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Nonfarm income and employment in rural Honduras: Assessing the role of locational factors[1]

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Abstract: This paper emphasizes the role of locational factors in the determination of rural nonfarm (RNF) employment possibilities in rural Honduras. It finds that while RNF wage jobs are predominantly located close to urban areas, RNF self-employment jobs are geographically dispersed around the country, depending on local motors such as a profitable agricultural activity, an important road, or a tourist attraction. In all, the importance of RNF income for rural households (31.3% of total income) suggests that the RNF sector should be considered when designing policies to improve the capabilities and livelihoods of the rural Honduran.

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I. INTRODUCTION

The traditional theory of the role of rural nonfarm (RNF) activities in the process of development has emphasized production and consumption linkages from agriculture leading to the development of labor-intensive, rurally produced goods. These so-called Z-goods were expected to be displaced by better quality imported manufactured imports over the course of development, as the economy specialized in the export of minerals and cash crops [*Hymer and Resnick, 1969*]. Ranis and Stewart [*1993*] extended the theory by considering multiple sources of demand for rural nonagricultural goods, including food producers oriented to the domestic market, urban consumers within the country, and the export market. In their most favorable scenario, the Z-goods sector is able to grow by adopting modern and more productive technologies, and linkages between agriculture and the RNF sector run in both directions.

Despite the RNF sector potential to contribute to the development of rural areas, traditional rural development policies in Latin America have focused almost entirely on the agricultural sector. A partial reason for this neglect has been the scarcity of detailed studies on RNF activities at the household level for countries in the region, until the recent publication of a series of 11 country case studies on the subject, summarized by Reardon, Berdegué, and Escobar [*2001*]. One conclusion from these case studies is that RNF income is very important for rural Latin American households, representing roughly 40% of their total income.

In their appraisal of the case studies Reardon et al. [*2001*] attribute particular importance to locational factors. Along the lines of Ranis and Stewart [*1993*], they emphasize that nonfarm goods, as well as services, can be driven by different 'motors'.

One of these motors could be the farm sector, particularly in areas with dynamic and profitable agricultural production. Other motors to the rural economy are given by the proximity to urban areas, particularly when transportation infrastructure is adequate, by the existence of other nonfarm activities that have previously developed in areas where agriculture played historically a major role [*p. 403*], or by the proximity to a tourist attraction.

When it comes to estimating the determinants of RNF income using household survey data, the locational concentration of RNF activities around these motors may pose econometric problems. Unless the data include geographical variables that can account for the presence of RNF motors, the estimates of the coefficients of observable factors, such as education or household characteristics, may be affected by omitted variable bias. Researchers have tried to account for locational factors by including regional dummies and variables such as altitude or proximity to paved roads, which (if available in the survey) can give some sense of the relative remoteness of a location from major consumption and production centers.

In this paper I propose to account for locational factors that may be unobservable to the econometrician by taking advantage of the clustered structure of the data. As is common practice in household surveys, the households interviewed are randomly selected from clusters of nearby homes. Therefore, while the sample of clusters is representative of the geographical diversity of the country as a whole, households within each cluster face identical locational factors, which may affect their access to RNF jobs. This characteristic of household surveys suggests two possibilities to deal with the potential problem of omitted variable bias. The first one is to include cluster or

'neighborhood' effects in the regression; the second is to include observable variables measured at the cluster level. In this paper I follow both procedures.

The rest of this paper is organized as follows. The next section briefly discusses the relevance of RNF income for Honduras. Section III first describes the earnings, education of workers, and female labor force participation in different activities in rural Honduras, as well as the importance of RNF activities for different income strata. Then it presents estimates of summary regressions of the share of RNF income on total income at the neighborhood level and at the household level. Next, it shows estimation results for participation and earnings equations for both RNF income and agricultural wage income. The section concludes by presenting complementary data on labor market characteristics of locations characterized by high levels of RNF participation. Finally, Section IV presents the conclusions of the analysis and discusses some policy implications.

II. RURAL NONFARM INCOME AND ITS RELEVANCE FOR HONDURAS

During the 1970s and 1980s, a main objective of Honduran rural policies was to increase both the aggregate production of food and the farmers' capacity to commercialize higher shares of their output. One of the instruments to achieve these objectives, the Land Reform Law of 1974, converted underutilized public lands into cropping lands and encouraged the establishment of farming cooperatives. Although this reform had very little distributional effects, it succeeded in increasing the level of commercialization of Honduran agricultural production [*Ruben and Clemens*, *2000: 171-72*]. Two additional instruments for the promotion of market production were the

establishment of subsidized credit lines for farmers and the procurement and marketing of grains crops by a state agency.

These policies came to an end in the early 1990s when, as a result of a deep economic crisis that had led the country to default on its credit lines from the international financial institutions, Honduras adopted a Structural Adjustment Program (SAP). In the context of the SAP, the Agricultural Modernization Law of 1992 liberalized completely the internal market for grains, curtailed subsidized credits, and let the market determine interest rates. These policies, along with an important devaluation of the Lempira, stimulated production for exports and for sales in the domestic market by the most efficient agricultural producers, mostly medium and large commercial farmers. This stimulus, in turn, led to steep increases in land prices that encouraged some of the cooperatives that benefited from the land reforms of the 1970s to sell their lands [*Thorpe, 1995: 208-09*].

Unfortunately, the winners from the relative price changes brought about by the SAP constituted a minority among the rural Honduran population. According to Ruben and van den Berg [*2000: 191*], around half of the Honduran rural population in 1993 operated farms of less than 5 hectares, considered the minimum for a viable family farm, while 27 percent of the rural economically active-population were landless, who depended on renting land and wage labor contracts. Because food prices increased by more than rural wages, both rural landless and peasants with insufficient access to land, who are net purchasers of food, were clear losers from the SAP.

Partly with the aim of compensating these losers, the Honduran government formulated an Action Plan for Food and Nutritional Security in 1994. However, a main

focus of this plan was to increase and stabilize the supply of food through a modernized national research and extension system, improved tenancy security, and the stimulation of private investment in the production of basic grains and other food products [*Clemens and Ruben, 2000: 174*]. The compensation of losers from the SAP was taken care of by a large-scale food distribution program for the most disadvantaged social groups, the Family Allowance Program (PRAF), and by the financing of projects of social infrastructure such as schools, rural health centers, and sanitation trough the Honduran Social Investment Fund (FHIS).

The dual nature of this plan is reminiscent of the viability view of rural development, which originated in Chile in the 1990s. According to this view viable peasant farms are those with sufficient access to good quality land and water, which could successfully compete in the market economy if they had access to capital investment and training. Nonviable peasants, on the other hand, could not conceivable become competitive production units. Therefore, the argument goes, 'these peasants should not be the object of programs aimed at enhancing their productive capacity but rather ought to be supported through social investment programs that would alleviate their poverty and ultimately facilitate their transition out of agriculture and into the urban economy' [*Bebbington, 1999: 2025*].

