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DESCRIPTIVE ANALYSIS OF
FEMALE HOUSEHOLD HEADS IN THREE
GUATEMALAN LAND PURCHASE PROGRAMS

by

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I. INTRODUCTION

Central America and land reform programs have had a long and troubled history (see Bulmer-Thomas, 1987 and Thiesenhusen, 1989). One of the objectives of many land reform programs is to improve the standard of living for poor rural peasants. By examining 1991 survey data this study looks at the impacts recent Guatemalan land purchase programs have had on the lives of the women who are affected by these programs. If these programs adversely impact on the woman's ability to maintain and reproduce the household then any improvements in living standards as measured by increasing income are surely tenuous.

Guatemala's history of land ownership is deeply rooted in the Latin American latifundia-minifundia model. Most of the arable land is held by a relatively small number of large holders while most farms are small and barely able to meet subsistence requirements. The inequities in land distribution, both in terms of land holdings and the quality of land, has been the leading contributor to the misery and poverty of rural Guatemalans. Poverty promises to only worsen as the Guatemalan population grows causing increasing land fragmentation.

If rural poverty is to be alleviated the inequities in land distribution must be addressed; as the Arbenz regime tried to do in 1952. The regime's intention was to facilitate a more equitable distribution of land through an expropriatory land reform, but the program was effectively canceled when the Arbenz regime was overthrown in 1954 and since that time Guatemalan governments and the military have had a distinct political dislike for expropriatory land reform programs (Strochlic and Schweigert, 1992).

In the mid-1980's the private, non-governmental Penny Foundation (FUNDACEN, *Fundación del Centavo*), the governmental National Institute for Agrarian Transformation (INTA, *Instituto Nacional de Transformación Agraria*) and the National Association of Peasants for Land (ANACAMPRO, *Asociación Nacional de Campesinos Pro-Tierra*) began separate land purchase programs with the intention of addressing living standards and land distribution issues through land markets. These land purchase programs see their role as facilitating the transfer of land from large land holders, who are interested in selling their land, to landless and land-poor peasants through a private-sector land redistribution program.

The FUNDACEN program, with funding from the U.S. Agency for International Development (USAID), purchases large farms on the open market, subdivides the land and resells the parcels to selected and carefully screened landless and land-poor peasants. FUNDACEN supplies the long-term credit that enables the peasant to purchase land as well as production credit, full-time technical assistance and social services, such as housing, running water and education. These services provided by FUNDACEN are credited against the peasant's future agricultural sales. By supplying a full complement of services, FUNDACEN hopes to supply the ingredients necessary for success as a commercial farmer, as measured by the repayment of loans and improved standards of living for the participating peasants.

INTA began a similar land purchase program in 1986 after the demand for land and associated political unrest became extremely vocal and unrelenting. The INTA program is the intermediary for purchases of land by groups self-organized for the purpose of buying land. INTA program farms are titled in the group's name but farmed as individual parcels; FUNDACEN, on the other hand, titles parcels individually. INTA does not supply the range of services seen on FUNDACEN program farms but INTA beneficiaries enjoy more autonomy.

ANACAMPRO, lead by Catholic priest Andres Girón, has a land purchase program similar to INTA's. Financial support for the program is supplied by the European Community's Bocacosta Project.

In an effort to insure the viability of program farms and increase the standard of living of beneficiaries, FUNDACEN has mandated that beneficiaries cultivate a cash crop. In most cases that cash crop is coffee. If a beneficiary does not comply and cultivates a non-mandated crop the beneficiary potentially faces expulsion from the program.

An extensive literature exists analyzing the various impacts cash cropping has had on peasants. Much of this literature has emphasized the expropriatory nature of cash cropping and the neutral or negative impacts these crops have had on the living standards of particular family members (for example, see von Braun and Kennedy, 1986). The following analysis adds to this literature by examining the impacts coffee cultivation has on the beneficiary households in the three land purchase programs in general and female household heads¹ in particular. Initial results indicate that coffee production is inducing women to supply more labor in both absolute terms and relative to the total family labor supply. These results are potentially a cause for concern because if this shifting pattern in women's time allocation adversely impacts on household maintenance and reproduction, then any improvements in living standards in terms of increasing income are thrown into question.

After the survey instrument is described in Section II, various aspects of the beneficiary households are presented in Section III. Evidence in Section III suggests a positive correlation between the relative importance of coffee production in the household's cropping regime and higher rates of agricultural participation by female household heads. Section IV expands on this result by examining the correlation in a multivariate context. Section V summarizes the conclusions from the analysis.

¹In the survey, and this study, female household head denotes the female partner in a conjugal couple. As the data will show, the great majority of the households in the sample are nuclear families consisting of the conjugal pair and their children.

II. DATA

The Land Tenure Center (LTC) of the University of Wisconsin is conducting a five year research program to assess the socioeconomic impacts of the Penny Foundation land purchase program. INTA and ANACAMPRO program farms were included for comparison. The LTC study consists of a baseline survey conducted in 1988 covering a sample of the beneficiary population with two follow-up surveys in 1991 and 1993. Using information generated from the 1991 LTC/FLASCO follow-up survey, the following report is a descriptive analysis of the female household heads involved in the three land purchase programs and the impact the cropping regimes have had on their lives.

