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Poverty, Language, and Participation in Non-Farm Labor Markets in Rural Paraguay

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The dynamics of rural poverty has long been a staple research topic for agricultural and development economists. The need to understand rural poverty is becoming more urgent because of its impact on rural-urban migration, and the strain that urban growth is placing on the quality of life in developing countries. Thought on how governments can best support rural incomes has evolved over the decades. T.W. Schultz's pathbreaking work encouraged reduced support for subsidies in favor of efforts to increase agricultural productivity through high payoff investments in research, extension and education (Schultz, 1964). More recently, the importance of non-farm employment and rural labor markets to rural incomes has been emphasized. This study examines factors that affect the decision of rural residents to work off-farm, and measures the effect of those factors on household income. We use data from Paraguay, a country that has a high poverty rate and which has been the subject of few published studies.

Research in other Latin American countries has shown that rural non-farm income represents a high and growing share of the total income of rural households. Rural non-farm employment is above 20% in all Latin American countries, and accounts for more than 40% of rural income (Reardon, et al., 2001). The published literature also supports the idea that poverty alleviation in rural areas requires support both for increased agricultural productivity, and for improved access to non-farm employment. The literature also notes a close association between rural off-farm economic activity and poverty reduction. Nonetheless, there has been relatively little micro-level analysis of the joint determinants of off-farm activity and poverty reduction.

Paraguay faces some significant rural development challenges that are not common to other Latin American countries. Guarani, rather than Spanish, is the first language of 73 % of the rural population. This has hindered efforts to integrate rural households into the national economy. Also rural development policy in Paraguay has concentrated on support for

agriculture, rather than on improving the quality of the rural labor force or on facilitating the development of rural labor markets. Between 1985 and 2000, about 86% of public rural expenditures in Paraguay went towards agricultural subsidies – the highest share among the nine countries surveyed in a recent World Bank publication – while investments in roads, communications infrastructure, and human capital have lagged (Ferranti, et al., 2005).

Rural residents in Paraguay live in a vastly different social, political and economic environment than their urban counterparts. Both populations face a poverty rate above 36%, but rural residents have less access to fundamental services such as sanitation, electricity, communication, education, and healthcare that urban residents take for granted (Anonymous, 2005). The average number of years of schooling in rural areas is just 4.8 years compared to 8.4 years for urban areas. The voice of rural people, other than large landowners, in the political process is very small indeed. These factors represent a huge challenge as Paraguay attempts to reduce poverty and to prepare its rural population to participate in a modern, global economy.

The General Department of Statistics, Surveys and Census (DGEEC), reports that in 2003, 51% of rural Paraguayans were living in poverty, and 31% in state of indigence³. Although there has been a growing Latin American literature on the importance of off-farm employment opportunities in relieving rural poverty, in Paraguay rural development policies have generally concentrated on supporting agriculture. The literature on rural off-farm economic activity notes a close association with poverty reduction (Lanjouw and Lanjouw 2001, Ellis 1998). Nonetheless, there has been relatively little analytical work on the joint determinants of off-farm activity and poverty reduction.

This paper examines the rural population of Paraguay, summarizing information on poverty, employment status, education and languages spoken. Results from a preliminary

³ Well-being Indicators 2002. Annual Publication of the Department of Statistics, Surveys and Census.

econometric analysis of the determinants of participation in non-farm, and of earnings are reported. Strategies for increasing access to non-farm employment income generation in the sector will be discussed with regards to their potential to improve living conditions and to mitigate poverty in depressed rural zones. Data from the 2003 Permanent Survey of Households (PSH) is used. This is the latest PSH available in Paraguay, and has a comprehensive set of socio-demographic and economic variables that permit analysis to be conducted at the country level. The PSH sampled 43,161 individuals, including 21,674 rural residents.

Literature Review

One of the initial studies on this subject in countries with large agricultural sectors was performed by Klein (1992). He shows that in the decade of the 80's rural non-farm employment grew in almost all Latin American countries. Reardon and Berdegúe (1999) show that on average, non-farm income represented 47% of the income of rural households in the region and that in the absence of the non-farm sources of income, poverty would be many times greater. These authors make a distinction between the roles of wage income and of self-employed income. The poorest households tend to be those that rely most heavily on farm wage employment, while non-poor households depend more heavily on non-farm employment sources.

