DEVELOPMENT AND HOUSEHOLD ECONOMY IN TWO ECO-ZONES OF EMBU DISTRICT

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ABSTRACT

This paper addresses the relationship between household economy and processes of development in two eco-zones of Embu District. It examines three principal types of rural household economic intestment: 1) land purchases; 2) small business; and 3) agricultural production. Patterns of household investment suggest that rural economic growth may be propelled largely by off-farm income and investment, though the success of such non-agricultural investment depends heavily on the health of small-scale agriculture.

Most types of agricultural investment examined tend to be concentrated among large land owners and households with regular off-farm income. However, while those with substantial off-farm income and larger than average farms are both more able and likely to invest in agriculture than are other smallholders, the former tend to invest more in land purchases and business itself than in agricultural production. Many land purchases are not made strictly for agricultural purposes but for possible future resale (due to rapidly rising prices) or as a form of security for obtaining loans for nonagricultural investment.

In short, there are two distinct sets of small-scale agricultural producers with quite different needs and investment capacities. The first (possibly 25-35 percent of Embu smallholders) is the larger land owners with substantial off-farm income and a tendency to invest somewhat in agricultural production but more so in other areas such as land purchases and small businesses. The second set (65 to 75 percent of Embu smallholders) has less land, less off-farm income, and a high propensity to invest nearly all of its resources in secondary education. Field data indicate an improvement on the living standard of the wealthiest 25 to 35 percent of the population. A variety of factors, however, limit economic advance and improved welfare among the 65 to 75 percent majority of smallholders.

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Introduction: Theoretical Framework

This paper addresses the relationship between household economy and processes of development or underdevelopment in two eco-zones of Embu District.[1] Much previous research on agricultural household economy contains an unnecessary analytic divergence between 1) individual economic motivation, and 2) wider patterns of a system of economic, ecological and socio-political relationships and institutions. The first approach is the basis of neoclassical economic theory and much of the formalist school of economic anthropology. Its focus is on formal models of individual economic decisions and the manner in which individuals adjust their economic activities to balance their marginal costs against marginal gains. Although the formalist-substantivist dichotomy is no longer a central theoretical debate in economic anthropology (see, for example, Johnson 1980), the dichotomy is still very apparent in agricultural economics. Some agricultural economists have recently begun to examine farming systems and technological and ecological relations in a shift away from concentrating on diffusion of innovation among individuals (see Saint and Coward 1977, Collinson 1979). However, this developing approach tends to focus on the natural environmental context of farming systems, with little attention given to the socio-political or institutional components which interact with the environmental component of any agricultural system. Most agricultural economists, following the model of neoclassical economics, continue to focus on individual economic motivation and to largely ignore the institutional context in which individual economic activities occur.

The second orientation is shared in varying forms by the substantivist school of economic anthropology (see Dalton 1961, 1971), and by economic theorists such as Ricardo, Marx and Veblen. This approach tends to

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1. This discussion is based on preliminary findings from two and one-half years of economic anthropological research and residence in Embu District in Kenya's Eastern Province. The study was funded by doctoral fellowships from the Social Science Research Council, the National Science Foundation (Grant No. BNS-7902715), and Northwestern University. Their support is gratefully acknowledged. Opinions and findings presented here are those of the author and do not reflect the views of any of the above named institutions.

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emphasize not individual variation and economic motivation, but the socio-cultural and political relations and institutions defining an economic system. In economic anthropology, this has often meant descriptive functional analysis of economic organization and structure in nonwestern societies (see, for example, Bohannan 1955, Malinowski 1921, Richards 1939). This approach in anthropology arose out of an emphasis on the more personal and less profit-motivated character of economic activities in nonmarket or partially monetized economies. Here analysis of an economic system entailed descriptive analysis of social institutions defining production, consumption, distribution, exchange and access to resources. Substantivists find the neoclassical emphasis on individual rationality and market criteria of achieving maximam production output at minimum cost to be irrelevant in non-western and nonmarket economies. Although substantivists and Marxists alike focus on institutions and social relations of production and exchange, substantivist economic anthropology tends not to analyse mechanisms of economic change, while Marxism is explicitly a theory of economic change.

A tendency to separate the individual and institutional (or ecological and socio-political system) levels of analysis leaves unresolved the relation between system patterns on the one hand, and principles governing the decisions and behaviour of individuals within the system on the other. The present study attempts in part to bridge the gap between these two levels and types of analysis. Individual household level economic activities are examined in specific relation to the wider context of ecology, society and policy in which they occur. It is necessary to understand both 1) the manner in which the socio-political, economic and ecological context defines production possibilities and economic alternatives open to the individual, and 2) the bases of variation in individual household response to this context.

By focusing on how individuals respond in varying ways to new economic opportunities and adjust to the particular constraints of the economic system in which they operate, one can begin to understand the dynamics of the system as a whole. This is not to suggest that the system is a simple aggregate of individually rational acts, but rather that there is a continually shifting set of forces which both shapes and in part responds to individual decisions. This analysis assumes that rationalistic self-direction of individuals within the rural economy both affects and is affected by changing natural environmental and institutional (social, political and economic) relationships.

Behaviour of individual small-scale agricultural producers can only be understood in relation to the behaviour of other groups such as small businessmen, large land owners, and urban workers. The economic options of individuals in any of these groups are defined and limited by the ways in which other individuals and groups exploit varying areas of the natural, economic and socio-political environment. If, for example, smallholders within a particular area gradually acquire more grade cows (exotic breeds) and increase their milk production, the internal sales opportunities open to the original minority with grade cows will diminish and more producers will have to seek external markets for their milk. If external milk sales possibilities are limited (e.g., because the market is controlled by an outside group or because it is too far away for the producer to reach daily), there may be a subsequent decrease in milk production within the original area and a shift to other types of production.

In examining household economy and development in rural Embu, we shall therefore consider variation in economic activities pursued by each household, and determinants and consequences of that variation at both the individual and system levels. This provides a basis for analysing wider system characteristics and trends both affecting and in part resulting from the economic pursuits of various types of individual households.

The relationship between household economy and system level processes of development or underdevelopment in Embu is addressed here by examining three principal types of household economic investment: 1) land purchases; 2) small business (e.g., rural retail shops, bars, restaurants); and 3) agricultural production (coffee, plows, ox carts, chemical fertilizers, hired labor, livestock).[2] Evidence presented here strongly suggests that it is not small-scale agriculture but rather non-agricultural economic pursuits in conjunction with land acquisition that are at present the most significant avenue of individual economic advance in the rural Embu economy. Types and degrees of individual advance are, however, strongly tied to the historical, socio-political and ecological context and cannot be understood by looking only at individual response to purely economic factors such as supply, demand and capital availability.

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2. Investment in secondary education is a fourth important category which, though not dealt with in detail in this paper, will be examined elsewhere by the author at a later stage of data analysis.

Despite the importance of off-farm income and investment, the success of nonagricultural investment by wealthier smallholders depends heavily on the health of the small-scale agricultural sector. Small business, a major form of nonagricultural investment, is especially vulnerable to fluctuations and changes in smallholder agriculture such as poor harvests, low agricultural commodity prices, and delays in cash crop payments by marketing institutions. At the same time, there is evidence that while the wealthier smallholders prefer nonagricultural to agricultural investment, a healthy non-agricultural sector also represents an important source of capital for investing in smallholder agriculture. It is the smallholder households with substantial off-farm income and larger farms who are both more able and more likely to invest in agriculture than are other smallholders.

Before examining individual household investment patterns and their implications for rural development, we begin with a discussion of the ecological context, the contrast between cotton and coffee zones, and the manner in which this shapes individual economic pursuits. The paper then examines some aspects of the socio-political context of individual economic activities by looking at present land distribution and its historical bases. Next the relationship between land holding size and investment in agriculture and small businesses is dealt with. Finally, the paper considers some implications of these findings for growth in the rural economy.