The 1988 baseline survey conducted by the Land Tenure Center (LTC) indicates that the peasants, or beneficiaries, participating in the land purchase programs bring with them high levels of agricultural labor experience. Only 6 percent of beneficiaries were engaged in non-agricultural activities prior to joining the programs indicating rural Guatemalans constitute a majority of the beneficiaries. In addition, a majority of beneficiaries are members of indigenous groups; 54 and 55 percent of FUNDACEN and INTA beneficiaries respectively are from indigenous ethnic groups as are 68 percent of ANACAMPRO beneficiaries (Strochlic and Schweigert, 1992). It appears that the three programs are reaching indigenous rural peasants who are typically the poorest Guatemalans and frequently left behind in Latin American development efforts.

A majority of FUNDACEN beneficiaries were living within the area of the program farm prior to their participation; only 31 percent came from other departments in Guatemala. INTA program farms exhibit the highest degree of beneficiary recruitment from the area around the farm. 34 percent of INTA beneficiaries had previously lived on the farm while only 15 percent came from other departments in Guatemala. In contrast, ANACAMPRO program farms have recruited 60 percent of their beneficiaries from other departments (Strochlic and Schweigert, 1992). Currently the programs are too young to clearly determine whether beneficiaries from the surrounding area of the farm improves the performance of the program.

The 1991 survey instrument, which is used in this study, consisted of three parts. The first part was directed toward the male head of household, and was designed to gather information on access to land, land use and agricultural production, male non-program income-generating activities, access to and awareness of household credit and suggestions for improvements.

The second part of the survey instrument consisted of detailed production information on yields, marketing strategies and sale prices, technologies used and costs, and labor allocation and costs. This questionnaire was also directed toward the male household head and was applied for each crop cultivated. The questionnaire collected agricultural labor input from the male household head at an unusual level of disaggregation. Data detail the household members involved and the intensity of their involvement in each particular task for

each major crop grown. It is believed that collecting highly disaggregated agricultural labor information will more accurately capture the agricultural activities of household members and their economic roles within the household.

The third part of the questionnaire was administered to the female household head. Information gathered included demographic data for all members of the household, female income-generating activities, household consumption patterns, and general attitudes toward the program and suggestions for improvements.

To address the impacts coffee has on women, this analysis initially profiles the women's basic characteristics and the various activities, non-agricultural as well as agricultural, in which they are engaged. Based on the patterns seen in the descriptive analysis a descriptive multivariate analysis is performed. The analysis suggests that, even when controlling for other explanatory factors, the labor supplied by the female household head is significantly influenced by the household's cropping regime. Specifically, coffee production appears to be increasing the female head's agriculture labor supply in general and as a percentage of total family labor supply. These results suggest that total family labor becomes relatively feminized as the family concentrates production in coffee. The multivariate analysis seeks to draw out the main determinants of this feminization of family labor.

III. DESCRIPTIVES

The survey collected data from a sample of 146 households across twelve program² farms from three land purchase programs. Within the 146 households there are 137 female household heads with an approximate mean age of 35 years. By most standards the men and women are poorly educated. In the entire sample, 64 percent of the women have had no education and 63 percent do not know how to read. Women, as compared to men, are less likely to be able to read and have fewer years of schooling; the widest educational gender gap is found on FUNDACEN program farms.

When comparing across land purchase programs, the FUNDACEN program appears to be attracting beneficiaries who have relatively higher education levels (as measured by the percentage of beneficiaries who can read). Differing education levels across programs may be a function of the selection process that the programs employ. Beneficiaries are

²Each of the three purchase programs covered by the survey initially obtain ownership rights to large farms or large tracts of land. The term 'program farm' denotes the initial large farm. In practice, program farms have been subdivided and distributed to households and most land rights have been individualized. Every program farm has a central organizing unit; some having a more extensive mandate than others. The unit of analysis in the survey, and in this report, is the household which has been allotted a plot of land in the program farm.

determined or chosen by the FUNDACEN program whereas beneficiaries in the INTA and ANACAMPRO programs are self determined. Persons interested in participating in the FUNDACEN program initially apply to the program where upon their application is reviewed and either accepted or rejected. In contrast, in the INTA and ANACAMPRO programs a group of farmers organize themselves and then apply as a group to the governing bodies of the two programs for the necessary funding to purchase the land.

Table I: Household Demographics by Program

| | FUNDACEN | INTA | ANACAMPRO | ALL |
|-------------------------|----------|-------|-----------|-------|
| # of Households | 98 | 24 | 24 | 146 |
| Household Size | 5.52 | 6.75 | 5.25 | 5.68 |
| Female Heads | | | | |
| Number | 91 | 24 | 22 | 137 |
| Age | 34.90 | 36.09 | 32.14 | 34.65 |
| % that can read | 41 | 29 | 32 | 37.20 |
| Yrs. of Schooling | .99 | 1.04 | .91 | .99 |
| Male Heads | | | | |
| Number | 94 | 24 | 22 | 140 |
| Age | 39.08 | 40.57 | 35.41 | 38.75 |
| % that can read | 69 | 54 | 55 | 64.30 |
| Yrs. of Schooling | 1.66 | 1.63 | 1.41 | 1.61 |
| Children | | | | |
| Total number | 4.11 | 5.96 | 3.83 | 4.37 |
| # Resident ^a | 3.61 | 4.76 | 3.42 | 3.78 |
| Children < 6 yrs. | 1.14 | 1.40 | 1.38 | 1.23 |
| Children 6 to 12 yrs | 1.27 | 1.76 | 1.13 | 1.33 |

Source: LTC/FLASCO Survey

a: These figures include children 18 years and older who are living with their parents.