It is in this context that the contribution of the RNF sector may become relevant. As Clemens and Ruben put it, current Honduran policies to increase access to food are implemented 'solely in the context of aid and social compensation, and only marginally address prospects to improve the purchasing-power capacities for sustainable food access by the rural poor' [*2000: 174*]. An alternative approach is to consider that even peasant

households that are 'nonviable' as farm production units may nevertheless have other means to make a living in the RNF sector. A broader view of the rural economy as involving more than the, admittedly very important, function of producing food and exportables may eventually lead to a more balanced set of policies to improve the capabilities and livelihoods of the rural Honduran.

III. RURAL NONFARM EMPLOYMENT AND INCOME IN HONDURAS IN 1998

a. Data

The source of the data used for the empirical analysis is the September 1998 Household Survey prepared by Honduras' National Directorate of Statistics and Census (DGEC). This survey, which is taken twice a year in Honduras, was prepared with the technical assistance of World Bank, Inter-American Development Bank, and the Economic Commission for Latin America and the Caribbean (ECLAC) in the context of the Program for the Improvement of Surveys and Measurement of Standards of Living in Latin America and the Caribbean (MECOVI).

This nationally representative survey includes 2,805 rural households from 16 of the country's 18 departments.[1] The survey has a stratified, multi-stage design. In a first stage a number of *municipios* or counties (the primary sampling units) were randomly selected from each of the 16 departments included, while in a second stage four census tracts (the secondary sampling units) were randomly selected form each *municipio*.[2] In a final stage, ten homes were randomly selected from each census tract to be visited by the interviewers. This design ensures both that the selected households are representative at

the national level and that the enumeration costs are minimized, as the households to be interviewed are clustered around a reduced geographical area.

The DGEC defines a rural area as a populated place (1) with less than 2,000 inhabitants or (2) that lacks at least one of the following services: (a) piped water; (b) communications by road, railroad, or regular maritime transportation; (c) a primary school; or (d) postal or telephone service. According to ECLAC, the quality of the income data is reasonably good. The only income component it judges to be occasionally undervalued is the imputed value of self-consumption of farm products. ECLAC estimates this item to be undervalued for 17% of the households reporting farm income and proposes an imputation to correct for this undervaluation. In this study I use ECLAC's corrected farm income measure.

b. The significance of rural nonfarm employment and income

Rural nonfarm income (RNFI) represents 31.3% of the total income of Honduran rural households in 1998.[3] This figure exceeds previous estimates reported by Ruben and van den Berg [*2001*]—between 16% and 25% in 1994—and by López and Valdés [*2000: Table 1, p. 200*]—23% in 1993—suggesting that nonfarm activities are becoming increasingly important for rural Honduran households. This type of income is almost equally divided between wage income (47.6%) and self-employment income (52.4%). In all, RNFI is the second most important source of income after farm income (48.0%), with agricultural wage income (12.9%) in a distant third place.[4]

The first two columns of Table 1 show the distribution of employed individuals across economic activities and the percentage in each activity that are wage workers. In

1998 35.8% of all rural workers were employed in nonfarm activities, particularly in commerce (12.5%), manufacturing (10.4%), and social, communal, and personal services (8.3%). Wage labor is particularly important in the latter group of activities, where 69.6% of all workers are wage workers. On the other hand, self-employment and the work of unpaid family members are very important in commerce (86.7%), agriculture (66.8%), and manufacturing (55.4%).

Columns 3 to 8 of Table 1 shows median monthly income, average years of education, and percentage of female workers by economic activity and distinguishing between wage income and self-employment income.[5] On average, the best source of rural income comes from farming (L 1,667 equivalent to US$ 125 a month). However, nonfarm wage income is only 10% lower (L 1,500), while, nonfarm self-employment income (L 1,000) provides a better source of income than agricultural wage employment (L 870).

The capabilities of nonfarm workers to earn a living derive from their holding of assets other than land. In particular, nonfarm wage workers have more than twice as many years of education as the self-employed agricultural workers. While nonfarm self-employed workers have only one more year of education than self-employed agricultural workers, they might have other assets (entrepreneurial skills, contacts, access to electricity) that allowed them to set up a business. If this analysis is correct, the remarkably lower income of agricultural wage workers must arise from their lack of both enough land, education, and other assets. Notice finally that the female labor force participation is significantly higher in the nonfarm sector compared to the agricultural

sector: 39.7% against 9.5% for the wage workers and 67% against 5% for the self-employed.

It should be pointed out that not all nonfarm activities offer high earnings. Although wages are higher in nonfarm activities than in agriculture, self-employment earnings are very low for some types of nonfarm activities, such as manufacturing and communal, social, and personal services. In these activities, which are very important for female workers, self-employment earnings are less than half (about L 400) the earnings of agricultural wage workers. Both sectors, in contrast, offer high earnings and are associated with high levels of education in the case of wage workers, suggesting an important degree of market segmentation.

Table 2 shows selected characteristics of rural household across income strata. The poorest households have higher dependency ratios (dependents over employed) and are more likely to be headed by a female. Their adult members (age 15 or older) have less years of education and the elementary-school-age children in the family are less likely to attend school. These households have less access to services such as public water and electricity, possibly because they are located in areas where these services are not available. And these households are more likely to live in houses with earthen floors and without toilets.

Across income strata, the most important source of income comes from self-employment in agricultural activities. This source of income is significantly lower than average for households in the lowest income quintile; for these households, agricultural wage income is almost as important.[6] The significance of rural nonfarm income increases with the level of income: While agricultural wage income is more important

than RNFI for the lowest two income quintiles, the latter represents 37% or total income against only 8% for agricultural wage income for the upper quintile. Finally, it is important to notice that households in the lower income quintile derive a substantially lower share of their nonfarm income from wages.

c. Explaining rural nonfarm income at the neighborhood and household levels

What are the determinants of rural nonfarm income? The literature reviewed by Reardon et al. [*2001*] has identified several variables of interest, among which access to infrastructure, population density, and education are highlighted. The inclusion of geographical variables, such as altitude, proximity to paved roads, etc. depends on the completeness of the survey utilized. Regional dummy variables are often included to account for broad differences across regions of the country. Only recently researchers have started to combine geographic information systems with census data for a much more precise account of locational factors [see e.g. *Araujo, 2001*].

In this paper I propose to take advantage of the clustered structure of the data to control for unobserved locational factors that may affect access to opportunities for nonfarm employment. As mentioned above, the survey consists of groups of around ten randomly drawn households from 324 nationally representative census tracts. Because households located in the same census tract are close to each other, their members must have similar physical access to local jobs. In this section I control for the physical proximity of households residing in the same cluster by adding fixed 'neighborhood' effects to the regression model. In the next section I consider observable locational variables that may influence the choice of occupation.

