the amounts of schooling and landholdings of the extended family are positively correlated. Female heads of households are also less likely to have acquired family land, but this effect is significant only at the 10 percent level (one-tailed test).

According to the last column, acquired forestland and family land have negative and significant coefficients, which strongly indicates that households seek additional land through renting and purchase when the traditional methods of land transfer, regardless of whether it is acquired forestland or transferred family land, are insufficient. In short, land scarcity stimulates land market transactions. It is also important to realize that the negative coefficients of acquired forestland and family land imply that land market transactions transfer land from land-rich to land-poor households, which would be conducive to the more efficient allocation of land. The coefficient of the migrant dummy is positive, indicating that migrants seek additional land through renting or purchase more actively. There is also indication that better-educated household heads are able to acquire land through renting or purchase, probably because these require previous savings and managerial ability. Female heads of households, however, are significantly less likely to have acquired land through purchase and rental, indicating that they may be disadvantaged, relative to men, in land sales and rental markets.

To recapitulate, the regression results indicate that males acquire forestland in their youth, receive family land when married, and if the acquired forest and family land is insufficient, they have recourse to land rental and sale markets. The implication is that as

the land becomes scarce, transfer of land through markets is induced to achieve more efficient allocation of land among households. Female heads of households, on the other hand, appear disadvantaged in all three modes of land acquisition, although their relative disadvantage is less significant for family land.

5. DETERMINANTS OF COCOA TREE PLANTING AND YIELD AT THE PARCEL LEVEL

Finally, in this section we attempt to assess the effects of land tenure institutions on the management efficiency of land in terms of proportion of cocoa planted area in a parcel and cocoa yield per unit of cocoa planted field, while using parcel level data.[20] The proportion of cocoa planted area is supposed to measure the "width" or extent of investment in trees, whereas the yield is assumed to reflect the "depth" of investment in management of cocoa cultivation. Note that if intensity of tree planting is low, the proportion of cocoa planted area may be large, even if cocoa yields are low.

Let us review Table 7, which exhibits the proportion of area planted to cocoa immediately before land acquisition and in 1997, by manner of land acquisition. Although the proportion of cocoa planted area tends to be higher in land with strong individual land rights (i.e., acquired village forestland, land received as gift and purchased from nonfamily members) than in land with weak land rights (i.e., inherited

[20] We define a parcel as a contiguous area of land obtained through a single manner of acquisition at a point in time, and a field as a portion of the parcel used for a specific purpose, e.g., fallow, growing food crops, and growing cocoa.

and allocated family land), the differences are not conspicuous. This observation indicates that incentives to invest in tree planting are not simply determined by the strength of land rights or land tenure security but also affected by expected changes in land rights after tree planting. Indeed, without considering the effect of tree planting on land rights, it is difficult to explain the nonnegligible proportions of parcels planted to cocoa in inherited and allocated lands, which are characterized by weak individual land rights (see Table 4).

The importance of previous tree planting as a prerequisite for receiving gifts appears to differ by gender. For men, only 20 to 25 percent of the parcel was planted to cocoa trees before land was transferred as gift. In other words, planting cocoa trees on a small portion of the parcel is often sufficient to obtain permission to transfer land through gift from the extended family members according to the current practice. If so, it is not surprising that trees are planted in inherited and allocated land with the expectation that the land parcels planted to trees may be allowed to be transferred as gifts in future. For women, however, between 40 to 50 percent of land was planted to cocoa before being acquired as a gift. This confirms our field observations that inter vivos gifts are given to wives in return for their helping their husbands plant and cultivate cocoa.

In general, the proportion of cocoa area is larger among non-Akan households than among Akan households, which may be due to greater individualization of land rights in non-Akan villages. The incidence of tree planting is very high in owned land acquired through past rental agreements, simply because tree planting is the required task under

share rental arrangements. The proportion of tree planted area in currently rented-in parcels is lower, as tenants are currently engaged in tree planting.