In describing the labor burdens female household heads carry, and the activities they engage in, it seems appropriate to start with activities in the home and an examination of their position as primary caretakers of children. Households in the sample average 6 members and 4 resident children. When household size was distributed according to the age of the household head it became evident that household size and the age composition of children follow a typical life-cycle pattern. Small households with young children are found among younger households as these households are in a period of expansion and growth. Older households with older children leaving and setting up independent households are in a period of dissolution and also tend to be small.

An age decomposition of the children reveals that beneficiary women care for approximately one child under the age of six. Frequently mothers are able to rely on older

children, particularly older female children, to help with the care of younger siblings. Older children are also capable of assisting with household and farm chores. On average, the female household head can rely on one child between the ages of 6 and 12 (46 percent are female children), and one child between the ages of 12 and 18 (45 percent are female children).³ It appears that female household heads overall have considerable child care responsibilities but they do have substantial intrahousehold resources, in the form of older children, to help alleviate the burden.

Besides their child care responsibilities women play a vital role in the daily maintenance of the household. Considerable amounts of time and energy are required in the daily upkeep of the home, meal preparation and the gathering of wood and water. Nearly 84 percent of the women must work without electricity and 89 percent prepare meals on unvented mud wood burning stoves located inside the home. In no case is there piped water within the home so that all water used in the home must be carried in.

The absence of electricity may actually alleviate women's work since the presence of electricity within the home can have the adverse effect of prolonging the working day. The nature of the stoves in beneficiary homes imply women must spend time gathering wood and cooking in smoke-filled rooms; a situation detrimental to their health. While all water must be gathered and carried into the home, water is not potable and, as Dunn (1991) notes, its source is often located next to latrines and sewage facilities.

³The mean number of children in each age bracket masks a great deal of variability; perhaps due to different stages of the life-cycle. The standard deviations for the number of children under the age of 6, between 6 and 12 years and between 12 and 18 years are 1.13, 1.19 and .98 respectively.

Table II: Dwelling Characteristics

| | FUNDACEN | INTA | ANACAMPRO | ALL |
|---------------------------------------|----------|------|-----------|------|
| # of Households | 97 | 24 | 24 | 145 |
| Basic Amenities in percentages | | | | |
| Electricity | 7.4 | 45.8 | 22.7 | 16.3 |
| Latrine | 90.5 | 95.8 | 77.3 | 89.4 |
| Water Source in percentages | | | | |
| River | 10.5 | 0.0 | 9.1 | 8.5 |
| Communal Well | 20.0 | 0.0 | 13.6 | 15.6 |
| Carried Water | 18.9 | 0.0 | 45.5 | 19.9 |
| Backyard Water Tap | 42.1 | 58.3 | 0.0 | 38.3 |
| Other | 8.5 | 41.7 | 31.8 | 17.7 |

Source: LTC/FLASCO Survey

The strategies the women follow to meet daily household food requirements can take several forms. Some women grow vegetables for household consumption in small gardens adjacent to the family dwelling. Close to 47 percent of the households cultivate gardens as a part of their daily survival strategy. Of these, 82 percent cultivate strictly for home consumption while 18 percent sell part of their harvest.

Maintenance of small animals, particularly chickens, represent another food source which women generally control. 63 percent of the households raise chickens while only 22 and 19 percent raise pigs and other fowl (such as ducks), respectively. Of the households raising small animals for home consumption, 77, 64 and 44 percent restrict their raising activities to either chickens, ducks or pigs respectively.

Table III: Garden Plots and Small Animals

| | FUNDACEN | INTA | ANACAMPRO | A.I.L |
|--|----------|--------|-----------|--------|
| # of Households | 97 | 24 | 24 | 145 |
| Garden Plots | | | | |
| # Cultivating Plots | 51 | 11 | 6 | 68 |
| % of all Households | 53 | 46 | 25 | 46.9 |
| % of Producers with a Marketable Surplus | 16 | 36 | 0 | 17.6 |
| Value of Marketable Surplus ^a | 137.00 | 122.75 | 0.00 | 132.25 |
| Small Animals | | | | |
| Chickens | | | | |
| # with Chickens ^a | 74 | 6 | 12 | 92 |
| # of Chickens/Household | 13.25 | 6.54 | 6.65 | 11.00 |
| # of Chickens/Producer | 20.64 | 37.50 | 7.00 | 20.60 |
| % of Producers with a Marketable Surplus | 14.86 | 66.67 | 50 | 23.1 |
| Value of Marketable Surplus ^b | 70.73 | 212.50 | 48.67 | 91.43 |
| Pigs | | | | |
| # with Pigs ^a | 23 | 7 | 2 | 32 |
| # of Pigs/Household | 13.25 | 6.54 | 6.65 | 11.00 |
| # of Pigs/Producer | 1.92 | 4.20 | 4.00 | 2.67 |
| % of Producers with a Marketable Surplus | 52.17 | 71.43 | 50 | 56.25 |
| Value of Marketable Surplus ^b | 333.75 | 416.00 | 460.00 | 363.61 |

Source: LTC/FLASCO Survey

a: Based on the time of the survey.

b: In nominal Quetzales; 5 quetzales = U.S. \$1.00.