As a first approximation, I estimate the following model at the neighborhood level:

$$y_n^* = \alpha + x_n\beta + \varepsilon_n, \qquad n = 1, 2, \ldots, 324 \tag{1}$$

$$y_n = \max\{0, y_n^*\},$$

where n indexes neighborhoods, x_n is a k-dimensional vector of explanatory variables at the neighborhood level, β is the parameter vector of interest, and ε_n is the error term. The dependent variable, y_n, is observed only when the latent variable y_n^* is positive. The dependent variables considered are the shares of *RNFI*, wage *RNFI*, and self-employment *RNFI* in total income. The explanatory variables are average years of education of household members of age 15 or older, proportion of households with access to electricity and public water in the neighborhood, rate of urbanization of the department where the neighborhood is located[7], and log of average neighborhood income.

Because the Tobit model's estimates of β are fragile to non-normality and heteroskedasticity of the error term, I estimate (1) using Powell's [*1986*] Censored Quantile Regression (CQR) model. Since the degree of censoring in these data is not too high, I chose to estimate the model at the 60th quantile.[8] I computed the standard errors using 60 bootstrap replications. See Buchinsky [*1994: 412*] and Jalan and Ravallion [*2000*] for further details on the methodology.

The results show that education and access to electricity play particularly important roles in explaining the share of nonfarm income in rural neighborhoods. An extra average year of education for the adults in the neighborhood is associated with a 9% increase in the share of *RNFI* in total income. Neighborhoods where all household have

access to electricity earn 22% more *RNFI* as a share of total income than neighborhoods where no one has access to electricity. Likewise, neighborhoods located in the most urbanized department have a share of *RNFI* in total income 21% larger than neighborhoods located in the least urbanized department.[9] As far as differences between the two types of *RNFI* are concerned, urbanization and education are more important in explaining the share of wage *RNFI*. While access to electricity is important in explaining the shares of both types of *RNFI,* access to public water is statistically significant only in explaining the share of self-employment *RNFI*.

We have seen in Table 2 that the relationship between share of *RNFI* and income was positive at the household level, and the same is true at the neighborhood level. However, after controlling for education, urbanization, and access to infrastructure, the relationship turns out to be negative, as indicated by the negative coefficients of log of average neighborhood income in Table 3. This result has two implications. First, it suggests that the low share of *RNFI* of the rural poor observed in Table 2 are due to lower levels of education, less access to infrastructure, or living far from urban areas. Second, the fact that lower income neighborhoods generate a larger share of income from *RNFI* given their education, access to infrastructure and urbanization confirms Lanjouw's [*2001*] suggestion that access to *RNFI* helps to alleviate income poverty. At the neighborhood level, this effect applies only to wage *RNFI*, as the coefficient of log of income is not significantly different from zero in the share of self-employment *RNFI* regression.

The infrastructure and urbanization variables included in the previous regressions control to some extent for geographical factors. However, there might be other

geographical factors that explain access to *RNFI*, such as proximity to a major road, or the presence of a nearby factory or commercial center, which are not observed by the econometrician. We can control for these unobserved factors using a fixed effects model. Consider the following variant of the previous model:

$$y^*_{nh} = \alpha + x_{nh}\beta + \delta_n + \varepsilon_{nh}, \qquad n = 1, 2, \ldots, 324, \qquad h = 1, 2, \ldots, H^n \tag{2}$$

$$y_{nh} = \max\{0, y^*_{nh}\}.$$

Notice that now the unit of analysis is the household and that the model includes a neighborhood-specific effect δ_n. In each neighborhood *n*, there are H^n households indexed by *h*.[10] In this model I add a new explanatory variable, the number of household members employed, and exclude the urbanization rate of the department, as the estimation procedure can not identify variables that do not vary at the neighborhood level. Other differences are that access to electricity and public water are dummy variables (1 if the household has access, 0 otherwise), and the income variable is the log of household income. The model is estimated using the trimmed least squares procedure for the censored regression model with fixed effects proposed by Honoré (1992).[11] This estimator is robust to an error term that is non-normal and heteroskedastic.

The main difference between the regressions presented in Tables 3 and 4 is that the former explain the cross-neighborhood variability in the share of *RNFI*, while the latter explain the within neighborhood variability in the share of *RNFI*. Specifically, they investigate whether households with more access to infrastructure or education than their neighbors have relatively higher shares of *RNFI*, after controlling for the average share of *RNFI* in the neighborhood.

As far as the regressions for the total share of *RNFI* are concerned, the estimated coefficients of education, access to electricity, and log of total income have the same signs and similar statistical significance within and across neighborhoods. The main differences between the two models reside on the regressions for the components of *RNFI*. In the cross-neighborhood regressions shown in Table 3 education and electricity were similarly important in explaining the shares of wage and self-employment *RNFI*. In contrast, in the within neighborhood regressions we find that education is very relevant for wage *RNFI* but not for self-employment *RNFI*, while electricity is very important for self-employment *RNFI* but not for wage *RNFI*. After controlling for unobserved neighborhood effects, households with an extra year of education increase their share of wage *RNFI* by 8%, while households with access to electricity increase their share of self-employment *RNFI* by 23%.

The within regressions include a new explanatory variable: the number of people employed in each household.[12] As it turns out households with more individuals engaged in economic activities have higher shares of *RNFI*. This is to some extent to be expected, as larger households have more opportunities to diversify their participation in economic activities. But notice that this variable is only relevant in the equation for the share of self-employment *RNFI*. A possible reason is that households engaged in self-employment activities are very likely to employ unpaid family members.

The negative relationship between share of *RNFI* and log of income shown in Table 4 suggests that this type of income plays a role in alleviating income poverty within, as well as across, neighborhoods. But in contrast with the cross-neighborhood regressions, this effect is statistically significant only in the self-employment equation.

Households with less education, access to electricity, and employed members than their neighbors derive a higher than expected share of income from nonfarm self-employment. Access to these activities partly compensates for their lack of education and access to infrastructure.

The regressions, in sum, show that geographical factors matter. Rural areas that are closer to urban centers enjoy greater opportunities for wage nonfarm employment. Households located in these areas can commute to work in nearby towns or cities and perhaps have access to good schools, which provide the necessary skills for that type of employment. In contrast, opportunities for self-employment nonfarm income are not necessarily located close to urban centers, though these activities depend very importantly on access to infrastructure. Education and infrastructure also determine access to nonfarm employment within the neighborhood. Within neighborhoods, households with higher levels of education are more likely to receive nonfarm wage income, while those with more access to infrastructure, electricity in particular, are more likely to receive nonfarm self-employment income. Both types of nonfarm income play a role in alleviating rural income poverty, though in different ways: While wage *RNFI* is important in low-income neighborhoods, self-employment *RNFI* is important for low-income households within neighborhoods.

d. Explaining off-farm employment and income at the individual level

The previous results on nonfarm income at the neighborhood and household levels are ultimately based on individual decisions on where to work and their ability to generate earnings. In this section we turn to the individual level. We first study the

determinants of individual participation in wage and self-employment non-agricultural employment. We also consider participation in wage agricultural employment for comparison. Next we turn to the determinants of earnings in each of these activities.