Rural non-farm activities are understood to be those developed by individuals in tasks other than their own-farm activities, including wages earned as workers on other farms, industry and manufacturing and services. These kinds of employment are considered activities that are important to (a) escape indigence or poverty (Berdegúe et al., 2001,), (b) generate income from family labor that is available during times of the year in which the labor demand goes down; (c) diminish the risk of income fluctuations.

Research in other countries of Latin-America points out that the rural non-farm income represents a high and growing share the total income of rural households (International Network

of Methodology in Production Systems). In Latin-America rural non-farm employment is above 20%, in all countries and accounts for more than 40% of rural income.

Robles (2002), in a study of the rural population in Paraguay, found that the non-farm income is more important for individuals who are less poor. Those results reveal the importance of this income source within the Paraguayan rural sector as a means to overcome poverty.

Reardon and Berdegúe also show the static nature of access of the rural poor to non-farm employment. This is due to the fact that the personal attributes needed to access off-farm employment are rare in the poor rural population. Non-poor rural populations show greater availability of assets, human and social capital, and are thereby better equipped to obtain non-farm jobs. Escobar (1998) has shown that in Peru access to public services and an adequate endowment of private assets (especially education and credit) may improve access to non-farm employment.

Woldehanna and Oskan (2001) and Smith et al. (2001) found signs of labor market duality in their studies of Ethiopia and Uganda. The skilled and educated individuals were found either to enter into high paid jobs or to return to self-employment, while the unskilled and uneducated were dependent on low-pay casual employment opportunities. Substantial entry barriers cause the relatively wealthy rural households to dominate the lucrative self-employment activities. Echeverría (2001) and de Janvry (2001) found that non-farm income constitutes an important force to mitigate poverty for many rural households. Other studies⁴ substantiate that this activity constitutes, for some households, a mechanism for overcoming poverty that the purely farm sector does not offer since it permits the stabilization of income, compensating for the seasonality of farm production and employment, the diversification of the sources of income,

⁴ Development of rural non-farm employment in Latin America and the Caribbean. Documents of Conclusions and Recommendations. BID/FAO/CEPAL. Santiago de Chile. September 1999.

thereby reducing the effect of inherent agricultural risks. In the Paraguayan case, Robles (2002) indicates that farm and non-farm income are substitutes for each other.

Empirical evidence in many countries supports the notion that agricultural wages are not perfectly flexible, and that rural agricultural labor markets are segmented with certain subgroups of the population such as women and children unable to obtain employment at the market wage. Indian village studies (Huffman, 1993) indicate the most important determinant of the incidence of non-farm employment may be that the poor with the lower reservation wages generally show the greatest inclination to become involved in low-paying non-agricultural activities.

Several studies (Da Silva, 1998 and Weller, 1997) have attempted to identify and characterize the influential factor in the process of developing non-farm employment. These factors may be either endogenous or exogenous to the rural sector. Case studies in Central America⁵ indicate that rural development influences are diverse and frequently originate from outside the rural sector. Endogenous factors permit the accumulation of capital (physical, human, financial) up to a point in which the state of development makes a region attractive for foreign capital investment. The exogenous determinants of non-farm employment include the influence of the urban cities on their rural surroundings. Cities demand an expanded set of goods and services and offer a larger labor market.

An empirical study carried out in Chile⁶ shows that non-farm employment is not only a source of income for rural households, but also a strategy for integrating women into the labor market. It also shows that education is a central element for the development of jobs for young people.

The Rural Labor force

⁵ Escobar, G. "Non-farm Employment" An alternative for Development? RIMISP.2000

⁶ "Non-farm Employment" Results of the VII Survey of National Socioeconomic Characterization (CASEN 1998). Documents of Labor. MIDEPLAN, Chile, August 2000.

The data for this study are from the Permanent Survey of Households 2003 (PSH2003) carried out by the Paraguayan Department of Statistics, Surveys and Census. A slightly higher percentage of rural than urban residents are employed (Table 1), but sources of employment differ markedly. Two-thirds of rural workers are employed in the primary sector, compared to just 6% in urban areas. Services employs three-quarters of urban workers compared to just one quarter of rural workers. Nearly half of the rural population is self-employed compared to just 31% in urban areas. Conversely, just 25.6% of rural workers are salaried, compared to 59.2% in urban areas. The main generators of employment of individuals living in rural areas continues to be family enterprise, even though this proportion has fallen from around 72% in recent years⁷. Non-salaried activity serves as the main regulator to absorb the rural unemployed.