Ecological Setting

Embu District lies immediately to the southeast of Mt. Kenya and covers a wide ecological gradient extending from altitudes over 7000 feet in the northwestern part of the district to about 3000 feet in the southeast. In Eastern Province, as one descends in altitude from the Mt. Kenya foothills, population density, agricultural potential and general economic prosperity decline. Subsistence farming tends to assume greater importance and the degree of dependence on cash inputs to agriculture assumes less importance as one moves down in elevation across Embu District and Eastern Province. Administrative, market, and social service networks (schools, roads, dispensaries) are considerably better developed in the high potential, densely settled areas than they are in the medium potential, less densely settled regions. All of these factors contribute to great variation in economic

opportunities in the district's various agro-climatic zones. In particular, cash cropping opportunities are defined by zone and altitude; tea is grown in the belt closest to Mt. Kenya at altitudes between about 5500 and 7000 feet; arabica coffee is grown between 4500 and 6500 feet; while cotton is grown below about 4500 feet.

Residents of high potential areas of the district are placing increasing demands on medium and lower potential areas for rapidly diminishing natural resources such as land, and wood for charcoal, firewood, and building. This takes the form of both resource extraction from medium into high potential areas, and also population migration (due to population pressure) from high potential into medium potential areas. Thus some growth in high potential areas is occurring at the expense of medium and low potential regions.

The research site covers both medium and high potential agricultural areas in two administrative sublocations in Kagaari Location of Embu District.[3] The inter-zone processes of resource extraction and population migration mentioned above have been significantly increasing in the research area in the last ten to fifteen years. This is attributable in part to an overall increase in the district's population density from 62 to 96 persons per square kilometre between 1969 and 1979. (see Table 4.) The population of Runyenje's Division, which includes all of the high potential and some medium potential areas of the district, increased from 220 to 318 persons per square kilometre between 1969 and 1979. The population density of Kagaari Location (the research area) increased from 184 to 262 persons per square kilometre in the same ten-year-period. As noted earlier, this population growth has intensified land scarcity in the high potential areas and encouraged migration into medium potential areas.

The two sublocations covered in the study represent a rapid altitude decline from about 5000 to 3800 feet within a distance of about ten kilometres. About midway in this descent is the boundary below which the growing of arabica

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3. Methods used in the research were drawn from the fields of both agricultural economics and anthropology and are described in Haugerud 1979. They included participant-observation as well as economic survey techniques. Survey data were collected from a random sample of 83 smallholder families in two sublocations in Embu coffee and cotton zones. These 83 households were visited regularly by the researcher while living in the area between November 1978 and April 1981. Participant-observation was used to verify and amplify survey data, as well as to collect additional contextual information on sample households and on socio-political and economic structures and institutions. Primary field data were supplemented by secondary sources such as Ministry of Agriculture records in Runyenje's Division of Embu District, and minutes of the Embu County Council and Local Native Council from 1925 to 1981.

coffee is illegal.[4] Despite this regulation, the coffee boom of the mid-1970's led many farmers to attempt to grow the crop at altitudes below which it is increasingly likely to succumb to excessive sun and too little rainfall. Although cotton rather than coffee is encouraged as a cash crop below about 4500 feet, cotton has been far less widely adopted in this zone than arabica coffee has in the zone immediately above it. Survey data indicate cotton adoption rates of only around 50% in the "cotton" zone, while coffee is grown by nearly 100% of small farmers in the "coffee" zone. For convenience, however, these two distinct eco-zones are referred to here as coffee and cotton zones. The boundary between the two coincides with the administrative boundary between the two sublocations included in the study. While the first sublocation lies in the coffee zone between altitudes of about 4400 and 5000 feet, the second (3800-4400 feet) extends southeastward to the northwestern boundary of the area of Embu District occupied by the Mbeere people. The study area therefore covers the two lowest altitude zones occupied by the Embu people, as distinct from the still lower altitude regions occupied by the Mbeere people in the same district.[5]

The natural vegetation of the coffee zone is moist to dry forest, while that of the cotton zone is dry forest and moist woodland. In the coffee zone, mean annual temperatures are 20 to 22°C and the rainfall-evaporation ratio is 65-80% (see Braun 1980). Rainfall averages 35 to 50 inches annually. The topography is one of ridges and valleys which are more widely scattered and less pronounced than in the upper coffee and tea zones above about 5200 feet. In the cotton zone, mean annual temperatures are 22 to 24°C and the rainfall evaporation ratio is 50-65%. Annual rainfall averages 30 to 40 inches. The Kenya Soil Survey (see Braun 1980) classifies both zones in the descriptive category of "volcanic foot ridges on the dissected lower slopes of major older volcanoes and mountains, with soils developed on Tertiary basic,

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4. The legal coffee growing limit was the 5100 feet contour in 1946, the 4800 feet contour in 1958, and the 4500 feet contour in 1961. Since 1961, and particularly since the coffee boom of the mid-1970's, the de facto coffee altitude limit has dropped a few more hundred feet. However, most of those growing coffee below about 4400 feet do so on a very small scale. Most of the coffee trees below this altitude are not yet mature and growers have had to replant large proportions of their seedlings due to drought and drying up of young seedlings.

5. Because cotton is also grown by the Mbeere at lower altitudes, the Embu cotton zone is more accurately termed the "upper" cotton zone and the Mbeere cotton zone the "lower" cotton zone. What is referred to here as the coffee zone is actually the lower half of the full coffee zone (which extends from 4500 to 6500 feet); the research area covers only the 4500 to 5000 feet portion of the coffee zone and is therefore more accurately termed the "lower" coffee zone.

igneous rocks".[6]

Maize, beans, bananas, sweet potatoes, English potatoes and cowpeas are widespread food crops in the coffee zone. Smaller quantities of arrowroots, sugarcane, pumpkins, cassava, pigeon peas, millet and sorghum are also grown. (see Table 15.) Food crops in the cotton zone include maize, beans, potatoes and cowpeas, in addition to some pigeon peas, cassava, sorghum and millet. Bananas, a very important crop in the coffee zone, are far less common in the cotton zone due to insufficient water availability and more frequent and severe years of inadequate rainfall. The principal food crops in both zones--maize, beans and potatoes-- are more likely to fail because of inadequate rainfall in the cotton zone than in the coffee zone. Rainfall statistics from the last 15 years suggest crop failures occur about one year in ten, while very poor yields occur about three years in ten. The risk of low yields and crop failure increases with declining altitude.

In short, features of the natural environment such as altitude, rainfall, temperature, evaporation, soils and vegetation together help define the range of production possibilities in a given area, and in connection with socio-political and economic factors influence the distribution and range of production options actually practised. As is demonstrated in the rest of this paper, the distinction between high and medium potential agricultural areas (coffee and cotton zones) described here has had important consequences for the development of the rural economy.

Late-Colonial Land Adjudication

This section briefly discusses late-colonial processes of land adjudication in Embu. As will be seen later, these were an important determinant of post-colonial land distribution, which in turn is shown to be closely related to household economic investment patterns.

As the colonial period drew to a close, the government, under the auspices of the 1954 Swynnerton Plan, initiated a program consolidating all smallholdings into individually titled and registered units. This was begun

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6. Soils in the coffee zone are "well drained, extremely deep, dusky red to dark reddish brown, friable clay, with acid humic topsoils", while cotton zone soils are the same, with "inclusions of well-drained, moderately deep, dark red to dark reddish brown, friable clay over rock, piso-ferric or petro-ferric material". (Braun 1980).

first in the central Kenya highlands and began in Embu District in the late 1950's. As Leys (1975) and others have discussed, the inexplicit hope underlying the program was that land consolidation would encourage the growth of a stable African middle peasantry and discourage political radicalism. The program was intended to promote the development of small-scale farming through such measures as the provision of agricultural extension services, credit issued on the security of new land titles, and removal of the ban on African coffee growing.