Table 5 presents results of labor force participation probit regressions based on all the remunerated rural workers of age 15 or more in the survey. The explanatory variables are divided in three groups: individual variables, household variables, and neighborhood variables. The individual variables are gender, status in the household (head or spouse), age, age squared, and years of education. The household variables include demographic indicators (number of adults, percent of adult females, and percent of children), whether the household head is female, access to electricity, and the average years of education of other adults in the household[13]. In addition I include variables reflecting the occupational choice of other members of the household, specifically the number of other members of the household who receive income from nonfarm wage and self-employment, and from agricultural wage and self-employment.

Besides the individual and household variables, I include a series of variables representative of the neighborhood where the household is located: rate of urbanization of the department, percent of other households in the neighborhood with access to electricity, average years of education of adults who live in other households in the neighborhood, and the number of adults who live in other households in the neighborhood who derive income from each of the four sources mentioned above. There are two main reasons why the occupational choice of other members in the household and in the neighborhood may matter. First, they may convey information about the type of jobs available in the area. Second, the may represent informal channels of

communication about job opportunities and for job referrals. Although the Honduran household survey does not allow me to distinguish between these two possible factors, I believe that both are compelling reasons for the inclusion of these variables.[14]

As expected, the individual variables are highly significant. Nonfarm activities, wage and self-employment, are more likely to be undertaken by women, in contrast to agricultural wage jobs. Household heads and their spouses are less likely to be engaged in wage employment, both agricultural and nonfarm. In contrast, the probability of participating in nonfarm self-employment is higher for household heads and their spouses. The probability of labor force participation increases with age for nonfarm self-employment activities, but it decreases with age for agricultural wage employment. In the case of nonfarm wage employment it increases with age till age 49 and then decreases, though this effect is not statistically significant. Finally, years of education are positively associated with participation in nonfarm wage employment, and negatively associated with participation in both nonfarm self-employment and agricultural wage employment.

Moving to the household characteristics, participation in wage employment, nonfarm and agricultural, is more likely for households with fewer adults. Household access to electricity and average years of education are associated with a lower probability of participation in agricultural wage employment. Nonfarm wage employment is more likely when other members of the household are similarly employed, and agricultural wage employment is associated with the participation of other household members in agricultural wage and self-employment. Finally, nonfarm self-employment is more likely when other members of the household are self-employed in

agriculture, and less likely when other members of the household are wage workers (nonfarm or agricultural).

As for the neighborhood characteristics, nonfarm wage employment is more likely in more urbanized departments. Access to electricity of other households in the neighborhood is positively associated with both nonfarm and agricultural wage employment, but not with nonfarm self-employment. The occupational choice of adults living in other households in the neighborhood is an important factor. In all three cases, workers are more likely to choose an occupation in which adults other households in the neighborhood participate.

A seemingly unintuitive result is that the likelihood of nonfarm wage employment decreases with the average years of education of neighbors, while the likelihood of farm wage employment increases with the average education of neighbors. The choice of wage employment, therefore, seems to be influenced not just by an individual's education but also by the difference between the individual's education and his or her neighbors'. Part of the explanation of this phenomenon could be based on the screening function of education.[15] Suppose, for example, that nonfarm employers are faced with a pool of job applicants who reside in the neighborhood and whose ability is difficult to ascertain before hiring. If employers believe that years of education are positively correlated with ability, they may screen out applicants with fewer years of education. Therefore, if the average years of education of neighbors increases compared to an individual's years of education, this individual is less likely to stand out in the view of the employer—and less likely to hold a nonfarm wage job. On the other had, farm wage jobs do not require educated workers. Therefore, an increase in the years of education of neighbors holding

an individual's education constant makes this individual more likely to be employed as a farm wage worker.

A potential problem with the probit results presented above is that the neighborhood variables are measured as averages of a small number of observations (remember that there are around 10 households per neighborhood), which makes them noisy proxies of the true neighborhood characteristics. Given the potential for measurement error in these variables, do they still do a good job in explaining the variation across neighborhoods? The answer is yes. The Wald tests for the restriction that the neighborhood variables' coefficients are simultaneously zero are strongly rejected in all the cases. Moreover, the P-values of these tests statistics are invariably smaller than the P-values for the Wald statistics for the restriction that the household variables's coefficients are simultaneously zero. For further confirmation, I re-run the probits omitting the neighborhood variables, and regressed the residuals of these probits on the 324 neighborhood dummies using OLS. Then I regressed the 324 estimated coefficients of the dummies on the seven neighborhood variables[16]. The R^2s of these auxiliary regressions range between 65% and 75%, confirming that, despite potential measurement error, the neighborhood variables explain a significant proportion of the cross-neighborhood variability.

Table 6 presents earnings regressions for each of the three off-farm activities. The samples used in each of the regressions include only workers engaged in the same type of activity, so they allow us to assess which factors are associated with higher or lower earnings within each activity. In each case, I control for sample selection bias by

including the inverse Mills ratio computed from the corresponding participation equation shown in Table 5 as an additional regressor.

The explanatory variables included are a subset of the variables included in the participation regressions: all the individual variables, the average years of education of other adults in the household, whether the household has access to electricity, whether there are other members of the household who work in different occupations, and the urbanization rate of the department. I assume that both the neighborhood variables, except urbanization, and the demographic characteristics of households influence an individual's choice of occupation but not his or her capacity to generate earnings.

Electricity is included in the earnings regressions because of its potential benefits for self-employed individuals who have a home-based business. For symmetry I include it in all the regressions. Average education of other adults in the household is included because other members of the household may help an individual to get a better job, and it is reasonable to assume that the more educated individuals may be more skilled in finding job opportunities. Therefore, while I keep the traditional interpretation of years of education as human capital, I consider the average education of other adults in the household as a form of social capital. Finally, the number of household members occupied in different activities is included because the existence of other income sources in the household may influence the intensity with which an individual need to work.[17]

Starting with the individual factors, males receive higher earning than females in nonfarm jobs, with a premium of around 11% for wage workers and 55% for self-employed workers. The latter is consistent with the much lower earnings of females self-employed in manufacturing and communal, social, and personal services compared to

female wage workers, together with the fact that women are more likely to be self-employed in these activities (see Table 1). In the three types of occupation, the wage premium increases with age. All else given, wages are around 40%-50% higher for 50-year olds than for 20-year olds. Finally, the rate of return of an extra year of education is around 6.5% for nonfarm workers and 4% for agricultural wage workers.

As for the household factors, the average years of education of other adults in the household are positive and statistically significant for all three activities. Earnings are around 5% higher for each extra average year of education of the adults in the family. One possible explanation of this finding is that more educated families may be more able to obtain information about good job opportunities. Family connections and knowledge about the job market may be considered a form of social capital that is complementary to the specific skills an individual needs for a particular occupation.