Garden produce and small animal production and how this production is allocated between the home and the market is emphasized because these activities present women with the potential *opportunity* of generating their own cash incomes, conceivably allowing some autonomy within the household. However, it appears that few women follow this strategy.

Women may also have other cash income opportunities from off-farm labor income and home enterprises. Only 5 women claim to have earned off-farm labor income during the

year prior to the survey. These women report average earnings of 269 quetzales⁴ (S.D. = 209.89). Approximately 43 percent of the earnings were contributed to household expenses, or the *gasto*⁵. Only 26 of the women report the operation of a home enterprise and 50 percent are young operations having started since 1987; after the majority of households had joined the program. Their average earnings were approximately 419 quetzales (S.D. = 435.23) in the year preceding the survey.

The reasons why few women appear to be generating personal cash incomes may be numerous. Time and cost constraints may make the returns to these activities unattractive. The markets for products capable of producing cash incomes may be too thin or non-existent. It is notable that the majority of program farms are in remote areas of the country implying viable markets for various products are non-existent outside the immediate program farm. It is also likely that the reporting of cash generating activities is measured with error. Many women may not have reported outside income out of fear of losing autonomous control over that income⁶.

Dunn (1991) cites the isolation of many FUNDACEN program farms, and research by de la Cadena and Strohlic (1991) indicates that female beneficiaries have few opportunities in generating income because ". . . their geographic sphere of activity is very limited, since it is difficult for them to leave the farm" (pg. 18). Before entering the land purchase programs some of the women earned cash income by selling goods from their homes, but they no longer engage in this activity because the community of the program farm is too small to support this type of activity (de la Cadena and Strohlic, 1991).

Female household heads also contribute to the household's maintenance and reproduction by supplying their labor to the household's agricultural activities. Households in this sample have roughly 2 to 4 manzanas of program land (see Table IV) which is generally not fully cropped⁷. As will be noted later in this study, the area of cultivation is an imperfect indicator of a household's agricultural labor needs particularly since the sample contains households with different cropping regimes.

The two prominent crops grown on program farms are maize and coffee. Table IV shows that households can be perfectly arrayed among three cropping regimes: maize

⁴5 quetzales = U.S. \$1.00.

⁵Nearly 60 percent of the *gasto* is spent on food purchases.

⁶It may also be hypothesized that women do not need this supplemental income. Given the perceived incidence of poverty on these program farms this appears to be an unlikely reason. However, the data do not allow the testing of this hypothesis.

⁷Only the FUNDACEN Sam Greene program farm indicates that parcels are fully planted.

households located in agroclimatic zones favoring commercial levels of production of maize, maize and coffee households raising maize for subsistence and coffee for cash, and coffee households raising only commercial coffee.

Table IV clearly indicates that, in general, female household heads did not supply large amounts of agricultural labor during the 1990 agricultural cycle. Among those households growing only maize, female household heads, on average, contribute approximately a half day of labor in total (representing 0.8 percent of total family labor) and a third of a day of labor per manzana. The data, however, show a significant amount of variation and most women are not involved.⁸

As compared to maize-only households, female heads in households growing both maize and coffee supply more labor input. These women on average contribute 21 days of labor in total (13 days per manzana); 90 percent of their labor is devoted to coffee production. Female heads in households growing only coffee devote approximately 24 days of labor (16 days per manzana) to coffee production.

These results are not surprising given the labor-intensive nature of coffee production. It is apparent that both total family labor and labor supplied by female heads increase when a farm is growing both crops; however, labor supplied by female heads increases at a faster rate and consequently constitutes an increasing proportion of total family labor (their labor represents 4.9 percent of total family labor). The proportion again increases (to 9.4 percent of total family labor) when households are only growing coffee; interestingly, these households cultivate fewer hectares and use less total family labor than the mixed crop households.

This descriptive analysis suggests that women supply more labor to agricultural activities when the household moves into and intensifies agricultural production in coffee, and that most of their agricultural labor is applied to coffee production. The proportion of total family labor which is supplied by the female head also increases when the cropping scheme shifts from maize to maize and coffee, and from maize and coffee to coffee only suggesting that coffee production feminizes total family agricultural labor. This pattern of feminization remains and is stronger when only those households where the female household head is contributing positive amounts of agricultural labor are analyzed (see Appendix). However, a closer and more sophisticated analysis to control for other mitigating factors such as household size and composition, farm size and other responsibilities which compete for a woman's time is warranted.

⁸The standard deviations for total labor days of female heads and days per manzana are 2.11 and 1.36 respectively. When only three women in the 44 maize households participate in maize production activities, relatively large variances can be expected.