As this process began in the high potential areas of Embu District in the late 1950's[7], committees of clan elders demarcated the boundaries of each clan's land holdings and consolidated fragments belonging to each family in preparation for individual ownership and issuing of title deeds. Under traditional tenure, land in Embu was broadly divided among particular clans. Individuals from a given clan were, however, often dispersed and cultivated land in widely separated areas. Individuals could traditionally obtain land from any locality as long as it was not in use by someone else. Several used land in different eco-zones in order to increase the diversity of crops they could grow, and in different areas of one eco-zone in order to avoid concentrating the risk of crop failure. As the Embu population increased, land began to be shared or held by members of one lineage or clan. Actual ownership, however, resided in the individual family or nyomba.[8]

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7. Similar processes of land adjudication are at present underway in Mbeere Division of Embu District. See Brokensha and Njeru 1977 and Njeru 1978.

8. Kikuyu traditional tenure, unlike the Embu system, did involve well-defined clan lands. Kikuyu settlement tended to follow a pattern of ridges originally claimed and held for many generations by a particular clan which controlled their use. The difference in Kikuyu and Embu tenure is in part attributable to topography. Whereas much of Kikuyu country is marked by a series of ridges and valleys, much of Embu is flatter and ridges are more widely scattered. Kikuyu tended to own land in strips running from ridge top to valley bottom. This allowed each family to exploit a significant degree of environmental diversity within a small area. Embu topography did not allow this, but did allow exploitation of environmental diversity over a larger area by taking advantage of a different topographic feature--fairly rapidly declining altitude as one moved southeastward from the slopes of Mt. Kenya through what are now tea, coffee, and cotton growing belts of decreasing altitude, as discussed in this paper. It is not uncommon in upper Embu District to find a one thousand foot drop in altitude within a distance of six to ten kilometres. In Embu, because individuals were free to acquire land in any area, several used land in different eco-zones in order to increase the diversity of crops they could grow, and in different areas of one eco-zone in order to avoid concentrating the risk of crop failure.

The government-initiated land consolidation program of the late 1950's involved first having committees of elders of each clan demarcate the boundaries of that clan's land. The boundaries of land belonging to individuals within the clan were then to be established and each owner was to be given a single piece of land representing the combination of fragments he had previously been using. This process involved many disputes over ownership among families and clans which were settled by committees of clan elders.[9] The manner in which such disputes were settled in the late 1950's then determined the character of land distribution in the new government system of individual freehold tenure and title deeds.

Many informants in field interviews asserted that individual success in the process of dispute settlement depended heavily on one's ties to influential persons as well as on payments of bribes and gifts to clan elders adjudicating cases. Influential individuals who paid most are said to have had the best chance of obtaining large pieces of land of good quality. The less influential, those who refused or were unable to pay, and those who were temporarily absent from the area often received either no land, very small pieces of land, or land of poor quality. Informants assert that there was a tendency for the more influential and wealthy to get land of better quality in high potential areas and to displace others to lower rainfall, less productive zones or to less favorable locations within a zone (e.g., sites with many rocks, steep slopes or poor access to water).

Individuals with positions in or ties to colonial government officials such as chiefs were often at a particular advantage because they

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9. Some cases, for example, involved inheritance and division of land from a common ancestor among surviving sons. Some individuals who believed they had inherited land from their fathers refused to have their clans divide the land among other family members.

had bothaccess to superior knowledge about the meaning of demarcation procedures and the influence and power to use that knowledge to their own economic advantage. Some individuals, on the other hand were less well informed about the significance of the new demarcation and consolidation procedures and therefore ignored them entirely. Many of them were easily taken advantage of by the better informed.

The following case helps to illustrate how ties to the colonial administration and personal influence were used by some individuals to obtain disproportionately large pieces of land. Much of the land in the area now identified as the cotton zone (between the high potential present coffee zone and the more marginal areas occupied by the Mbeere) was only sparsely populated in the late 1950's. It was used largely as communal grazing grounds by residents of the adjacent coffee zone and as a sort of buffer zone between Embu and Mbeere peoples. Just before actual demarcation took place, colonial government officials instructed people from the present coffee zone to define their runo (explained below) lands in the adjacent lower zone. The few people living in the lower zone (present cotton zone) at the time are said by interview informants to have been largely unknowledgeable and to have thought anyone agreeing to such boundary claims foolish. In the context of the traditional tenure system, such claims would be invalid and unnecessary.

A group of people in one influential clan in the upper zone took advantage of the situation to rush to the lower zone to claim hundreds of acres for themselves as their runo land. This particular clan had strong ties to the colonial administration through at least one of its members who was part of the administrative system and whose father was a clan elder. According to many field interviews, this clan's elders used a plough to dig a trench extending for many kilometres to define the boundary of "their" land in the lower zone. They were able to use to their own advantage their earlier and better knowledge of the colonial government order to define clan land boundaries in what is now the cotton zone. In the process this clan is said to have taken away several "ignorant" people's land. While the latter could technically have claimed the land themselves, they were poorly informed and uninfluential and therefore are said to have lost their land.

Such individuals had no reason to believe they would lose their land under traditional land tenure rules which allowed an individual to cultivate any piece of land as long as it was not being used by someone else or had not been

legitimately (requiring certain traditional ceremonies) defined as someone else's runo land. Under runo rights, an individual was allowed to define a piece of land as his own by placing stones or planting trees along the boundary. He was then required to put the land into immediate use. This, then, was an important means of preventing "hoarding" of land and reduced inequity in the traditional economy. In this traditional context, the behaviour of the elders of the clan which suddenly claimed a huge tract of runo land had no validity. Field interviews indicate that this particular clan was by no means unique in seizing an opportunity to use the new demarcation procedures to its own advantage.

Under the traditional tenure system, many individuals owned land in two or three different eco-zones. Land consolidation decreased this risk reducing function of the traditional system by calling for consolidation of all of each individual's holdings into one parcel. Despite this intent, many individuals did, as we shall see in the next section, obtain land in more than one eco-zone and more than one location within an eco-zone. Individuals in the clan mentioned in the case discussed above managed to get large pieces of land in both coffee and cotton zones, though they found it particularly easy, as discussed here, to obtain large tracts of land in the cotton zone.

In sum, government clan land demarcation and individual consolidation set in motion a scramble for land which exaggerated and then legally froze inequality. Although inequality was also a feature of the traditional land tenure system, it was less apparent, since land was perceived as an individually used asset within the context of clan "ownership". Population growth within the last twenty years, as well as land consolidation, have both increased the perceived importance of individual ownership and also accentuated the actual economic consequences of unequal ownership. In the remainder of this paper, we shall see some of the economic consequences of late-colonial processes of land adjudication discussed here.

Post-Colonial Land Distribution

The present distribution of land has important consequences for individual household investment patterns. In this section, we examine post-colonial land distribution and then in the next section its relationship to patterns of household investment in agriculture and small business. A combination of processes of 1) influential individuals and clans acquiring more land

at the time of land demarcation in upper Embu twenty years ago (as discussed in the last section), and 2) upwardly mobile individuals later purchasing land has led to an important degree of inequality in present land distribution in Embu.

In the study's random sample of 83 smallholders, it was found that nearly all (92%) had acquired the land they now occupy from their clans or through inheritance. As table 31 shows, about two-thirds (66%) have never engaged in any cash purchases or sales of land, while the remaining 34% have engaged in some form of monetary land transaction. Among those who have made cash land transactions, ten households (12%) have purchased land but have never sold any, while thirteen households (16%) have sold land but never purchased any. Only two households have both purchased and sold land. Thus to a very large degree patterns of present land ownership arise directly from the processes twenty years ago of clan land demarcation and consolidation discussed in the last section.

As table 33 shows, land ownership is concentrated to the degree that the wealthiest 10% of the sample households (owning 25 acres or more) own just over 40% of the total land owned by the sample. The wealthiest 20% of the sample own 54% of the total sample land. At the opposite and of the scale, the poorest 20% of the sample households (with holdings of 4.2 acres or less each) own only 5% of the total sample land.

Some inequality is also reflected in the number and location of parcels owned by each household. Forty-eight households (58% of the sample) own two or more parcels of land, while fifteen households (18%) own three or more parcels. (see table 30.) Among the 48 households owning two or more parcels, one-quarter have purchased land. The other 36 households acquired more than one parcel from their clans at the time of land demarcation. As table 30 indicates, more than a third (38%) of coffee zone residents also own land in the cotton zone, though only 18% of cotton zone residents own land in the coffee zone. Slightly more coffee zone residents (59%) than cotton zone residents (54%) own more than one piece of land. Holding sizes tend to be larger in the cotton zone than in the coffee zone because agricultural potential and population density are lower in the cotton zone than in the coffee zone.