A possible caveat for this interpretation is that the causality may run in the opposite direction in some cases. For example, children of age 15 or more in a relatively wealthy household may have been able to go to school many years, but that does not necessarily mean that their education would help their parents get a better job. In order to control for this possibility, I run alternative regressions where the variable is redefined as average education of other adults in the household except sons and daughters of the household head. In these alternative regressions the estimated coefficients of the individual education variable increase to close to 8% for nonfarm workers and to 5% for agricultural wage workers, remaining highly significant. At the same time the estimated coefficients of the redefined average education of other adults in the household variable is reduced to around 2.5% for wage workers (nonfarm and agricultural) and to 1.8% for

the nonfarm self-employed. Despite its lower value, the estimated coefficients remain highly significant for wage workers, with *t* statistics of around 3, though the coefficient fails to be significant at the 10% level for nonfarm self-employed workers. This robustness check suggests that the interpretation of the education of other adults in the household as a form of social capital remains valid, at least for individuals engaged in wage employment.[18]

Access to electricity is associated with higher earnings of self-employed nonfarm workers, confirming the analysis at the household level, and also of agricultural wage workers. Both nonfarm and agricultural wages are higher in more urbanized departments. In general the occupations of other members of the household are not important factors in the determination of earnings, with two exceptions. Earnings of the nonfarm self-employed are lower for individuals who have other members of the household employed in agricultural activities. For these households, access to nonfarm self-employment seems to be a secondary activity that helps them reduce the extent of poverty.[19]

Although the inverse Mills ratio is significant only in the earnings regression for agricultural workers, its inclusion in all the regressions is important to control for selection bias in all the earnings regressions. A measure of this bias was 16% for nonfarm self-employment, 20% for nonfarm wage employment, and 39% for agricultural employment.[20] The significantly negative coefficient of the inverse Mills ratio for agricultural wage earnings means that individuals who are very likely to be employed as agricultural wage workers will receive lower earnings in that activity. Because Heckman's two-stage method is sensitive to nonnormality and heteroscedasticity of the

error term, I ran the earnings regressions using a robust method suggested by Deaton [*1997: 105*]. The results were qualitatively and quantitatively similar to those reported in the paper. [21]

e. Locations and occupations

Where are nonfarm jobs located? What jobs are most important? What are the differences across regions where different types of jobs predominate? In order to have a more tangible view of the locational factors referred to in the econometric work, each column of Table 7 summarizes information about the ten *municipios* with the largest shares of the rural economically active population employed as either RNF wage workers, RNF self-employed workers, farm wage workers, or farm self-employed workers.[22]

Nonfarm wage jobs are highly concentrated in only two departments, Cortés (6 *municipios*) and Francisco Morazán (3 *municipios*). These highly urbanized departments (with urbanization rates of 73% and 81%, respectively) encompass Honduras' two largest cities, Tegucigalpa and San Pedro Sula. The types of nonfarm jobs most common in these *municipios* are in manufacturing industries, such as clothing and furniture, construction, and domestic services. In the most urbanized of these *municipios*, some residents have access to jobs in banks, medical clinics, schools, and even a university. Overall, the variety of nonfarm jobs available approaches that of urban labor markets. An outlier from this group of *municipios* is one located in the department of Copán, in the coffee-growing region of Western Honduras. In this *municipio* the median nonfarm wage

is only L360 (a fourth of the median nonfarm wage), and almost all of the nonfarm workers are employed in the same occupation: the manufacturing of firecrackers.

In contrast to RNF wage activities, high concentrations of RNF self-employment jobs occur in *municipios* located in predominantly rural departments, with an urbanization rate of around 20% (except Atlántida, 56%). In these *municipios* farming activities are relatively profitable on average, thus acting as a 'pull factor' for RNF jobs. A good example is a relatively rich milk-producing *municipio* in the Northern Honduras department of Atlántida. Agriculture as a pull factor, however, seems to be relevant mainly for self-employment jobs in commerce. Self-employment manufacturing activities, which are concentrated in the department of Santa Bárbara in Western Honduras, are not that profitable. In particular, many workers in the area are self-employed in the production of hats, with average monthly earnings of only L150. On the other hand, self-employment jobs may be pulled by factors other than agriculture. For example, the main road connecting Olancho, a relatively unpopulated department in Eastern Honduras, with Tegucigalpa passes through a *municipio* characterized by very profitable commercial activities. Other *municipio* in the department of Valle is located on the Gulf of Fonseca coast, a location where tourism may be as important as shrimp farming as a motor for commerce.

Of the ten *Municipios* with high concentrations of agricultural wage jobs, eight are located in the departments of Yoro, Atlántida, and Colón, in Northern Honduras. Most agricultural wage workers are employed in banana and other fruits plantations. African palms, cattle ranches, grains, coffee, and milk production are somewhat less important. Although agricultural wage workers are the least well paid, it is interesting to

notice that agricultural wages are significantly higher in these *municipios* than in other regions of the country: the median agricultural wage (L1,280) here is only 15%less than the median Honduran nonfarm wage. Other indicators, such as the degrees of urbanization and electrification, the level of farm income, and the human development index, suggest that the level of rural development in these *municipios* is relatively high.

The ten *municipios* where farm self-employment is the most important activity are geographically dispersed (covering eight of the sixteen departments included in the survey) and the least economically diversified (mostly grain production). The degree of urbanization of the departments where these *municipios* are located varies widely, from the least (Lempira) to the most (Francisco Morazán) urbanized. These *municipios* have, on average, a very low electrification rate (20%), the lowest human development index, and a female participation rate that is around half that of the other regions. Finally, earnings from nonfarm self-employment are 20% to 50% lower in these *municipios* than in any of the other regions considered in the table. This seems evidence of 'push effects' from agriculture, contrasting with our previous analysis for the *municipios* with high concentration of RNF self-employed workers.

Two remaining items in Table 7 need to be explained. The neighborhood activity concentration index is the percentage of workers in a neighborhood that are employed in exactly the same economic activity. As expected, this index is lowest (34%) in *municipios* with high concentrations of RNF wage jobs, and highest (67%) in *municipios* with high concentrations of farm jobs. The relatively high level of this index across *municipios* supports the idea that individual workers' occupations are determined by locational factors. The second item is the percent of neighborhoods where agriculture is

the main economic activity. This percent is, as expected, fairly large, even in neighborhoods where RNF wage jobs predominate.

IV. CONCLUSIONS

RNF activities are important in Honduras, employing 35.8% of the workers and providing 31.3% of the total income of rural households in 1998. Nonfarm wage employment provides a particularly attractive source of income, with median earnings only 10% less than median earnings from farming. However, access to nonfarm wage jobs is both limited to individuals with twice as many years of education as the typical agricultural worker and geographically concentrated in the most urbanized regions of the country. In general, nonfarm self-employment activities are less profitable than nonfarm wage activities, though they do not require so many years of education and are much more geographically dispersed. These activities, particularly commerce, seem to be pulled by different motors, such as relatively profitable agriculture, access to important roads, and proximity to tourist areas.

Because the households included in the survey are clustered around geographically dispersed neighborhoods, in this paper we examined the determinants of RNF income both across and within neighborhoods. Across neighborhoods, those with higher average levels of education and more access to electricity have higher shares of both RNF wage and self-employment income in total income. Neighborhoods located in more urbanized department have a greater shares of RNF wage income, while a neighborhood access to public water leads to a higher share of RNF self-employment

income. The picture is somewhat different if we look within neighborhoods. Within neighborhoods, households with higher levels of education have more access to RNF wage income (but not RNF self-employment income), while households who have electricity in their homes have more access to RNF self-employment income (but not RNF wage income).