Table IV: Maize and Coffee (During the 1990 Agricultural Cycle)

| | FUNDACEN | INTA | ANACAMPRO | ALL |
|------------------------------------|----------|-------------------|-----------|--------|
| Maize Only* | | | | |
| # of Households | 23 | 10 | 11 | 44 |
| Total Parcel Area | 3.51 | 3.95 | 2.57 | 3.36 |
| # of Manzanas ^b Planted | 1.66 | 2.64 | 2.23 | 2.03 |
| Labor Days | | | | |
| Female Heads | .48 | 1.22 | 0.00 | .56 |
| Per Manzana | .48 | -. ^c | 0.00 | .29 |
| % reporting 0 Days | 91.3 | 88.9 | 100.0 | 92.3 |
| Total Family | 76.74 | 55.67 | 59.36 | 68.76 |
| Per Manzana | 77.41 | 16.00 | 33.40 | 56.37 |
| Maize and Coffee | | | | |
| # of Households | 54 | 2 | 4 | 60 |
| Total Parcel Area | 4.07 | 1.92 | 1.68 | 3.84 |
| # of Manzanas in Maize | .89 | .72 | .50 | .88 |
| # of Manzanas in Coffee | 2.88 | 0.00 ^d | 1.48 | 2.67 |
| Labor Days - Maize | | | | |
| Female Heads | .74 | .00 | 30.33 | 2.20 |
| Per Manzana | 1.17 | .00 | 47.40 | 3.46 |
| % reporting 0 Days | 92.5 | 100.0 | 66.7 | 91.5 |
| Total Family | 63.47 | 115.50 | 107.00 | 70.91 |
| Per Manzana | 66.38 | 191.67 | 159.72 | 76.84 |
| Labor Days - Coffee | | | | |
| Female Heads | 10.23 | .00 | 149.50 | 19.32 |
| Per Manzana | 3.50 | - | 92.60 | 9.69 |
| % Reporting 0 Days | 75.5 | 100.0 | 50.0 | 74.6 |
| Total Family | 352.45 | 315.00 | 598.00 | 366.98 |
| Per Manzana | 157.84 | - | 383.84 | 174.09 |
| Coffee Only | | | | |
| # of Households | 20 | 12 | 9 | 41 |
| Total Parcel Area | 3.75 | 2.09 | 1.67 | 2.82 |
| # of Manzanas ^e Planted | 2.91 | .71 | .73 | 1.79 |
| Labor Days | | | | |
| Female Heads | 28.95 | .58 | 43.44 | 23.70 |
| Per Manzana | 10.70 | -. ^c | 55.92 | 15.58 |
| % Reporting 0 Days | 57.9 | 91.7 | 55.6 | 67.5 |
| Total Family | 318.39 | 186.80 | 187.56 | 251.00 |
| Per Manzana | 106.92 | 188.40 | 178.61 | 136.14 |

Source: LTC/FLASCO survey

- a: Among these households there are 20 households (10 are in the Anacampro program) that actually grow maize and sesame.
b: Among the INTA households, one respondent reported 0 manzanas planted in maize.
c: These values could not be calculated due to households reporting the input of labor, but 0 number of manzanas planted in the crop.
d: It is possible that a household will not have any planted coffee on its land if its coffee seedlings are still in the nursery.
e: 5 and 4 households in the INTA and Anacampro programs, respectively, recorded 0 manzanas planted in coffee. See note d above.

IV. MULTIVARIATE ANALYSIS

The univariate analysis of the preceding section suggests a positive relationship between the relative intensity of coffee production in the household's cropping regime and the absolute and relative amount of agricultural labor supplied by female household heads. That is, the cropping scheme is a determining factor in the woman's supply of labor to agricultural activities. This pattern is cause for concern because by adding additional pressure on women's time, the introduction and spread of coffee production may force female household heads to choose between coffee production activities and direct responsibilities to care for and maintain children and home.

There are other factors, however, that mediate a woman's choice to work in agriculture. Household responsibilities and characteristics of the particular program may influence whether or not a woman actually involves herself in agricultural activities. It may be the case that those women working in coffee production do so because they have few child and animal care responsibilities. When examining the feminization of family agricultural labor we need to also consider basic family characteristics such as educational levels and life-cycle factors which may be over-riding influences in the determination of who does or does not participate in agricultural activities. Thus, by examining the proportion of total family labor provided by the female household head under a multivariate framework we are able to control for not only the influence of cropping regimes but also other explanatory factors.

The first set of factors examined that may influence agricultural work decision are the woman's basic characteristics and non-agricultural household responsibilities. The role played by her basic characteristics (literacy and age) are difficult to analyze given their ubiquitous role in determining behavior. The woman's ability to read, or her literacy, may be a proxy for her efficiency within the household (the literature examining mother's education and nutritional outcomes of children uses this line of reasoning, see Behrman and Deolalikar, 1988, for a review). Literacy among women may also proxy for household attitudes which may promote women working in agriculture. Conversely, the woman's level of literacy may be an indication of her bargaining power and position within the household which influences the amount of labor she supplies to agricultural activities.

Assigning a role to age is as difficult as the role played by education. While it is reasonable to assume that older women are less active, thereby decreasing the likelihood that they would take part in agricultural production, younger women tend to have younger children and have less household help; a constraining situation given the nuclear nature of most households in the sample⁹. However, due to the lack of older children in younger households the demand for her agricultural labor may be higher.

⁹The correlation coefficient between the female household head's age and the household's child care burden is -.5539 with a one-tailed significance level of .001.

Given the potential significance of child care activities on women's time, a separate child burden variable is included in the model. By including a child burden variable the woman's age variable is able to more accurately represent her physical abilities and we would expect her age to be negatively related to her contribution to total family agricultural labor.

The child burden indicator is the ratio of the number of resident children under the age of six to the number of potential child-care givers resident in the household. Child-care givers are defined as female children between the ages of six and eighteen plus the female head. It is assumed that the larger the child burden is, the less time the female head has to devote to agricultural activities.