Nearly all of the largest and smallest landholders in the survey sample acquired land only through their clans at the time of land demarcation and not through later cash purchases. All but one of the eight largest land owners (25 acres or more) have never purchased any land and acquired land only through their clans. Five of the eight largest landowners have sold land. At the opposite end of the scale, only one of the fifteen smallest land owners (4 acres or less) has purchased any land, while two have sold land.

Although nearly all of the largest and smallest land owners acquired no land through cash purchase, there is a quite different pattern of land acquisition among the nine households forming the second largest landholders (owning more than 15 acres but less than 25 acres). Five of these nine households have since land demarcation purchased land, and as a group these nine households have purchased nearly 30% of the total land area they now own. This set of households then represents an important upwardly mobile one which was not necessarily at an economic advantage at the time of land demarcation twenty years ago.

Three of the five land purchasers in this second rank of land owners operate small businesses (tailor, butchery, retail shop), while one of the other two purchasers is one of the largest coffee growers in the area (with 1200 trees, far above the smallholder media of 318 trees in the coffee zone). The fifth purchaser was among one of the first groups of people from the area to be educated up to Standard Eight in the colonial period. He increased his wealth through hard work, good management and access to loans which allowed him to purchase such assets as a plow, ox cart and weeding machine.

Non-agricultural income[10] is also important for most of the other nine households who have purchased land. All but two of these nine have regular non-agricultural income sources, including three with small businesses (tailor, tea shop, trader) and five with income from permanent wage employment (three teachers, one policeman, one tourist hotel employee). One of these households has income from both permanent wage employment (primary school headmaster) and a small business (tailor). About 43% of the twenty-eight total [illegible] sample households with regular non-agricultural income sources have purchased land. (This includes 50% of the regular income earners in the coffee zone and 33% in the cotton zone).

In short, most land purchasers have non-agricultural income from either or both regular wage employment and operation of small businesses in rural markets. In the case of those with small businesses, land title deeds are often an important means of acquiring cash loans to start a business (though many such loans are actually intended for agricultural purposes). At the same time, earnings from small businesses are often invested in land purchases.

As noted earlier, land purchases in the cotton zone by coffee zone residents and other outsiders are accompanied by increasing population migration to the cotton zone from more densely populated, land scarce areas.

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10. Non-agricultural income is considered here only for those households in which the male or female household head or resident adult is engaged in permanent wage employment or has his/her own small business such as a butchery, retail shop or tea shop. It does not include several households with less regular sources of non-agricultural income such as one in which the husband acts illegally as a middleman in small coffee sales and one in which the husband from time to time is hired by friends and neighbors to construct granaries, wood frames of traditional mud houses, and to do other small building tasks for cash.

There is some tendency for wealthy individuals from upper Embu and from Central Province to buy larger than average pieces of land in the Embu cotton zone. For example, one cotton zone resident in the sample is a university educated professional with a private business who acquired a seventy acre parcel by purchasing sections of three previously separate parcels. Many informants in the cotton zone mentioned in informal interviews that a number of outsiders are buying land and moving into the area. These purchasers then often become hirers of large numbers of casual laborers drawn from nearby homes. This has been going on for only a few years, however, and in this part of Embu there is as yet a very small landless class (possibly 2 to 5% of the population). Because there is still much uncultivated (though individually owned and registered) land in the cotton zone, some of the landless are tenants on parcels owned by people living elsewhere. While they do not pay for the use of the land, they can be told to leave at any time.

Because some families own more than one parcel of land or own more land than they can themselves cultivate, there is still a large amount of land borrowing and lending in Embu. This at present somewhat off sets unequal ownership, though it may simultaneously promote other types of inequality in the form of dependency relationships between land lenders and land borrowers. Six of the eight largest land owners lend land to others, while twelve of the seventeen largest landholders lend land. Nearly-half (7) of the fifteen smallest land owners borrow land; one of these both borrows and rents land. Another household among the fifteen smallest landholders rents land to use but does not borrow any. Four of the seven land borrowers in this group borrow from relatives. Three households among the fifteen smallest land owners are lending land--all to relatives; however, these three are relatively small families.

More than a third (37%) of the sample households lend but do not borrow land, while a quarter borrow but do not lend land (See Table 32). Another 13% both borrow and lend land, while only 25% neither borrow nor lend land. Only three households rent land from others. Most lending and borrowing of land entails no mandatory or fixed payments in cash or kind, though many informants said small gifts such as a kilo or two of sugar may sometimes be given as a gesture of good will.

Land lending and borrowing is in part a function of both labor and capital availability. Those with adequate labor and capital to use their own land are less likely to lend land to others. As more and wealthier individuals move into the area, the degree of lending and borrowing will likely decrease and inequality of land distribution may increase.

In addition to simple quantitative redistribution, land exchanges increase the diversity of types of natural environment a household can utilise. They provide an important means of exploiting different types of soil, water and temperature environments not available on an individual's own land holding. Some families, for example, borrow very small portions of another's valley bottom land to plant crops such as arrowroots, bananas and sugarcane which do particularly well in such well-watered places. Land exchangescan also help to protect against total crop loss due to pests and disease, flooding or drought in a particular area.

In sum, this section has indicated both a substantial degree of inequality in present land ownership in Embu and a strong relationship between land purchases and non-agricultural income. Unequal land distribution has been seen to be a consequence of both land purchases within the last twenty years and of an originally unequal distribution of land at the time of government land demarcation and individual registration at the close of the colonial period. In the next section, we examine the degree to which investment in agriculture is concentrated among large land holders and households with regular sources of non-agricultural income. Implications for development or growth in the rural economy are considered in the final section.

Agricultural Investment

This section briefly examines agricultural investment and the manner in which it is related to investments in land and small business already discussed. This then provides a basis for discussing in the final section some implications for the economic system of patterns of individual household investment.

a) Coffee

Coffee is one of the major sources of cash income for most Embu smallholders. Even though prices are often low and payments to farmers irregular, many small farmers value coffee because it can be used as security for some agricultural loans and for credit from cooperative societies for payment of secondary school fees. For most small farmers in Embu, secondary (and in some cases primary) school fees are both the largest and one of the highest priority expenditure categories. Coffee

income tends to be spent primarily on larger expenses such as school fees and clothing, while income from periodic small food crop sales tends to be spent on smaller, more frequent household consumption items such as salt, soap, sugar, tea leaves, and (for wealthier families) rice, wheat flour and meat. (When food crop sales are inadequate to meet smaller household consumption needs, many people turn to casual labor as a source of income.) When coffee payments are delayed or inadequate to meet larger expenses such as school fees, livestock may be sold.

As Table 23 shows, twenty-nine percent of the coffee zone sample households own fewer than 200 mature coffee trees. Another 36% own between 200 and 400 mature coffee trees, while only 6% own 800 or more trees. In a good harvest, 350 coffee trees can produce about 1600 to 2300 kilograms of coffee in this area (output varies according to husbandry and climate). Per kilo cash returns to the farmer vary greatly from one cooperative society and factory to another, but average returns were approximately one shilling per kilo in the research area is 1979 and 1980. From this amount, however, the local coffee cooperative society makes various deductions to meet its operating costs, to cover inputs such as sprays and fertilizers purchased by the individual farmer, and to contribute to various Harambee projects in the area. Before such deductions are made, 350 trees can produce a cash income of about 1600 to 2300 shillings ($210-310). The 29% of the sample with fewer than 200 mature coffee trees thus earns less than about 1100-1300 shillings ($145-175) per year before deductions.