Not all RNF activities are profitable. Some of them, particularly self-employment jobs, offer only a 'last resort' source of income for the very poor, as Lanjouw (2001, p. 531) has found for El Salvador. For example, self-employment jobs in manufacturing and social, communal, and personal services offer median earnings of only L400 a month, equivalent to a fourth of the median farming income or a half of the median agricultural wage. Although these activities generate a very low income, they nevertheless play a role in the alleviation of rural poverty. With female participation rates in the 66%-76% range (in contrast to 5%-10% for agricultural jobs), these activities provide an additional source of income for the household.

The regression analysis shows that the compensating role of RNFI on rural household incomes is somewhat different across and within neighborhoods. Across neighborhoods, the share of wage RNFI increases by 1% with a 10% drop in the average neighborhood income, though the share of self-employment RNFI is not significantly affected by changes in income. In contrast, within neighborhoods a 10% drop in household income is associated with a 1% increase in self-employment RNFI, but the effect on wage RNFI is smaller and less statistically significant. This distinction is significant for policy. Because differences across neighborhoods are mainly driven by locational factors such as the proximity of major urban areas, which cannot be easily

changed by policy, poverty alleviation policies should focus mainly on the within-neighborhood analysis. The results thus suggest that policies to improve access to RNF self-employment jobs would help boost the incomes of rural households in a wider geographical area than policies focusing on RNF wage jobs.

The role of locational factors is confirmed by the participation regressions. In particular, they show that the occupational choices of workers from other households in the neighborhood are an important determinant of an individual's occupational choice. For example, an extra worker in the neighborhood working in RNF wage activities increase the probability that an individual will work in a RNF wage activity by 1.5%. This concentration of occupational choices at the neighborhood level was also found for rural Mexico by Araujo [*2001*], who interpreted it as reflecting informal networks of job referrals. The Honduran survey does not allow us to test this hypothesis, as it lacks information about exactly where and how far from their homes individuals work. I believe that the referrals hypothesis is more relevant for individuals who live near urban areas, as they face a wider range of possible occupational choices and information about job opportunities may be difficult to obtain. In contrast, for individuals living farther away in the countryside, locational motors may offer only a limited number of opportunities for RNF jobs. In these cases, referrals should be less important, as it would not be difficult to households in the area to learn about the limited opportunities available.

The earnings regressions show positive premia for years of education and age (reflecting experience) both for RNF jobs and for agricultural wage jobs. All else given, women earn 11% less per month than men in RNF wage jobs and as little as 55% less

than men in RNF self-employment jobs. The very low income of women in self-employment RNF jobs may partly be attributable to part-time wok, but the lack information on hours of work in the survey makes it impossible to confirm this explanation. An interesting finding is that a worker's earning increase with the average years of education of other adults in the household of the worker, at least in wage jobs (both nonfarm and agricultural). A possible explanation for this finding is that more educated families are able to obtain better information about job opportunities. Family connections and knowledge about the local job market may be considered a form of social capital that is complementary to the human capital or skills an individual has. This type of capital is likely to be more important for households located close to urban areas, where a much larger variety of opportunities makes job market information more valuable.

In all, the analysis suggests that there is good potential for the RNF sector to play an important role both in the alleviation of rural poverty and in the promotion of rural development. Current social programs in Honduras include the distribution of food through the Family Allowances Program (PRAF) and investment in schools, rural health clinics, and sanitation through the Honduran Social Investment Fund (FHIS). These programs play an important role in poverty alleviation, but they address only partially the problem of how to improve the capabilities of the rural poor for making a living. The development of job opportunities in the RNF sector could contribute to that purpose.

Because funds are scarce, some criterion for selecting areas and activities for RNF development will be necessary. Given the wider geographical area where RNF self-employment activities proved to be profitable, compared to RNF wage activities, it seems

appropriate to focus on that particular segment. We have also found that manufacturing activities, wage and self-employment, are often very unprofitable 'last resort' activities. As Renkow [*forthcoming*] has pointed out, there are risks in promoting this type of activities because they could be wiped out by competition from better quality goods produced in the urban centers or abroad, as transportation infrastructure improves. On the other hand, more attention needs to be paid to rural commercial activities, which tend to be relatively profitable in the proximity of motors such as a profitable agricultural area. As Correa and Reardon [*2001*] pointed out, there is little research about rural service sector jobs, but the data for Honduras shows that they are already a good option for Honduran rural households.

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Table 1: Workers' earnings, education, and gender by economic activity

Sector	% of the rural labor force	% of wage workers	Median earnings per worker (L/month)		Average years of education		% of female workers	
			Wage workers	Self-employed	Wage workers	Self-employed	Wage workers	Self-employed
Agriculture	0.642	0.332	870	1667	3.04	2.85	0.095	0.050
Manufacturing	0.104	0.446	1300	400	4.94	3.82	0.425	0.758
Mining, EGW	0.003	0.867	1040	800	3.81	3.00	0.000	0.000
Construction	0.029	0.613	1200	2000	4.05	3.77	0.022	0.035
Commerce	0.125	0.141	1300	1370	5.05	3.87	0.443	0.745
Transport, Finance	0.014	0.671	2000	3000	6.99	6.30	0.151	0.000
Other Services	0.083	0.696	1730	420	7.78	3.08	0.532	0.656
All nonfarm	0.358	0.423	1500	1000	6.04	3.80	0.397	0.670

EGW stands for electricity, gas, and water. Commerce includes hotels and restaurants. Transport includes storage and communications. Other services include communal, social, and personal services.

Table 2: Selected household characteristics by income quintile

	Averages by income quintile					Overall average
	1st	2nd	3rd	4th	5th	
Demography, education:						
Dependency ratio	2.70	2.75	2.50	2.15	1.95	2.41
Female headed household	0.35	0.19	0.19	0.14	0.16	0.22
Mean years of education	2.66	3.20	3.60	3.99	5.18	3.68
Children attend school	0.64	0.66	0.65	0.78	0.80	0.71
Infrastructure, dwelling:						
Access to public water	0.21	0.19	0.19	0.24	0.26	0.22
Access to electricity	0.27	0.34	0.39	0.49	0.61	0.41
Toilet in the house	0.23	0.22	0.31	0.38	0.49	0.32
Non-earthen floor	0.33	0.36	0.50	0.57	0.76	0.50
Income:						
Income per occupied	616	1122	1492	1977	4145	1870
Share of rural nonfarm income	0.22	0.23	0.32	0.34	0.37	0.29 (0.313)
Share of self-employment agricultural income	0.31	0.47	0.45	0.45	0.47	0.43 (0.480)
Share of wage agricultural income	0.30	0.24	0.18	0.16	0.08	0.19 (0.129)
Share of wage income in rural nonfarm income	0.26	0.43	0.49	0.43	0.44	0.42 (0.476)

Numbers in parentheses are weighted averages of income shares (with income weights).