The other variable describing the woman's non-agricultural household responsibilities is the number of animals the household has at the time of the survey. The animals considered are chickens, other fowl (e.g., ducks) and pigs. Women in Guatemala take the main responsibility for animal care and maintenance. They also generally control the sale of animals. Again causality between the number of animals a household has and the labor supply of the female head is not particularly clear. Do women who maintain more animals consequently supply less time to agricultural activities or does the agricultural production of the household dictate the woman's ability to maintain animals?¹⁰ Most likely causality runs both ways.

The estimated model of the female head's contribution to total family agricultural labor also includes the total number of manzanas that a household has in crops. It is reasonable to expect that as the household's area of cultivation increases there will be a greater need for the women to work as family labor per manzana decreases. However, given that these households crop small parcels of land and the competing responsibilities women have within the household, one would expect to find female labor supplied to agricultural production increasing at a decreasing rate as cultivated area increases.

Cropping patterns enter the model as dummy variables. Dummy variables also represent the land purchase programs. Taken together, the intercept term captures maize households and/or INTA program farms.

¹⁰This notion is supported by bivariate correlations of $-.2217$ between the number of animals owned and the coffee only production regime and $.2493$ between animal ownership and the maize production regime. These correlations have a one-tailed significance level of $.01$.

Estimation Procedures

The previous section distinguished the variable of interest as the proportion of total family labor that is supplied by the female head. The stochastic model that is represented by the Tobit model¹¹ is:

$$y_i^* = X_i\beta + u_i$$

$$y_i = y_i^* \text{ if } y_i^* > 0$$

$$y_i = 0 \quad \text{otherwise}$$

where y_i is the i^{th} observation of the dependent variable and u_i is an independently distributed error term assumed to be normal with zero mean and constant variance, σ^2 . The model assumes that there is an underlying, stochastic index y^* equal to $X_i\beta + u_i$ which is observed only when y^* is positive, and hence qualifies as an unobserved, latent variable (McDonald and Moffitt, 1980). y^* can be thought of as the family's propensity to employ the female household head in agricultural activities. We only observe this propensity when the woman actually participates.

The interpretation of the model is then

$$E(y_i^*) = X_i b \text{ and}$$

$$\frac{\partial E(y_i^*)}{\partial x_j} = b_j$$

that is, the vector of estimated coefficients, b , contains the predictions of the *latent* variable.¹²

¹¹Because the dependent variable has numerous values clustering at a limiting value, zero, the estimated model uses a Tobit analysis. The Tobit technique uses all observations, both those at the limit, zero, and those above it, to estimate a regression line.

¹²These coefficients are obtained from the maximization of the Tobit Likelihood function. The maximization and estimation of the model was done using version 6.0 of LIMDEP.

Discussion of Results

Results of the Tobit analysis are presented in Table V. The results suggest that when controlling for child and animal care responsibilities and the characteristics of the parcel and farm, literate women contribute a larger proportion of labor to total family labor.

The woman's age also plays a significant role in determining the woman's relative contribution to the family agricultural labor supply. As the female household head ages she contributes relatively fewer days. Both results indicating that younger and better educated women contribute more to the family agricultural labor supply were foreshadowed in Table AI of the Appendix.

The rest of the signs on the estimated coefficients for the woman's characteristics and responsibilities support a priori expectations. Increasing child and animal care burdens reduces the female head's relative contribution to total family labor. The child and animal care burden coefficients, however, are not significantly different from zero at the 10 percent significance level. While this result may be due to definitional considerations, Tables I, AI and an overall sample mean for a child burden of .785 indicate that on average this burden is not particularly large due to the availability of other household members. An overall average of 13 animals per household suggests considerable animal care responsibilities but Table AII indicates that those women who are contributing agricultural labor continue to maintain relatively large numbers of animals. This pattern suggests that animals do not require much care or their children assist in this activity or both.

The cultivated area coefficients have the conjectured signs suggesting female household heads comprise a larger proportion of total family labor as cultivated area increases but this increase occurs at a decreasing rate. Interestingly, these two coefficients are not significantly different from zero at the 10 percent significance level. The relationship between cultivated area and labor requirements is weak for two reasons. First, intuition suggests that the number of manzanas cropped is crop determined¹³. A given amount of labor can work a larger area of maize crops than coffee cultivation due to coffee's greater labor needs. Second, several of the program farms engaging in coffee production are at an early stage and very few trees are actually permanently planted, implying labor activity is concentrated in nursery and preparation tasks. This second factor is a function of the timing of the survey, the relatively young age of the land purchase programs and coffee farms, and the biology of coffee trees. Together, the inclusion of different cropping regimes and the stage of coffee cultivation on many of the farms weakens the relationship between farm size and labor input.

¹³Correlation coefficients between number of manzanas and the mixed cropping regime dummy variable and the number of manzanas and the coffee cropping regime dummy variable are .3319 and -.4216 respectively. Both have one-tailed significance levels of .001.