The number of coffee trees per household in the study's sample ranges from zero to 1200. To what degree is coffee production concentrated in the hands of the largest land owners and those with significant nonagricultural income sources? Four of the five largest coffee growers in the coffee zone sample are among the 17 largest landholders. On the other hand, none of the fifteen smallest landholders is among the ten largest coffee growers. Four of the eleven smallest coffee growers are among the fifteen smallest landholders, while none of the eleven smallest coffee growers are among the seventeen largest land holders. Although three of the fifteen smallest landholders have more than the median number of coffee trees two of these have significant nonagricultural sources of income, while the third has several grade cows and earns substantial income from sales of milk. In short, most of the largest coffee growers are also among the largest land owners or have significant cash incomes from other sources.

Half(5) of the ten largest coffee growers have significant non-agricultural income sources, while a sixth household is headed by a man who spent much of his adult life working on a coffee estate in a neighboring district. Nearly, half(5) of the eleven smallest coffee growers also have regular off-farm income sources, but these tend to be wage employment rather than small business enterprises. Although all of the regular off-farm income earners among the largest coffee growers have small businesses (butchery, bar, restaurant, retail shop), all but one of the regular off-farm income earners among the smallest coffee growers are permanent wage employees (primary teacher,mechanic, coffee factory worker, hospital laboratory worker) without small businesses.

As in the case of land ownership, small business operators are heavily represented among the largest coffee growers. While many wage earners have purchased land (though they are not among the seventeen largest landholders who have purchased land), wage earners are not represented at all among the ten largest coffee growers.

b) Plows and Ox Carts

Ownership of two important productive agricultural assets --plows and ox carts--is also concentrated somewhat in the hands of the largest land owners. As Table 14 shows, eighteen percent of coffee zone residents and twenty-three percent of cotton zone residents own plows. Nearly half (eight out of seventeen) of the sample households owning plows are among the seventeen largest land owners, while only three of the 17 households owning plows are among the 15 smallest land owners. Similarly, nine of the 29 households owning ox carts are among the 17 largest landowners, while only three of the 29 ox cart owners are among the fifteen smallest land owners. Oxcart ownership is more than twice as common in the coffee zone as it is in the cotton zone, with 51 percent of coffee zone residents but only 20 percent of cotton zone residents owning oxcarts.

Though plows are concentrated among the largest land owners, only two plow owners have regular off-farm income sources (shop, wage employment). An additional three of the ten cotton zone households owning plows earn significant income from illegal sales of home-brewed traditional beer to their neighbours. (A plow itself is of course a significant source of income, earning in 1981 120 shillings per acre plowed.)

c) Chemical Fertilizers

Chemical fertilizers, a significant purchased agricultural input, were used by 50% of the sample households (69% of the coffee zone sample and 33% of the cotton zone sample) during the 1980 long rains season (See Table 24). They were used primarily on coffee and maize; 25 out of 82 farmers applied chemical fertilizers to coffee and maize, while six farmers used fertilizer on potatoes and two farmers applied it to cabbages or onions. Unlike investment in cofee, plows and ox carts, however, use of chemical fertilizers is not necessarily concentrated among the largest land holders. Nine of the 17 largest landholders used chemical fertilizers in the 1980 long rains season, while eight of the 15 smallest landholders also used them. (Though it is likely that the largest landholders used larger quantities of purchased fertilizers and manure than did small landholders, these data have not yet been tabulated).

d) Hired Labor.

Nearly two-thirds (65%) of the sample households used some hired labor during the 1980 long rains season. Only 17% of the sample (14 households), however, spent 300 shillings($40) or more on hired labor. (See Tables 25, 26 and 27). Among these 14 households, eight have regular off-farm income sources and six are among the 17 largest landholders. Only one of those spending more than 300 shillings on hired labor is among the 15 smallest landholders, and this household has regular off-farm income from wage employment (tourist hotel employee).

Cotton zone residents tended to spend less on hired labor than coffee zone residents; 80 percent of cotton zone residents and 63 percent of coffee zone residents spent less than 200 shillings on hired labor. (See Table 26). Much of the money spent by cotton zone residents on hired labor was used to hire plows; 45 percent of cotton zone residents but only 8 percent of coffee zone residents hired plows during the long rains 1980. This is due in large part to the flatness of the land and therefore greater ease of plowing in the cotton zone.

e) Livestock

Livestock wealth is concentrated to the degree that the wealthiest ten percent [illegible] (in terms of all qualities of cow taken together) own 34 percent of the total cattle owned by the sample. The poorest ten percent own only one percent of the total cattle owned by the sample. Five

of the eight largest cattle owners are among the seventeen largest land owners.

Only four households own grade cows (pure exotic breeds); two of these are among the seventeen largest land owners, while one is among the 15 smallest land owners. Three of the four households owning grade cows have substantial off-farm income sources (butchery, restaurant, accounting firm). The fourth, though one of the smallest land owners, has 459 coffee trees (well above the median of 318 trees).

Crossbreed cattle (crosses between zebu and exotic breeds through artificial insemination) have been more widely adopted than grade cows. As Table 22 shows, over half (51%) of the coffee zone sample own crossbreeds, though only sixteen percent of the cotton zone sample own crossbreeds.

Many informants noted that livestock holdings in the area have decreased in the last ten to twenty years. This is due in part to 1)increasing population density and growing competition between land for grazing and land for crop production , and 2) lack of labor for grazing once children begin attending school. It is also a reflection of gradual selling off of livestock in order to meet rising cash expenditures on such things as secondary education.[11] As noted earlier, coffee income tends to be used on school fees and indeed coffee payments are supposed to be timed by cooperative societies to coincide with the time school fees are due. When coffee or cotton income is inadequate to pay school fees, people tend to sell livestock since this is for many of them the only other source of large enough amounts of money. This has serious nutritional consequences as the supply of milk for home consumption then decreases and the cost of purchasing milk (2 shillings per 750 ml bottle) nearly always exceeds the capacity of families forced to sell livestock to meet other needs. Several families who have sold livestock to meet cash needs say they buy milk for home consumption only occasionally when they have just received cash from some source such as selling food crops, coffee or cotton.

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11. In addition, several cotton zone residents said they sold livestock inorder to buy coffee seedlings to plant.

To summarize this discussion of agricultural investment, we have seen that investment in coffee production tends to be concentrated among large land owners and small business operators. Plows are concentrated among the largest land owners and among those with either regular or irregular (e.g., illegal beer brewing and sales) off-farm income. Use of hired labor for agricultural purposes is greatest among large land owners and those with off-farm income. Investment in improved livestock breeds is more common in the coffee zone and among households with substantial off-farm income. We now consider possible implications of household investment and wealth distribution patterns for rural economic growth.

Implications of Household Investment Patterns for Rural Development

This paper has examined several aspects of individual household economic investment, including individual land purchases and their effect on overall land distribution; the strong relationship between land purchases and off-farm income; and the relationship between various types of agricultural investment, and holding size and off-farm income. Here we examine possible implications for the wider economic system of patterns of individual household investment.

Thus far we have seen that most types of agricultural investment tend to be concentrated among large land owners and households with regular off-farm income. While smallholders with large farms and substantial non-agricultural income are both more able and more likely to invest in agriculture than are other smallholders, the former tend to invest more in land purchases and business itself than in agricultural production.

Because land prices are rapidly rising due to increasing scarcity and population growth (particularly in high potential areas), investment in land for possible future resale or as a form of loan security is considered by many to be more attractive than investment in agricultural production. Most households which have purchased additional land since the time of government land adjudication twenty years ago have not put all of their additional land into agricultural use. Only three of the fifteen land purchasers in the sample have put all of the land they own into agricultural production. Eight of the fifteen are cultivating less than two-thirds of the land they own. Even though more than half of the land purchasers (nine out of fifteen) are lending land to others, at least eight of them still own uncultivated land. Despite this, the largest land owners and those with substantial off-farm income are more likely and more able than others to invest in agriculture, as was demonstrated in the last section.

About a third of the households in the study's random sample have regular non-agricultural income sources in the form of either permanent wage employment or a small business. A high proportion of those with regular off farm income (43%) have purchased land. Only 13 percent of the total sample have small businesses and these are concentrated in the coffee zone where markets are better and demand is greater. Just over 20 percent of the total sample have a household head or spouse permanently employed, and these are somewhat more common in the cotton zone.