Table 3: Determinants of RNFI at the neighborhood level

Explanatory variables	Dependent variable: Share in total income of		
	RNFI	Wage *RNFI*	Self-employment *RNFI*
Average years of Education (neighborhood)	0.088***	0.046***	0.031***
	(5.5)	(3.4)	(3.2)
% Homes with electricity	0.219***	0.126***	0.131***
	(3.8)	(3.9)	(5.4)
% Homes with public water	0.055	0.009	0.056**
	(0.9)	(0.2)	(1.9)
Urbanization rate of department	0.276***	0.242***	0.001
	(3.4)	(2.8)	(0.0)
Log of average neighborhood income	-0.130***	-0.096***	-0.017
	(-2.7)	(-3.0)	(-0.8)
Constant	0.845***	0.619***	0.110
	(2.3)	(2.6)	(0.8)
Pseudo R^2	0.296	0.175	0.175
N	314	306	324
Uncensored obs.	292	223	274

Censored quantile regressions computed at the 60th percentile. Standard errors are calculated from 60 bootstrap replications. The numbers in parentheses are *t* statistics. Stars denote rejection of $H_0 : \beta = 0$ at the 10% (*), 5% (**), or 1% (***) significance levels.

Table 4: Determinants of household RNFI controlling for fixed neighborhood effects

Explanatory variables	Dependent variable: Share in total income of		
	RNFI	Wage *RNFI*	Self-employment *RNFI*
Average years of education (household)	0.056***	0.077***	0.012
	(10.8)	(10.4)	(1.3)
Electricity (1=yes)	0.108**	-0.051	0.226***
	(2.1)	(-0.8)	(3.2)
Public water (1=yes)	0.172**	0.103	0.165
	(2.2)	(0.9)	(1.6)
Log of household income	-0.089***	-0.050*	-0.105***
	(-4.4)	(-1.8)	(-3.9)
Employed members of household	0.043***	0.017	0.053***
	(3.5)	(1.0)	(3.2)
Wald test	159.7***	121.4***	34.3***
Uncensored obs.	1220	591	777

The sample consists of 2659 rural households. The parameters were estimated using Honoré's (1992) trimmed least squares semi-parametric procedure for the censored regression model with fixed effects. The numbers in parentheses are *t* statistics. The Wald test is for the hypothesis that all parameters are zero. Stars denote rejection of $H_0 : \beta = 0$ at the 10% (*), 5% (**), or 1% (***) significance levels.

Table 5: Determinants of individual participation in off-farm activities (probit)

		Nonfarm Wage Employment		Nonfarm Self-Employment		Agricultural Wage Employment	
	Mean Value	Marginal Effect	*z*-stat	Marginal Effect	*z*-stat	Marginal Effect	*z*-stat
Individual Characteristics							
Gender (man=1)	0.75	-0.123	-5.2***	-0.333	-11.9***	0.163	8.8***
Head of household (yes=1)	0.56	-0.088	-4.3***	0.035	1.7*	-0.106	-4.9***
Spouse of household head (yes=1)	0.11	-0.098	-5.0***	0.191	5.7***	-0.076	-3.1***
Age	37.51	0.002	1.0	0.010	4.5***	-0.009	-5.4***
Age squared	1654.24	-0.00005	-1.8*	-0.0001	-4.1***	0.0001	3.3***
Years of education	3.69	0.024	11.0***	-0.006	-3.0***	-0.016	-7.6***
Household Characteristics							
Female headed household (yes=1)	0.20	-0.052	-3.6***	0.029	1.7*	-0.016	-1.0
Number of adults	3.50	-0.014	-2.4**	-0.004	-0.8	-0.029	-5.7***
Females/adults	0.49	0.056	1.4	-0.082	-2.1**	0.137	3.4***
Children/(children + adults)	0.38	0.032	1.2	-0.031	-1.2	-0.004	-0.2
Average years of education of other adults	3.78	-0.0005	-0.2	0.005	2.0**	-0.005	-2.2**
Electricity (yes=1)	0.43	-0.008	-0.5	0.029	1.6*	-0.035	-2.7***
Other workers in household:							
Nonfarm wage workers	0.26	0.072	6.6***	-0.031	-2.7***	-0.004	-0.4
Nonfarm self-employed	0.21	0.003	0.2	0.024	1.5	-0.011	-0.9
Farm wage workers	0.36	-0.006	-0.6	-0.037	-3.8***	0.107	12.0***
Farm self-employed	0.28	0.002	0.1	0.030	2.5**	0.029	2.4**
Neighborhood Characteristics							
Urbanization rate of department	0.36	0.054	2.6**	-0.007	-0.3	0.010	0.6
Ave. years of education of adults	3.75	-0.014	-2.8***	0.001	0.3	0.015	3.2***
Electricity (% of households)	0.42	0.044	2.1**	0.011	0.5	0.050	3.0***
Other workers in neighborhood:							
Nonfarm wage workers	2.30	0.015	7.2***	-0.001	-0.4	-0.012	-5.4***
Nonfarm self-employed	2.54	-0.002	-0.9	0.016	5.5***	-0.006	-2.4**
Farm wage workers	3.08	-0.010	-4.8***	-0.006	-2.8***	0.019	11.5***
Farm self-employed	4.36	-0.013	-5.6***	-0.008	-3.2***	-0.015	-7.5***
Pseudo R^2			0.299		0.305		0.307
Wald tests:							
Individual variables			271.4***		588.4***		278.6***
Household variables			90.2***		61.5***		187.8***
Neighborhood variables			216.6***		68.3***		245.5***

The estimations are based on 4095 rural, remunerated workers of age 15 and above who live in households with two or more individuals. Neighborhood characteristics (except for the urbanization rate) are cluster averages that exclude the individual's household; therefore, they vary across individuals who live in different households. Standard errors are robust, adjusted for clustering by neighborhood. The marginal effect is the change in probability evaluated at sample means resulting from an infinitesimal change in a continuous explanatory variable or from a change from 0 to 1 in a dummy explanatory variable. Stars denote rejection of $H_0 : \beta = 0$ at the 10% (*), 5% (**), or 1% (***) significance levels.