The maintained hypotheses of this analysis are that cocoa tree planting is more profitable than shifting cultivation and that higher cocoa yields indicate higher production efficiency, both of which seem reasonable in view of the continued expansion of cocoa area. We assume that land tenure institutions are predetermined for each household, but may differ within each household, depending on the gender of the parcel owner. In order to control for possible correlation between land tenure variables and unobservable household characteristics, we applied the household-level fixed effects model for both the proportion of area planted to cocoa and cocoa yields. For comparison, and to test for the importance of parcel-level heterogeneity, we also applied the random effects model to the estimation of the cocoa yield function.[21] For analyzing cocoa yield, we have 391 parcels of mature cocoa, for households with more than one mature cocoa parcel. We also estimate the percentage of area planted to cocoa using the same subsample of 391 parcels for comparability. In the latter, the dependent variable should be interpreted as the

[21] Since the proportion of area planted to mature cocoa is censored upwards at 100 percent, we applied a Tobit procedure with household dummy variables. We attempted to estimate this equation using the Honoré (1992) procedure but were not able to achieve convergence.

percentage of area planted to cocoa, conditional on mature cocoa being present in the parcel.[22]

In explaining the proportion of area planted to cocoa and cocoa yield, we included ten land tenure dummies represented by the manner of land acquisition (patrilineal inheritance, family allocation, family allocation interacted with patrilineal inheritance, gift, gift interacted with patrilineal inheritance, appropriation of village land, purchase of village land, private purchase, current renting, and acquisition through renting in the past), with matrilineal inheritance as a base of comparison. We also included the distance from house to parcel, parcel size, percentages of parcel covered by forestland and planted to cocoa before acquisition, year of acquisition and its squared term. It is expected that since virgin forest is more fertile than previously cultivated fallow land, the percentage of the parcel covered by forest may have a positive effect on tree planting.[23] In the cocoa planting function, years since acquisition and its square capture effects related to the timing of investment. In the cocoa yield function, we include the percentage of trees under five years and the percentage between five and 20 years to account for yield differences due to tree age. Traditional cocoa varieties only begin to bear fruit after five

[22] We also estimated the cocoa planting function using all parcels, for households with at least two parcels, but we report the results from the subsample with mature cocoa for comparability with the cocoa yield functions. It can also be argued that parcels with mature cocoa describe an equilibrium situation whereas those with only young trees are still subject to short-run adjustment processes. Parcels with mature cocoa may also have a mix of younger trees.

[23] Lopez (1997) found that biomass had a positive effect in his estimation of production functions using regional data from Western Ghana. While he attributes this effect to the positive production externality arising from the effect of biomass on protection from soil erosion and flooding, we consider it more plausible to interpret that the biomass is positively correlated with soil fertility.

years. Since tree age may be correlated with the number of years since acquisition, we do not include the latter in the cocoa yield functions. Finally, we include a dummy variable for the gender of the parcel owner in the cocoa planting and the cocoa yield functions.

The estimation results are shown in Table 9. Parcel size is shown to have an extremely significant and negative effect on the proportion planted to cocoa, implying that an inverse correlation exists between parcel size and tree planting. This indicates that the land rental market, not to mention the land sales market, is imperfect, because some portions of the parcel could have been rented for tree planting if the land rental market worked effectively (Hayami and Otsuka 1993). As further support of the hypothesis of imperfect rental and sales markets, the coefficients of current land rental and renting in the past are positive and significant.

A more important finding is that the dummy for allocated family land has a positive and significant effect on tree planting. This is surprising, if current land tenure security alone is a critical determinant of investment in tree planting, because land rights are weakest for allocated family land (see Table 4). If trees are not planted, allocated family land may have to be returned to the extended family for use by other family members. If trees are planted, there is a possibility that the land parcel may be transferred to the desired person as a gift. It seems that the expected strengthening of land rights associated with tree planting provides strong incentives to plant trees on allocated family land.

Dummies for land parcels with strongly individualized ownership, i.e., gift, appropriated village land, purchased village land, and purchased private land, all have

Table 9 Determinants of proportion planted to cocoa and cocoa production per hectare at the household level

	Proportion planted to cocoa on plots with mature cocoa [a]	Yield (production/cocoa area)	
	(Tobit with household dummies)	Household fixed effects[a]	Household random effects[b]
Distance to parcel	0.02*	-18.36**	-10.24*
	(1.32)	(-2.07)	(-1.61)
Parcel size (ha)	-0.03***	-3.48	-0.65
	(-6.04)	(-1.00)	(-0.25)
Amazonia dummy		39.13	-12.15
		(0.64)	(-0.23)
Hybrid dummy		-69.30	-59.77
		(-0.89)	(-0.91)
Percentage forest area at acquisition	0.03	27.77	-30.38
	(0.39)	(0.47)	(-0.62)
Percentage cocoa area at acquisition	0.45***	-46.31	-72.01*
	(6.20)	(-0.82)	(-1.47)
Dummy inherited and patrilineal	-0.24	-90.67	-8.19
	(-0.47)	(-0.24)	(-0.05)
Dummy allocated family land	0.21**	-147.42**	-104.95*
	(1.92)	(-1.82)	(-1.56)
Dummy allocated family and patrilineal	-0.19	-98.57	-15.89
	(-0.51)	(-0.41)	(-0.13)
Dummy land received as gift	0.10	-87.84	-51.38
	(1.11)	(-1.24)	(-0.86)
Dummy gift and patrilineal	-0.17	48.03	-30.42
	(-0.84)	(0.35)	(-0.40)
Dummy appropriated village land	0.19*	-128.02*	-81.32
	(1.42)	(-1.32)	(-1.01)
Dummy purchased village land	0.21*	-98.69	-32.33
	(1.44)	(-0.88)	(-0.35)
Dummy privately purchased land	0.24**	-156.34*	-100.69
	(1.97)	(-1.63)	(-1.25)