The economic success of the wealthiest 25 to 35 percent of Embu smallholders (those with substantial off-farm income) is tied to the economic condition of the 65 to 75 percent majority of smallholders. The success of investment in small business (an important source of off-farm income and investment capital), for example, is closely connected to the state of the small-scale agricultural sector. Small business is quite vulnerable to fluctuations and changes in the health of smallholder agriculture. Several small business operators interviewed, for example, noted their shops do very well after a good harvest or immediately after a coffee payout by the cooperative society. One successful "hotel" (small restaurant) operator in a rural market center of under 2,000 people said his business is quite good about five months per year, while he often operates at a loss in the other months. During a year of drought or poor harvest, the post-harvest surge in business which allows many such small businesses to survive does not occur.

There was a very sharp decline in business among small shop and "hotel" keepers in the research area during the 1980 famine and during periods in 1979 and 1980 when payments by coffee cooperative societies to farmers were seriously delayed due to internal political, management and corruption problems within the cooperative. During this period, some of the newer small businesses failed more quickly than they otherwise might have. At the same time, many small farmers borrowed heavily from the more prosperous- so much so that when fresh money finally entered the rural economy in a much delayed coffee payout, many small farmers had already used through prior credit most of the cash they finally received.

In addition to such short-term hardships as the 1980 drought and delayed cash crop payments, the rural economy in Embu and elsewhere will soon suffer the combined effects of longerterm problems brought about in part by an end to the prosperous "coffee boom" of four to six years ago, several seasons of poor rainfall in 1979 and 1980, and deterioration in the

national and international [illegible] economy (associated with such factors as rising oil import costs, food imports and declining foreign exchange). (Such effects have already been felt in the form of a paraffin shortage in 1981 and periodic shortages of various essential commodities such as sugar, tea leaves, matches, flour, bread, and rice in the past two years). While good weather and adequate food crop harvests may prevent these factors from causing drastic decline in the welfare of many small producers, they must inevitably slow certain types of investment such as small business and land purchases made possible in large part by small business earnings. A slowdown in growth of the non-agricultural sector of the rural economy is also likely to slow agricultural investment, since, as we have seen, much of the latter depends on off-farm income.

Given the relationships established between off-farm income, land purchases and agricultural and non-agricultural investment, it is important to ask in what, then, are the majority of small producers not engaged in business or land purchasers investing. Their major investment tends to be in secondary education for their children, which now costs approximately two to three thousand shillings per year per child.[12] This amount represents 100 per cent of the coffee income of an above average coffee producer with about 350 trees. This means that the average smallholder family in the coffee zone paying secondary school fees for at least one child is very hard-pressed to meet its subsistence needs for food and clothing, and to in addition pay school fees. As mentioned earlier, many therefore turn to sales of livestock and occasional wage labor to earn some cash to help satisfy these needs. However, as noted, selling off livestock and doing occasional wage labor in turn can have negative consequences for family welfare by, for example, contributing to poorer nutrition (e.g., by decreasing or eliminating the family livestock milk supply and by decreasing family labor time available for agricultural production at home).

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12. There is evidence, however, (see Kiryanjui 1981 and Nkinyangi 1980) that educational investment in Kenya tends to reinforce already existing patterns of economic advantage and disadvantage due to factors such as the varying quality of schools and socio-economic factors defining access to superior and inferior schools.

Though the majority of smallholders in both coffee and cotton zones are hard pressed to meet their cash and subsistence needs, many coffee zone residents are better off than cotton zone residents. Even though coffee income fluctuates and payments may be unreliable (e.g., producer prices averaged only one shilling per kilo and payments were sometimes delayed up to six months in the research area in 1979 and 1980), the coffee cooperative societies do provide credit to members for payment of school fees. Even when payments to farmers are delayed, coffee cooperatives usually ensure that parents of secondary school children are provided money for secondary school fees at the right time. Most cotton zone residents, on the other hand, have no such source of cash for school fees. Cotton itself produces from one harvest per year an income of only about 250 to 300 shillings for half an acre. Moreover, cotton zone residents generally have far poorer access than coffee zone residents to rural markets in which they can sell food crops for cash to meet day-to-day household consumption needs. Cotton zone residents must therefore rely more heavily on alternative means of earning cash such as charcoal production, livestock sales and casual wage labor.

In short, there are two distinct sets of small-scale agricultural producers with quite different needs and investment capacities. The first (possibly 25 to 35 percent of Embu smallholders) is the larger land owners with substantial off-farm income and a tendency to invest somewhat in agricultural production but more so in other areas such as land purchases and small business. The second set (about 65 to 75 percent of Embu smallholders) has less land, less off-farm income, and/[a]high propensity to invest nearly all of its resources in secondary education for its children. While the wealthy also invest in secondary education, it does not require for them a similarly high proportion of their total resources.

The implications for the rural economy as a whole of individual household investment patterns discussed here suggest that while some growth in both agricultural and non-agricultural sectors of the rural economy has occurred (in part as a result of expansion of cash crop production in the last twenty years and the coffee boom of the mid-1970's), the possibilities for growth in the near future appear rather limited. The majority of smallholders are caught in a cash squeeze which limits their potential investment in agriculture. Rising costs and demand for secondary education together with fairly static agricultural commodity prices combine to make their

economic situation difficult.[13] Any successful smallholder agricultural policies must take into direct account both 1) the limited agricultural investment capacity of the majority of smallholders, and 2) the tendency for the wealthiest 25 to 35 percent of smallholders to invest to only a limited degree in agricultural production, and to invest more heavily in the non-agricultural (particularly small business) sector where returns are higher. Failure to propel new growth in small-scale agriculture itself may adversely affect agricultural and non-agricultural investment alike.

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13. The condition of smallholder agriculture in other areas of Kenya such as Nyanza involves problems similar to that of Embu. Anyan'g Nyong'o (1981), for example, argues that small-scale agriculture and the development of a middle peasantry in Nyanza has been blocked by other social classes extracting any surplus it may produce.

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PART A. DEMOGRAPHIC DATA

(Tabulated from 1969 and 1979 Kenya Population Census)

Table 1. Proportion of Embu and Mbeere Population Living Outside Embu District.

E M B U		M B E E R E	
1969	1979	1969	1979
7%	9%	5%	7%

Table 2. Ethnic Composition of Embu District

ETHNIC GROUP	PERCENTAGE OF DISTRICT POPULATION	
	1969	1979
Embu	61%	63%
Mbeere	26%	22%
Kamba	7%	n.d.
Kikuyu	4%	n.d.
Meru	0.7%	n.d.
Tharaka	0.7%	n.d.
Asian	0.2%	n.d.
European	0.04%	n.d.
Other	0.5%	n.d.

Table 3. Sex and Age Composition of Embu Population in 1969

	PERCENT MALE	PERCENT MALE ADULT	PERCENT FEMALE	PERCENT FEMALE ADULT	TOTAL POPULATION
Embu District	47.99%	21.32%	52.01%	25.68%	178,912
Embu Division	47.74%	20.11%	52.26%	25.05%	101,368
Mbeere Division	47.62%	21.80%	52.38%	26.79%	73,566
Kagaari Location	48.15%	20.46%	51.85%	24.87%	28,809
Gichiche Sub/Loc.	47.46%	19.06%	52.54%	24.20%	3,363
Gichera Sub/Loc.	50.50%	22.32%	49.50%	24.88%	2,291

NOTE: The research area was Gichiche and Gichera sublocations in Kagaari Location, Embu Division, Embu District. After 1969, the name of Embu Division was changed to Runyenje's Division.

Table 4. Growth of Population and Population Density Between 1969 and 1979

	POPULATION IN 1969	POPULATION IN 1979	POPULATION DENSITY IN 1969 PER SQ.KM.	POPULATION DENSITY IN 1979 PER SQ.KM.
Embu District	178,912	262,085	62	96
Runyenje's/Embu Div.	101,368	146,884	220	318
Kagaari Location	28,809	41,048	184	262
Gichiche Sublocation	3,363	3,743	379	n.d.
Gichera Sublocation	2,291	4,084	55	n.d.