Similar proportions of men work in the primary and tertiary sectors (40%), while the secondary sector employs just 18% of the male population. For women, the tertiary sector is the main sector of employment, with approximately 70%. The data show that the Paraguayan economy generates few manufacturing or construction jobs in either rural or urban areas.

Table 2 characterizes the rural farm and non-farm workforces by gender, level of education, language, size of household and age. Two-thirds of the total rural workforce is employed on-farm. Men comprise 76% of farm labor, and slightly more than half of non-farm workers.

The education and language figures reveal the magnitude of the challenges facing the country in stark terms. Rural Paraguay has less than 90,000 workers out of a total workforce of more than 1 million that have completed high school. Barely a quarter of the rural workforce has even attended high school. These few educated workers are concentrated in the non-farm sector.

⁷ Robles, Marcos (2002)

Virtually no workers with a university education are employed in farming; just 3% have completed high school.

Eighty-two percent the farm workforce speak only Guarani, compared to 56.1% of the non-farm population. Just 7.8% of the farm-employed population is bilingual, while the non-farm bilingual percentage is 22.1%. About 3% of the farm workforce and 14.8% of the non-farm workforce speaks only Spanish. The lack of language skills represents a huge employment obstacle to the majority of the rural workforce.

The farm workforce is concentrated in the very young and older workers compared to the non-farm workforce. Thirty-three percent of the farm workforce is between 10 and 24 years of age, 4% higher than for non-farm work. The non-farm workforce has higher shares between 25 and 34 years of age and between 35 and 44 years old by 9.7% and 4.9% respectively. This shows that a great part of the rural population in their “prime” work years tends to perform non-farm activities, which would imply that they find more incentives in those activities.

Table 3 illustrates the correlation between income and farm or non-farm employment using national income quintiles and poverty status. Nearly half of rural farm employees live in poverty, earning an average of \$15 monthly, compared to 17% of non-farm employed who earn an average of \$34 monthly. Just 25% of rural farm employed are in the top two national income quintiles. Only in the highest quintile does average income is exceed \$100.

Table 4 shows large monthly income discrepancies between men and women, between farm and non-farm employees. The premium on education is surprisingly small for farm workers. Those with no education earn less than those with some schooling, but workers with some primary school have virtually the same wage as those who have graduated from high school. The education premium in the non-farm sector is higher. This suggests a lack of opportunity to employ educated workers in a stagnant farm sector. The inability to speak

Spanish is a clear economic disadvantage. Spanish speaking or bilingual workers earn two to three times the average wage that Guaraní speakers earn.

Econometric approach

An especially rich dataset is available for the analysis, allowing identification of a number of personal factors that can attribute to decisions to participate in the non-farm labor market. One econometric issue in the analysis of off-farm employment decisions and incomes lies in individual worker self-selection. It is necessary to estimate a system containing a selection mechanism probit equation for the decision to work off farm, and a wage or income equation. In addition to controlling for endogeneity, this estimation strategy leads to a richer set of results because we can uncover structural differences in the population that lead to the employment decisions ultimately affecting their financial well-being.

A two stage econometric approach is used to analyze participation in the non-farm labor market and non-farm earnings. The first stage analyses whether non-farm labor participation is related to human capital attributes, such as the schooling level or with other characteristics such as the sex of the head of household, the age of the individual, the size of the household, and other factors. The second stage model examines attributes influencing the income level.

The nature of the data calls for the use of a technique developed by Heckman (1979). Rural non-farm employment data is observed only for part of the workforce, resulting in what the literature calls a selective truncation. Only 34.4% of individuals are employed in the non-farm sector. Other potential rural workers might work off-farm if their wage requirement were met. They would therefore become part of the contingent that in the sample that appears with income for this type of work. Estimating the earnings equation by OLS using only the observed sample wages produces inconsistent results (Greene, 1999).

The first stage of the analysis estimates a PROBIT model using the full data set of the rural population. The dependent variable has a value equal to 0, when there is no non-farm employment, and takes the value 1 when non-farm employment takes place. The first stage evaluates the probability of being employed in a non-farm job using the PROBIT estimation, as:

$$z_i = \alpha_i + \beta_i x_i + \mu_i$$

The x vector includes variables affecting the probability that an individual participates in non-farm employment (variable definitions contained in appendix). Once estimated the PROBIT equation is used to obtain the inverse Mills ratio, γ , to correct for truncation. A semi-log functional form is used for the earnings equation: $Lny_i = \alpha_i + \beta_i x_i + \beta_\lambda \lambda_i + v_i$

The dependent variable Lny_i is the logarithm of non-farm income. Due to the fact that this variable has value only when z_i , of the probabilistic equation has a value of 1, the variable λ is incorporated in the model, which contains information relevant to the population that does not have non-farm employment.