(continued)

	Proportion planted to cocoa on plots with mature cocoa [a]	Yield (production/cocoa area)	
	(Tobit with household dummies)	Household fixed effects[a]	Household random effects[b]
Dummy rented land	0.20**	-167..47**	-141.30**
	(1.79)	(-1.88)	(-1.92)
Dummy ownership through renting	0.38***	-99.31	-72.38
	(2.69)	(-0.96)	(-0.82)
Percentage of trees under 5 year		-0.28	-0.75*
		(-0.44)	(-1.32)
Percentage of trees 5 to 20 years		0.49	0.22
		(0.92)	(0.50)
Dummy for female-held parcel	-0.05	-74.90	-80.18**
	(-0.57)	(-1.43)*	(-1.89)
Years since acquisition	0.01		
	(1.06)		
Years since acquisition squared	-0.00		
	(-0.62)		
Constant	0.28	417.4***	431.4***
	(0.88)	(5.10)	(5.94)
Log-likelihood	-73.98		
Chi-square	393.35		
p-value	0.00		
Breusch-Pagan Langrangian Multiplier Test (p-value)		35.53 (0.00)	
Hausman Specification Test (p-value)		18.29 (0.45)	
Number of observations	391	391	

[a] *t*-statistics in parentheses. ***indicates significance at 1 percent level, ** at 5 percent level and * at 10 percent level, one-tailed tests.

[b] *Z*-scores in parentheses. ***indicates significance at 1 percent level, ** at 5 percent level and * at 10 percent level.

positive coefficients but only the dummy for purchased private land is significant at the conventional level of significance ($\alpha = 0.05$, one-tailed test). Dummies for appropriated village land and purchased village land are positive, but significant only at 10 percent (one-tailed test). Thus, although land tenure security may have a positive effect on tree planting, as argued by Besley (1995), its effect is not necessarily strong. The dummy for

a female parcel owner has a negative but insignificant effect on the proportion of area planted to cocoa, suggesting that there is no significant difference between male and female parcel owners with respect to tree planting.[24]

We also estimated cocoa yield functions with fixed and random effects. In the estimation of cocoa yield functions, we included dummies for improved varieties of cocoa, i.e., *Amazonia* and hybrid, and proportions of trees younger than five years of age, which are immature, and between five and twenty years of age, which are at the highly productive stage. The estimation results of the cocoa yield function contrast markedly with those of tree planting.[25] First of all, for the random effects results (the preferred specification), the dummy for allocated family land is negative and significant. Thus, tree planting density and subsequent management intensity of cocoa trees are lower in allocated family land, even though the proportion of tree planted area is larger. Such behavior is understandable if one plants trees in order to obtain permission to transfer land as a gift.

Second, the coefficient of the dummy variable for current renting is negative and significant. Contrary to the conjecture of Boadu (1992), share tenancy in Ghana's cocoa

[24] It is also possible that, if women receive land only after it has been planted to cocoa, subsequent observations will not reveal any difference in the probability of planting cocoa between male and female parcel owners.

[25] Since the Breusch-Pagan test indicates the importance of random effects, and since the Hausman test shows that household-level unobservables are not significant, random effects is the preferred specification.

field is found to be inefficient.[26] This finding is consistent with the finding of inverse correlation between parcel size and the proportion of area planted to trees, because it is not necessarily advantageous for a landowner to rent out a portion of a large parcel to a tenant if tenancy is inefficient.

Third, the coefficients of dummy variables representing gift, appropriated and purchased village forestland, and purchased private land are all negative, even though none of them are significant. If stronger land tenure security leads to much greater incentives to invest in management of trees, the coefficients of these dummy variables ought to be positive and significant. It may well be that once cocoa trees are planted, individual land rights are enhanced such that management incentives do not differ significantly among various land tenure institutions. This is consistent with the finding of Place and Hazell (1993) that land tenure security does not significantly affect crop yields in several Sub-Saharan African countries.