NOTE: Administrative boundary changes between 1969 and 1979 redefined the areas of the two study sublocations and of Mbeere Division. The population increases in the two study sublocations therefore reflect a change in total area rather than purely internal growth.

PART B. HOUSEHOLD SIZE AND COMPOSITION

Table 5. Average Number Persons per Household

	Coffee Zone	Cotton Zone	Total
	9.77	8.18	8.9
	(N=39	(N=44)	(N=83)

Table 6. Average Number Permanent (Year-Round)* Residents per Household

	Coffee Zone	Cotton Zone	Total
Adults (Over 14 years)	4.26	3.73	3.98
Children (Under 14 years)	3.69	3.84	3.77
Total	7.95 (N=39)	7.53 (N=44)	7.76 (N=83)

*NOTE: Year-round residents exclude household members such as boarding school students or wage earners who are away from home at least three-quarters of the year.

Table 7. Polygamous Households

Coffee Zone	Cotton Zone	Total
15%	18%	17%
(6)	(8)	(14)
(N=39)	(N=44)	(N=83)

Table 8. Female Headed Household*

Coffee Zone	Cotton Zone	Total
15%	5%	12%
(6)	(2)	(8)
(N=39)	(N=44)	(N=83)

*NOTE: All of the female-headed households are headed by widows.

Table 9. Age of Household Heads

Year Born	Coffee Zone	Cotton Zone	Total
Before 1900	2% (1)	0	1% (1)
1900-1920	17% (7)	24% (13)	21% (20)
1921-1930	17% (7)	7% (4)	12% (11)
1931-1940	34% (14)	22% (12)	27% (26)
1941-1950	22% (9)	39% (21)	32% (30)
1951-1960	7% (3)	7% (4)	7% (7)
	(N=41)	(N=54)	(N=95)

(Here N includes multiple household heads in homes with widowed co-wives.)

PART C. HOUSEHOLD EMPLOYMENT, EDUCATION, AND ASSETS

Table 10. Formal Sector Permanent Wage Employment

Household Head or Spouse Employment Permanently*

Coffee Zone	Cotton Zone	Total
15%	2%	9%
(6)	(11)	(17)
(N=39)	(N=44)	(N=83)

(*Those employed include five teachers (1 secondary, 3 primary, 1 nursery); one government clerk; one private accountant; one motor mechanic; one lab technician; two coffee factory workers; one school watchman; two policemen; one cook; and one dockworker. In two cases the wife of the household head and not the husband is the wage earner--both of these women are teachers.)

Table 11. Household Head Working Outside District.

Coffee Zone	Cotton Zone	Total
8%	11%	10%
(3)	(5)	(8)
(N=39)	(N=44)	(N=83)

(Those working outside Embu District are employed in Nairobi (4); Mombasa (1); Nyanza Province (2); and Kirinyaga District (1).)

Table 12. Education of Household Head

	Coffee Zone	Cotton Zone	Total
University Degree	0	2% (1)*	1% (1)
Secondary	2% (1)**	6% (3)***	4% (4)
Std. 7/8	20% (8)	20% (11)	20% (19)
Std. 5/6	12% (5)	17% (9)	15% (14)
Std. 3/4	24% (10)	17% (9)	20% (19)
Std. 1/2	2% (1)	4% (2)	3% (3)
No Education	39% (16)	35% (19)	37% (35)
	(N=41)	(N=54)	(N=95)

Note: Here N includes multiple household heads in homes with widowed co-wives.

*This individual holds an M.A. in Economics.

**Form IV

***These include one Form II leaver and two Form IV leavers.

Table 13. F.T.C. Nonformal Education (of Household Head or Spouse)

Coffee Zone	Cotton Zone	Total
28%	18%	23%
(11)	(8)	(19)
(N=39)	(N=44)	(N=83)

Nonformal education: one day to one month of F.T.C. agricultural instruction.

Table 14. Assets Owned Per Household

Item	Percentage Households Owning		
	Coffee Zone	Cotton Zone	Total
Ox Cart	51%	20%	35%
Plough	18%	23%	20%
Bicycle	46%	27%	36%
Water Tank	69%	52%	60%
Radio	62%	36%	48%
Pressure lamp	3%	2%	2%
Hurricane lamp	56%	41%	48%
Small Paraffin lamp ("Taandika")	64%	80%	72%
Jiko	62%	48%	54%
Paraffin Stove	38%	16%	27%
Both Jiko and Paraffin Stove	33%	9%	21%
Neither Jiko nor Paraffin Stove	31%	45%	39%
Thermos Flask	51%	34%	42%
Torch	79%	84%	82%
Sofa Set	15%	18%	17%
	(N=39)	(N=44)	(N=83)

PART D AGRICULTURE

Table 15. Crop Enterprises

Crop	Percent of Households Growing Crop		
	Coffee Zone	Cotton Zone	Total
Maize	100% (39)	100% (44)	100% (83)
Beans	100% (39)	100% (44)	100% (83)
Bananas	100% (39)	41% (18)	69% (57)
Sweet Potatoes	92% (36)	61% (27)	76% (63)
English (White) Potatoes	59% (23)	43% (19)	51% (42)
Cow peas	97% (38)	95% (42)	96% (80)
Cassava	92% (36)	59% (76)	75% (62)
Pigeon peas	49% (19)	45% (20)	47% (39)
Bulrush or Finger Millet	10% (4)	20% (9)	16% (13)
Sorghum	67% (26)	20% (9)	42% (35)
Arrowroot	46% (18)	41% (18)	43% (36)
Pumpkins	85% (33)	66% (29)	75% (62)
Cabbages	41% (16)	14% (6)	27% (22)
Napier Grass	92% (36)	16% (7)	52% (43)
Sunflower	18% (7)	11% (5)	14% (12)
Cotton	8% (3)	48% (21)	29% (24)
Coffee	100% (39)	50% (22)	74% (61)
	(N=39)	(N=44)	(N=83)

Table 16. Average Number Bags Maize and Beans Harvested Per Household in Four Seasons

Season	Maize (Bags)	Beans (Bags)	
Short Rains 1978	7.3	3.0	(N=74,75)
Long Rains 1979	2.9	1.9	(N=78,79)
Short Rains 1979	1.3	0.5	(N=83,83)
Long Rains 1980	3.2	2.6	(N=81,81)

Table 17. Percent of Households Purchasing and Selling Maize and Beans in Long Rains 1980 Season (February-September 1980)

Purchased Maize for Home Consumption

Coffee Zone	Cotton Zone	Total
64% (25)	48% (20)	56% (45)
(N=39)	(N=42)	(N=81)

Purchased Beans for Home Consumption

Coffee Zone	Cotton Zone	Total
41% (16)	83% (35)	63% (51)
(N=39)	(N=42)	(N=81)

SOLD MAIZE

Coffee Zone	Cotton Zone	Total
51% (20)	12% (5)	31% (25)
(N=39)	(N=42)	(N=81)

SOLD BEANS

Coffee Zone	Cotton Zone	Total
69% (27)	38% (16)	53% (43)
(N=39)	(N=42)	(N=81)

Purchased Maize to Plant Long Rains 1980

Coffee Zone	Cotton Zone	Total
46% (18)	9% (4)	27% (22)
(N=39)	(N=44)	(N=83)

Purchased Beans to Plant Long Rain 1980

Coffee Zone	Cotton Zone	Total
38% (15)	34% (15)	36% (30)
(N=39)	(N=44)	(N=83)

Both Purchased and Sold Maize in Long Rains 1980

Coffee Zone	Cotton Zone	Total
36% (14)	0	17% (14)
(N=39)	(N=44)	(N=83)

Both Purchased and Sold Beans in Long Rains 1980

Coffee Zone	Cotton Zone	Total
23% (9)	25% (11)	24% (20)
(N=39)	(N=44)	(N=83)

Table 18. Percent of Households Using Hybrid Maize in Long Rains 1980

Coffee Zone	Cotton Zone	Total
41% (16)	20% (9)	30% (25)
(N=39)	(N=44)	(N=83)

Note: It is likely that more than usual number of households planted hybrid maize in the long rains 1980 season because the previous harvest was very poor and few people had seed left over from that harvest to plant during the long rains 1980. In the situation of such a short fall, when it is necessary to purchase maize to plant, most families purchase hybrid rather than local maize because the quality of local seed available in open markets is extremely variable and unpredictable.