Tables 5 and 6 present the results of the participation and of non-farm income models. Standard errors were corrected using Huber and White heteroskedasticity method. Participation results suggest that female heads of households are more likely to participate in non-farm employment. However, in terms of non-farm income, the average income of women in the non-farm sector is 63% below than that of men. The existence of household poverty¹⁰ has a negative association with the probability of access to rural non-farm employment and with the level of income. Belonging to a household with a larger number of people positively affects the probability of being employed in a non-farm sector, and has a positive and significant effect on the level of non-farm income.

¹⁰ Prepared on the basis of the classification established by the Department of Statistics, Surveys and Census.

Education, measured by years of schooling, is positive and statistically significant both for the probability of access to rural non-farm employment and for level of income. The estimation shows that one more year of schooling increases non-farm income by 6%. These results are similar to those obtained in other studies performed in the region and to those obtained by Robles (2002) regarding the direction of their effects, but not in the magnitude.

For example, in a study performed by the Ministry of Planning and Cooperation in Chile¹¹ showed that one more year of study increases non-farm income (per hour) by 12.5%, while Taylor (1999), in a study of non-agricultural rural activities for rural households in Michoacán, Mexico, found that the impact on monthly incomes was on the order of 9%.

The fact that rural non-farm employment constitutes a labor alternative for the younger residents, is shown by the negative signs of the coefficients of the age variable. Speaking only Guaraní reduces the probability of being employed in the non-farm sector, as well as reducing the income received in non-farm activities by 31%.

Finally, the coefficients of the variables that reflect ownership of assets and access to electrical energy service, are not significant in the non-farm income equation, but are statistically significant in the probability of non-farm employment. As expected, the ownership of land and the ownership of machinery appears to induce the property owners to concentrate their activities on the farm sector rather than in non-farm labor market. Access to electricity increases the probability of non-farm labor participation.

Conclusions

From this preliminary analysis, we present some recommendations for the design and implementation of policies and programs oriented to encourage the development of rural non-farm employment and income. The comparative advantage of women and the absence of

¹¹ Results of the VII Survey of National socio-economic Characterization (CASEN 1998) Document No 17 – Rural Non-farm Employment, Santiago de Chile, August 2000.

entrance barriers for youths in this type of employment suggests that a strategy of intervention for these groups has a double benefit: potentially greater income for individuals and the incorporation of people who have access limitations in programs of farmer assistance.

Education is a central element for the development of rural non-farm employment. Great attention should be given to education and to training programs that ease the entrance to non-farm activities, given restrictions placed by lack of human resources to put into practice these policies of rural development. Investment in rural education should be directed towards the promotion of wide and generalized technical training plans among youths of rural areas, not only in regular secondary schools, to form a base of workers with the minimum tools, including language skills, that are required in the secondary and tertiary sectors.

The growth of off-farm employment in recent years has accelerated the abandonment of subsistence farms. These farms have traditionally been central to maintaining rural peasant families, with intensive employment of female labor because male family members are absent working off-farm. It is important to consider policies for reducing poverty from a perspective of gender equality. Employment policies focused on rural women must consider that off-farm employment possibilities are a significant complement to low productivity peasant farms.

The challenge of more fully integrating rural Paraguayans is a large one. Until rural residents are fully bilingual, have access to public education and begin to move out of poverty, it will be difficult for them to make their voice heard within the political process.

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Table 1: Percentage Of Population 10 Years Of Age And Older By Economic Sector.

Category	Area		Sex		
	Urban	Rural	Male	Female	Total
By employment status:					
Employed	53	58	69	41	55
Unemployed	7	2	5	5	5
Inactive	41	39	26	54	40
<i>Total</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
By sector of employment:					
Primary ^a	6	66	40	21	33
Secondary ^b	18	10	18	10	15
Tertiary ^c	76	24	43	70	53
<i>Total</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
By Salaried or non-salaried:					
Public employee	10	3	6	10	7
Private employee	17	2	10	10	10
Public worker	2	0	2	1	1
Private worker	19	16	25	6	18
Domestic employee	11	4	1	19	8
<i>Total salaried</i>	<i>59%</i>	<i>26%</i>	<i>43%</i>	<i>45%</i>	<i>44%</i>
Employer	5	3	5	2	4
Self-employed	31	49	37	42	39