Lastly, the dummy for female-owned parcels is negative and significant. This indicates that, controlling for differences in land tenure as well as household-level characteristics, female parcel managers obtain lower yields on their cocoa plots. This finding is similar to that of Udry (1996)'s study on Burkina Faso, which finds lower yields on maize plots cultivated by females within the same household. While this may indicate

[26] According to Hayami and Otsuka (1993), share tenancy in Asia, which is observed mainly in annual crop farming, is, in general, not significantly inefficient compared with owner-cultivation and fixed-rent tenancy. It may well be that inefficiency of share tenancy arises in Ghana's cocoa fields partly because land ownership rights are not sufficiently well established, and partly because, compared to annual crop farming, it is more costly to monitor the tenant's activities over the extended periods required for perennial crop cultivation.

greater credit constraints faced by female farmers, it also suggests inefficiencies in intrahousehold resource allocation, since the household could have increased aggregate yields by reallocating resources across male and female-managed plots. It may also indicate that female parcel owners may concentrate more on the food crops grown on cocoa plots rather than on cocoa itself.

To sum up, the contrasting estimation results of cocoa tree planting and cocoa yield functions can be understood only if land rights are enhanced by tree planting, so that incentive structures are different for tree planting and management of trees. Incentive structures may also be different for male and female farmers within the same household.

6. CONCLUSIONS

Increasing population pressure induces a shift towards more labor-intensive and land-saving farming systems. While doing so requires investment in land, incentives to invest are weak or close to nonexistent under traditional communal land tenure institutions. In this study we found that customary land tenure institutions have evolved toward individualized systems in order to provide appropriate incentives to invest in tree planting and management. Such an evolution has been facilitated by the stipulation of the customary land tenure institutions that confers strong individual land rights to those who exert efforts to clear forest and to invest in land improvement, including tree planting. So long as population continues to grow, the profitability of long-term investment for

intensified land use will further increase, which will either sustain or accelerate the evolution of customary land tenure institutions.

Such evolutionary changes towards individualized rights have been argued to have detrimental effects on women's traditional land rights (see Lastarria-Cornhiel 1997). It is commonly believed that privatization of land rights, particularly land titling, results in the transfer of land rights from women to men. While this may be true in some societies, it is unfounded to conclude that individualization of land rights necessarily leads to weaker rights for women. If labor-intensive agriculture increases the demand for women's labor, as in the case of cocoa in Ghana (Okali 1983; Awusabo-Asare 1990), women's labor on her husband's plot may represent a form of "sweat equity" which confers individualized land rights. Our findings suggest that gift transactions, usually in return for labor on a husband's cocoa plot, are the most important mode of land acquisition for women. Legal reform, as illustrated by the Intestate Succession Law, has also provided women means of obtaining access to their husband's land should he die intestate.

While it is not necessarily land tenure security but expected *changes* in land tenure security that affect incentives to invest in tree planting and management, these changes may differ by gender. Women farmers typically have to plant a larger proportion of parcels to cocoa before land is transferred as a gift. Our statistical evidence also indicates that incentives to increase cocoa area by planting trees and to increase cocoa yield by intensive management are quite different. This finding clearly indicates that the incentive structure to invest changes with investment in trees. While women and men may have

equal probabilities of planting cocoa, the significantly lower yields of women parcel owners may indicate credit and other constraints faced by women, including their responsibility to provide food for their families. The comparative profitability of food and cocoa needs to be analyzed subsequently using a more detailed household-level data set.

Given the need for agricultural intensification, a major question is what types of policies can assist such evolutionary changes in a manner compatible with efficient and equitable development of rural areas. While land titling is feasible only if land rights are sufficiently individualized, implementation of land titling programs must pay special attention to the gender issue. If men are traditionally owners of land, as in Western Ghana, land titling may strengthen their land rights at women's expense. To be fair, men and women should be equally qualified for acquiring land titles. Judging from the experience of Ghana, the promulgation of the Intestate Succession Law, which stipulates how property should be bequeathed to the spouse, children, and other family members, is likely to be an effective policy option, which would facilitate less gender-biased land inheritance systems in customary land areas. Transferring ownership of land to women, however, is unlikely to raise productivity if access to and use of other inputs remains unequal. This suggests that attempts to equalize land rights of men and women are unlikely to lead to gender equity and improved efficiency and productivity of women farmers unless other constraints faced by women are also addressed.

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