TABLE V

TOBIT ANALYSIS

Dependent Variable = Total Female Head Labor/Total Family Labor

N = 134

| | Coefficient | Sd. Error | Mean | Sd. Deviation |
|--|-------------|-----------|---------|---------------|
| Female Head's Charac. | | | | |
| Literacy ^a | 0.1576 | 0.0786 | 0.3657 | 0.4834 |
| Age | -0.0159 | 0.0055 | 34.5710 | 9.5424 |
| Child Burden ^b | -0.0816 | 0.0610 | 0.7850 | 0.8308 |
| # of Animals ^c | -0.0038 | 0.0024 | 12.9320 | 18.5570 |
| Farm Size | | | | |
| # of Manzanas | 0.0760 | 0.0951 | 2.8697 | 1.6576 |
| (# of Manzanas) ² | -0.0193 | 0.0174 | 10.9620 | 10.3050 |
| Cropping Regime^d | | | | |
| Maize & Coffee | 0.2723 | 0.1191 | 0.4328 | 0.4973 |
| Coffee Only | 0.2953 | 0.1251 | 0.2761 | 0.4488 |
| Land Purchase Program^d | | | | |
| FUNDACEN | 0.2228 | 0.1419 | 0.6642 | 0.4741 |
| ANACAMPRO | 0.2483 | 0.1498 | 0.1642 | 0.3718 |
| Intercept | | | | |
| Intercept | -0.2071 | 0.2730 | | |
| Log-Likelihood | | | | |
| Log-Likelihood | -41.8345 | | | |
| σ | 0.3031 | | | |

- a. This is a dichotomous variable. 1 indicates the woman knows how to read.
- b. The Child Burden variable is defined by the number of children under the age of 6 divided by the sum of female children older than 6 and less than 18 plus the female head.
- c. The number of animals is the sum of chickens, other fowl and pigs the household owns at the time of the survey.
- d. The cropping patterns and land purchase programs are represented by dummy variables, i.e., one if the characteristic holds and 0 otherwise. The intercept term is therefore capturing INTA farms and/or non-coffee producing farms.

Both types of cropping regimes are positive and significant at the 5 percent significance level. The cropping regime coefficients suggest that female household heads in maize and coffee growing households make up a significantly larger proportion of total family agricultural labor than those women in maize only households, even after controlling for the demands of child and animal care responsibilities. The same is true of female household heads in coffee only households as compared to maize only households. Thus, the descriptive results discussed in section III are maintained. Despite controls for other explanatory and mediating factors, the cropping regime that the farm follows is an important determining factor in the feminization of total family labor in the sample.

V. Summary

The initial descriptive analysis suggests that female household heads are concentrating their activities within the home; maintaining the home and the welfare of other household members. This first level of analysis draws a picture of a division of labor suggesting women remain in the domestic sphere and men in the agricultural sphere.

As a household increases its involvement in growing coffee the roles and activities of the female heads appear to be changing, placing greater stress on the woman's time allocation constraint. Coffee production, by adding one more responsibility for the female head, may cause severe time constraints for many of the beneficiary women. This change, and the nature of its impact needs to be closely analyzed because the FUNDACEN land purchase program mandates cash cropping, mainly coffee, as a means to insure viability of the program and eventually most FUNDACEN program farms will be concentrating production in coffee. With this concern in mind, a multivariate analysis was performed. The analysis sought to highlight the roles played by the cropping regime and other mediating factors in determining the level of feminization in total family agricultural labor.

The multivariate analysis indicates that, when controlling for responsibilities within the home and various aspects of the household's agriculture, younger women and women who can read will supply a larger proportion of total family agricultural labor as well those women whose household follow a mixed cropping regime of maize and coffee or exclusively grow coffee. The multivariate analysis confirms the univariate analysis which suggests that coffee production increases the woman's participation in agricultural activities.

Whether or not family labor is feminized as a household becomes more involved in coffee production requires further analysis. Preliminary analysis of labor supply by task suggests that female heads are more involved in agriculture activities when the coffee trees are producing than when the trees are in the preproduction stages. This preliminary result suggests that as these program farms stabilize, mature and become well established, female household heads will be supplying more labor to agricultural activities than what they currently are. Deeper analysis of this subject will be facilitated by subsequent survey rounds when households are running mature coffee production operations.

By engaging in this analysis a better understanding of the gender impacts these land purchase programs have on the beneficiaries and the consequential shifting factors competing for women's time is realized. Land purchase programs need to recognize that the introduction of cash cropping, and the subsequent shifting labor supply patterns among particular family members, may be adding labor burdens on women. This may result in less time for child care and household maintenance and reduce improvement in the quality of life for beneficiary families.

APPENDIX

This appendix is a restricted analysis of the subsample of 34 households (23 percent of the entire sample) whose female household heads contribute labor to agricultural activities. The tables presented here are analyzed in comparison to the descriptive information found in Section III of the main body of the paper.

The women contributing their labor to agricultural activities are on average 3 years younger but better educated than the overall sample of women. The men in this subsample are also younger and better educated. Interestingly, the literacy rates between the genders are more homogenous in this restricted group.

Households in this group are also slightly smaller. Women in these households care for children who are slightly younger and they have fewer children 12 to 17 years old to assist with household responsibilities. The younger age distribution of children is another indicator of the youthfulness of this subsample of households.