Table 6: Determinants of individual income by type of off-farm activity

	Nonfarm Wage Employment		Nonfarm Self-Employment		Agricultural Wage Employment	
	Coef.	*t* stat.	Coef.	*t* stat.	Coef.	*t* stat.
Gender (man=1)	0.110	2.0**	0.547	2.5**	-0.057	-0.6
Head of household (yes=1)	-0.002	-0.0	0.294	2.9***	0.218	3.6***
Spouse of household head (yes=1)	-0.230	-2.0**	0.437	3.0***	0.089	0.6
Age	0.046	4.5***	0.045	3.1***	0.038	5.2***
Age squared	-0.001	-3.9***	-0.0005	-3.2***	-0.0004	-4.8***
Years of education	0.067	6.3***	0.064	4.9***	0.041	5.1***
Average years of education of other adults in the household	0.049	5.1***	0.050	4.1***	0.049	5.1***
Electricity in the house (yes=1)	0.079	1.5	0.430	4.4***	0.287	5.4***
Other workers in household:						
Nonfarm wage workers	-0.016	-0.5	0.050	0.8	-0.030	-0.7
Nonfarm self-employed	0.049	1.2	0.006	0.1	-0.040	-0.6
Farm wage workers	-0.079	-1.6	-0.305	-3.8***	-0.051	-1.8*
Farm self-employed	-0.051	-0.8	-0.151	-1.8*	-0.039	-0.7
Urbanization rate of department	0.372	2.7***	0.170	1.1	0.298	2.3**
Inverse Mills ratio	0.143	1.3	0.294	1.2	-0.386	-6.3***
Constant term	5.369	17.7***	4.449	8.4***	5.947	35.9***
N	746		806		1011	
R^2	0.345		0.360		0.301	

Dependent variable is the log of the individual's income. Parameters estimated using Heckman (1979) two-step procedure to control for sample selection bias. Standard errors are robust, adjusted for clustering by neighborhood. Stars denote rejection of $H_0 : \beta = 0$ at the 10% (*), 5% (**), or 1% (***) significance levels.

Table 7: Characteristics of top 10 *municipios* by worker participation

	Nonfarm wage employment	Nonfarm self-employment	Farm wage employment	Farm self-employment
Median income (% of workers)				
Nonfarm wage	1,500 (0.44)	1,500 (0.18)	1,500 (0.12)	1,800 (0.08)
Nonfarm self-employment	1,382 (0.20)	910 (0.37)	810 (0.18)	640 (0.11)
Farm wage	1,200 (0.18)	800 (0.09)	1,280 (0.54)	720 (0.15)
Farm self-employment	1,700 (0.18)	1,838 (0.35)	1,959 (0.17)	1,473 (0.66)
Urbanization rate of department	0.711	0.260	0.397	0.321
Electrification rate	0.719	0.487	0.590	0.202
Female participation rate	0.313	0.332	0.265	0.154
Human development index	0.563	0.518	0.590	0.444
Neighborhood activity concentration index	0.343	0.435	0.456	0.669
Main neighborhood activity in agriculture (%)	0.564	0.660	0.952	0.972
Departments included	Cortés (6), Francisco Morazán (3), Copán	Valle (3), Santa Bárbara (3), Choluteca, Olancho, La Paz, Atlántida	Yoro (3), Atlántida (3), Colón (2), Choluteca, Comayagua	F. Morazán (2), Comayagua (2), El Paraíso, Olancho, Lempira, Copán, Intibuca, Choluteca
Main activities	Garments, Construction, Domestic Services, Firecrackers, Shirts, Commerce, Pottery, Sawmills, Furniture, Sugar Mills, Food Services, Banks, Public Sector, Sausages, Transport, Armed Forces, Schools, Entertainment, Auto Repair, Cheese, Bakeries, Underwears, Tiles, Iron Balconies, Auto Parts, Gas Stations, Security Guards, Medical Clinics	Commerce, Hats, Nets, Garments, Personal Services, Pottery, Cooks & Laundresses, Construction, Food Services, Bakeries	Bananas & Other Fruits, African Palm & Coconuts, Cattle Raising, Grains, Coffee, Milk, Shrimp Farms	Grains, Coffee, Vegetables

The source for the human development index at the *municipio* level is United Nations Development Program, *Informe sobre desarrollo humano: Honduras 1998,* November 1998.

ENDNOTES

[1] Only the departments of Gracias a Dios and Islas de la Bahía are excluded from the survey, the first one because of its remoteness and low population density and the latter because of its high enumeration cost.

[2] Three rural *municipios* include 8 census tracts. The number of *municipios* drawn from each department varies from department to department. In all, the survey includes 324 rural census tracts from which 3,240 homes were visited, yielding a high response rate of 87% (2,805/3,240).

[3] Total income includes wage income and self-employment income from a business or farm plus transfers such as pensions and property income (rents and interest). Transfers and property income accounted for only 7.8% of the total income or rural Honduran households.

[4] Although the survey includes information about income earned in secondary occupations, it does not specify which are these occupations. In this paper, income is classified by economic activity according to the worker's primary occupation only. While this criterion might induce errors in the distribution of income by occupation, these errors are unlikely to be too large, as income from secondary occupations represents only 6.8% of total income in the survey.

[5] The period of reference is the previous month for wage income and the average of the previous six months for self-employment income. Income expressed in lempiras (L). The calculations in columns 3 to 8 of Table 1 are based on remunerated wage and self-employed workers (unpaid family members are not included).

[6] Notice that the income-weighted average of the share of agricultural self-employment income (in parenthesis) exceeds the unweighted average. This means that households with higher than average shares of this type of income earn higher than average levels of income. The opposite is true for agricultural wage income: households where this type of income is very important earn less than average income.

[7] The urbanization rate is estimated as the percentage of individuals that live in urban areas in each department.

[8] In a standard Tobit model, the null hypothesis of normality of the error term was strongly rejected in all the regressions by the Pagan-Vella test. Regressions for the 50^{th} (CLAD) and the 65^{th} quantiles were also run with qualitatively similar results.

[9] The most and least urbanized departments are, respectively, Francisco Morazán and Lempira. Their urbanization rates are estimated, respectively, as 82% and 4%.

[10] Although the survey design selected ten homes to be visited in each census tract, some of the selected homes were unoccupied, while a few others were shared by more than one household. As a result H^n is not always equal to 10.

[11] I thank Professor Honoré for kindly providing me with a GAUSS program that implements his estimator.

[12] This variable was omitted from the previous regressions because it does not vary much across neighborhoods (though it varies significantly within each neighborhood).

[13] In order to include the latter variable, I need to exclude from the sample 138 households with just one adult.

[14] Araujo [*2001*] argues that the referral motive is more important than the location motive in a study of 500 poor rural Mexican villages.

[15] I thank an anonymous referee for suggesting this interpretation.

[16] In this case I used simple neighborhood averages, in contrast with the individual level's probits, where the averages excluded the household of the individual.

[17] Remember that earnings are recorded in the survey on a monthly basis. Therefore, the existence of other employed members in the family may help to control for the number of hours an individual works, which certainly influence his or her earnings.

[18] Besides the changes to the coefficients of the educational variables already mentioned, the alternative regressions are qualitatively and quantitatively similar to the ones included in the paper.

[19] The average monthly earnings from nonfarm self-employment is only L1,050 (N = 369, SE = 70.8) for individuals who have other household members engaged in agriculture, compared to twice as much (L2,106, N = 495, SE = 101.2) for those who don't.

[20] If b_j^{two} and b_j^{ols} are, respectively, the parameters computed by Heckman two stage method and OLS, the bias is measured as the median of $\left|b_j^{two} - b_j^{ols}\right| \Big/ b_j^{two}$ over j.

[21] The method consists of including in each earnings equation a polynomial on the predicted values of the corresponding participation equation, instead of the inverse Mills ratio.

[22] The 40 *municipios* included in the table represent almost half of the 78 *municipios* included in the survey.