Table 19. Year First Planted Hybrid Maize

Year First Planted	Coffee Zone	Cotton Zone	Total
1966-1970	10% (4)	0	5% (4)
1971-1975	23% (9)	14% (6)	19% (15)
1976-1980	54% (21)	53% (22)	53% (43)
Never planted	13% (5)	33% (14)	23% (19)
	(N=39)	(N=42)	(N=81)

Note: These figures include households who tried hybrid only once and no longer plant it, as well as those who regularly plant hybrid maize.

Table 20. Average Livestock Holdings per Household

Average Number Cattle	Average Number Goats	Average Number Sheep
4.3	2.5	1.3
	(N=83)	

Table 21. Percent of Households with Grade Cows

Coffee Zone	Cotton Zone	Total
8% (3)	2%* (1)	5% (4)
(N=39)	(N=44)	(N=83)

*NB. Although this cotton zone resident owns a grade cow, the cow is actually kept by a relative in the upper zone.

Table 22. Percent of Households with Crossbreed Cows

Coffee Zone	Cotton Zone	Total
51% (20)	16% (7)	33% (27)
(N=39)	(N=44)	(N=83)

Table 23. Number Mature Coffee Trees Owned Per Household

Number Trees Owned	Coffee Zone Residents	Cotton Zone Residents
1,000+	3% (1)	0
800-999	3% (1)	3% (1)
600-799	8% (3)	0
400-599	23% (9)	5% (2)
200-399	36% (14)	12% (5)
100-199	26% (10)	16% (7)
1 - 99	3% (1)	14% (6)
0	0	51% (22)
	(N=39)	(N=43)

Table 24. Percent of Households Using Chemical Fertilizers (Long Rains 1980)

Coffee Zone	Cotton Zone	Total
69%	33%	50%
(27)	(14)	(41)
(N=39)	(N=43)	(N=82)

The chemical fertilizers are used primarily on coffee and maize. A few farmers also use them on potatoes and vegetables. Twenty-five out of 82 farmers applied chemical fertilizers to coffee; 25 out of 82 applied it to maize; 6 out of 82 applied it to potatoes; and 3 out of 82 applied it to cabbages or onions.

Table 25. Percent of Households Using Hired Labor in Long Rains 1980

Coffee Zone	Cotton Zone	Total
6 % (2)	[illegible]% (21)	[illegible]% ([illegible])
(N=38)	(N=42)	(N=80)

Table 26. Cash Paid for Hired Labor (Including Plowing) in Long Rains 1980

Cash Paid (KShs)	Coffee Zone	Cotton Zone	Total
0	34% (13)	35% (15)	35% (28)
Shs 1 - 99	18% (7)	26% (11)	22% (18)
Shs 100 - 199	11% (4)	19% (8)	15% (12)
Shs 200 - 299	16% (6)	7% (3)	11% (9)
Shs 300 - 399	3% (1)	5% (2)	4% (3)
Shs 400 - 499	5% (2)	5% (2)	5% (4)
Shs 500 - 999	13% (5)	2% (1)	7% (6)
Shs 1000 - 1500	0	2% (1)	1% (1)
	(N=38)	(N=43)	(N=81)

Table 27. Use of Plows in Land Preparation

Hired Plow for Land Preparation Long Rains 1980			Used Plow for Land Preparation Long Rains 1980		
Coffee Zone	Cotton Zone	Total	Coffee Zone	Cotton Zone	Total
8% (3)	45% (18)	26% (21)	21% (8)	57% (24)	40% (32)
(N=39)	(N=42)	(N=81)	(N=39)	(N=42)	(N=81)

PART E L A N D

Table 28. 1980 Land Values in Embu District

Estimated Market Value* Per Acre			
Upper Coffee/ Lower Tea Zone	Coffee Zone	Lower Coffee Zone	Upper Cotton Zone
Shs 15,000-18,000	Shs 10,000-14,000	Shs 6,000-8,000	Shs 4,000-5,000

*These figures come from field interviews about land sales and purchases in the areas specified.

Table 29. Number Acres Land Owned Per Household

Acres Owned	Coffee Zone Residents	Cotton Zone Residents	Total
100+	3% (1)	0	1% (1)
50-99	0	5% (2)	2% (2)
20-49	8% (3)	9% (4)	8% (7)
15-19	13% (4)	9% (4)	11% (8)
10-14	15% (6)	27% (12)	22% (18)
5-9	38% (15)	34% (15)	36% (30)
1-4	20% (9)	14% (6)	17% (15)
0-.99	3% (1)	2% (1)	2% (2)
	(N=39)	(N=44)	(N=83)

Table 30. Number Parcels Owned Per Household

Number Parcels Owned	Coffee Zone Residents: Land in Coffee Zone	Land in Cotton Zone	Total Land Owned by Coffee Zone Residents	Cotton Zone Residents: Land in Coffee Zone	Land in Cotton Zone	Total Land Owned by Cotton Zone Residents
0	0	62% (24)	0	82% (36)	2% (1)	2% (1)
1	67% (26)	28% (11)	41% (16)	16% (7)	57% (25)	43% (19)
2	18% (7)	8% (3)	31% (12)	0	34% (15)	45% (20)
3	10% (4)	3% (1)	18% (7)	2% (1)	7% (3)	7% (3)
4+	5% (2)	0	10% (4)	0	0	2% (1)
	(N=39)			(N=44)		

Table 31. Household Land Purchased and Sales

Purchased Only			Sold Only			Both Purchased and Sold			Neither Purchased Nor Sold		
Coffee Zone	Cotton Zone	Total	Coffee Zone	Cotton Zone	Total	Coffee Zone	Cotton Zone	Total	Coffee Zone	Cotton Zone	Total
26%	7%	16%	18%	14%	16%	3%	2%	2%	54%	77%	66%
(10)	(3)	(13)	(7)	(6)	(13)	(1)	(1)	(2)	(21)	(34)	(55)
(N=39)	(N=44)	(N=83)	(N=39)	(N=44)	(N=83)	(N=39)	(N=44)	(N=83)	(N=39)	(N=44)	(N=83)

Table 32. Land Lending and Borrowing

Lend Land But Do Not Borrow			Borrow Land But Do Not Lend			Both Borrow and Lend Land		
Coffee Zone	Cotton Zone	Total	Coffee Zone	Cotton Zone	Total	Coffee Zone	Cotton Zone	Total
44%	32%	37%	21%	30%	25%	15%	11%	13%
(17)	(14)	(31)	(8)	(13)	(21)	(6)	(5)	(11)
(N=39)	(N=44)	(N=83)	(N=39)	(N=44)	(N=83)	(N=39)	(N=44)	(N=83)

Note: Some lending and borrowing transactions involve informal, nonfixed gifts of food. An additional three coffee zone households rent land from others for fixed cash payments.

Table 33. Land Distribution

Percent of Total Sample Land Owned by Fractions of Sample Households

Percent of Sample	Coffee Zone Percent of Land	Cotton Zone Percent of Land	Total Percent of Land
1. Wealthiest 10%	45% (Each owns 20 acres or more.)	34% (Each owns 30 Acres or more.)	40% (Each owns 25 acres or more.)
2. Wealthiest 20%	54% (Each owns 17 acres or more.)	52% (Each owns 15 acres or more.)	54% (Each owns 17 acres or more.)
3. Poorest 10%	2% (Each owns 4 acres or less.)	2% (Each owns 4 acres or less.)	2% (Each owns 4 acres or less.)
4. Poorest 20%	5% (Each owns 4 acres or less.)	6% (Each owns 5 acres or less.)	5% (Each owns 4.2 acres or less.)
	(N=39)	(N=44)	(N=83)