Table AI: Household Demographics by Program

| | FUNDACEN | INTA | ANACAMPRO | ALL |
|-------------------------|----------|-------|-----------|-------|
| # of Households | 26 | 2 | 6 | 34 |
| % of Households | 26.5 | 8.3 | 25.0 | 23.2 |
| Household Size | 5.62 | 5.00 | 5.50 | 5.56 |
| Female Heads | | | | |
| Number | 26 | 2 | 6 | 34 |
| Age | 32.81 | 32.50 | 30.00 | 32.29 |
| % that can read | 57.7 | 50 | 30.30 | 52.90 |
| Yrs of Schooling | 1.04 | 2.50 | 1.33 | 1.18 |
| Male Heads | | | | |
| Number | 26 | 2 | 6 | 34 |
| Age | 37.00 | 31.50 | 33.50 | 36.06 |
| % that can read | 73.10 | 50.00 | 66.70 | 70.60 |
| Yrs. of Schooling | 1.50 | 1.00 | 1.33 | 1.44 |
| Children | | | | |
| Total number | 4.08 | 5.00 | 3.50 | 4.03 |
| # Resident ^a | 3.62 | 3.00 | 3.50 | 3.56 |
| Children < 6 yrs. | 1.42 | 1.50 | 1.50 | 1.44 |
| Children 6 to 12 yrs. | 1.62 | 1.50 | 1.17 | 1.53 |
| (% Female) | (47) | (33) | (67) | (48) |
| Children 12 to 17 yrs. | .46 | 0.00 | .83 | .50 |
| (% Female) | (58) | (0) | (50) | (59) |

Source: LTC/FLASCO Survey

a: These figures include children 18 years and older who are living with their parents.

A slightly smaller proportion of these women cultivate garden plots and they appear to raise slightly fewer animals.

Table AII: Garden Plots and Small Animals

| | FUNDACEN | INTA | ANACAMPRO | ALL |
|-----------------------|----------|-------|-----------|------|
| # of Households | 26 | 2 | 6 | 34 |
| Garden Plots | | | | |
| # Cultivating Plots | 12 | 2 | 0 | 14 |
| (%) | 46.2 | 100.0 | 0.0 | 41.2 |
| Small Animals* | | | | |
| Total # of Animals | 11.50 | 11.0 | .83 | 9.59 |

Source: LTC/FLASCO Survey

a: Sum of chickens, pigs and other fowl the household owned at the time of the survey.

The women in this subsample contribute a non-trivial amount of labor to agricultural activities. In maize-only households female household heads work slightly more than 9 days representing approximately 7 percent of total family labor. The women in households planting both maize and coffee contribute more labor to agriculture and most of their time is spent in coffee production. Women in these mixed crop households put in about 71 days of labor - 90 percent of that labor is in coffee - making up 17 percent of total family labor. Female household heads in coffee-only households contribute the largest number of days at 73 days which is approximately 24 percent of total family labor. So the shifting of female household heads into agricultural production as a household intensifies production in coffee remains and is stronger in this subsample as compared to the overall sample.

Table AIII: Maize and Coffee (During the 1990 Agricultural Cycle)

| | FUNDACEN | INTA | ANACAMPRO | ALL |
|----------------------------|----------|----------------|-----------|--------|
| Maize Only* | | | | |
| # of Households | 2 | 1 | 0 | 3 |
| Total Parcel Area | 2.86 | 3.75 | 0 | 3.16 |
| # of Manzanas | 1.23 | 3.75 | 0 | 2.07 |
| Labor Days | | | | |
| Female Heads | 5.50 | 17.00 | 0 | 9.33 |
| Per Manzana | 5.56 | 4.53 | 0 | 5.22 |
| Total Family | 70.50 | 275.00 | 0 | 138.67 |
| Per Manzana | 61.11 | 73.33 | 0 | 65.18 |
| Maize and Coffee | | | | |
| # of Households | 16 | 0 | 2 | 18 |
| Total Parcel Area | 4.10 | 0 | 1.64 | 3.83 |
| # of Manzanas in Maize | .69 | 0 | .44 | .66 |
| # of Manzanas in Coffee | 2.77 | 0 | 1.64 | 2.64 |
| Labor Days - Maize | | | | |
| Female Heads | 2.44 | 0 | 45.50 | 7.22 |
| Per Manzana | 3.87 | 0 | 71.09 | 11.34 |
| % reporting 0 Days | 75 | 0 | 50 | 72.2 |
| Total Family | 32.69 | 0 | 149.50 | 45.67 |
| Per Manzana | 61.42 | 0 | 260.94 | 83.59 |
| Labor Days - Coffee | | | | |
| Female Heads | 33.88 | 0 | 299.00 | 63.33 |
| Per Manzana | 12.13 | 0 | 135.19 | 32.49 |
| % reporting 0 Days | 18.8 | 0 | 0 | 16.7 |
| Total Family | 327.50 | 0 | 1004.00 | 402.67 |
| Per Manzana | 148.08 | 0 | 624.12 | 204.08 |
| Coffee Only | | | | |
| # of Households | 8 | 1 | 4 | 13 |
| Total Parcel Area | 3.65 | 2.00 | 1.66 | 2.91 |
| # of Manzanas | 2.55 | 0 ^b | .62 | 1.76 |
| Labor Days | | | | |
| Female Heads | 68.75 | 7.00 | 97.75 | 72.92 |
| Per Manzana | 25.41 | - | 139.79 | 48.29 |
| Total Family | 361.00 | 7.00 | 277.50 | 307.54 |
| Per Manzana | 139.37 | - | 281.07 | 167.71 |

Source: LTC/FLASCO survey

- a: Among these households some are actually growing maize and sesame. One women in the INTA program supplies labor to sesame production.
- b: It is possible that the household will not have any planted coffee on their land if their coffee seedlings are still in the nursery.

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