Non-salaried Family	4	22	14	10	12
<i>Total Non-salaried</i>	<i>41%</i>	<i>74%</i>	<i>57%</i>	<i>55%</i>	<i>56%</i>
<i>Total Salaried and Non-</i>					
<i>salaried</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>

Source: PSH 2003

^a Agriculture, cattle, hunting and fishing

^b Manufacturing and construction

^c Electricity, water, commerce, financial institutions, community and personal services

Table 2: Characteristics Of Rural Farm And Non-Farm Work Force

Category	% of		Total	Total
	Farm	Non-Farm	(%)	(1,000)
Total Rural Workforce	66	34	100	1,055
Gender:				
Male	76	54	69	725
Female	24	46	31	330
Education:				
No schooling	6	3	5	53
Some Primary	49	30	42	447
Completed Primary	26	26	26	272
Some Secondary	16	23	19	195
Completed Secondary	3	9	5	53
University Graduate	0	9	3	34
Language:				
Only Guaraní	83	56	73	774
Guaraní/Spanish	8	22	13	134
Spanish	3	15	7	73
Other	7	7	7	72

Source: PSH 2003

ND = No data

Table 3: Percentage Of Employed Rural Population, By Income Quintile And Poverty Status.

Categories	Farm	Non-Farm	Total
% of workers by Poverty Status			
Poor	48	17	37
Non-poor	52	83	63
% of workers by Income Quintile			
Lowest	37	10	28
Second	21	17	20
Third	16	22	18
Fourth	13	26	18
Highest	12	26	17
Average income by Income Quintile(\$US)			
Lowest	13	30	15
Second	28	48	34
Third	43	69	54
Fourth	67	99	83
Highest	341	182	101
Overall average income	69	98	79

Source: PSH 2003

**Table 4: Average Monthly Income Of The Employed Rural Population, (US Dollars,
Converted At November 2003 Exchange Rate Of 1 US Dollar = 6,371 Guarani).**

Category	Farm	Non-Farm	Total
Overall	69	98	79
Sex			
Male	74	126	88
Female	52	66	59
Education			
No schooling	39	58	43
Some Primary	69	74	71
Completed Primary	68	88	75
Some Secondary	79	93	85
Completed Secondary	66	126	102
University Graduate	91	219	208
Language			
Only Guarani	38	75	47
Guarani/Spanish	97	118	109
Spanish	239	145	170
Other	343	128	269
Age			
10 to 24	21	62	34
24 to 34	80	112	94
35 to 44	90	128	105
45 to 54	130	110	124

55 to 64	94	85	92
65 and +	48	80	53
Poverty status			
Poor	15	34	18
Non-poor	118	112	115

Source: PSH 2003

Table 5. Probit Model. Participation In Rural Non-Farm Employment

Dependent Variable: logarithm of on-farm income

Variable	Coefficient	Std. Error	z-Statistic	Prob.
Poverty	-0.6386	0.0636	-10.0431*	0.0000
Sex	0.7251	0.0694	10.4443*	0.0000
SizeHousehold	0.0457	0.0108	4.2110*	0.0000
Education	0.1026	0.0085	12.0943*	0.0000
Age	-0.0034	0.0020	-1.7079**	0.0876
Guaraní speaking	-0.3165	0.0536	-5.9019*	0.0000
Land	-0.1948	0.0562	-3.4632*	0.0005
Electricity	0.3908	0.0748	5.2218*	0.0000
Machinery	-0.9996	0.0574	-17.4191*	0.0000
Migrant	-0.0313	0.0762	-0.4103	0.6816
C	-0.6496	0.1376	-4.7206	0.0000
S.E. of regresión	0.3840	Sum squared resid		567.5394
Log likelihood	-1755.7707	Restr. log likelihood		2377.5518
LR statistic (10 df)	1243.5622	McFadden R-squared		0.2615
Probability(LR stat)	0.0000	Included observations:		3,859

QML (Huber/White) standard errors & covariance

* Statistically significant at 95% confidence level.

** Statistically significant at 90% confidence level.

Table 6. Earnings Equation For Rural Non-Farm Employment

Dependent Variable: logarithm of on-farm income

Included observations: 1177

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Poverty	-1.1029	0.1218	-9.0537*	0.0000
Sex	-0.6309	0.1118	-5.6428*	0.0000
SizeHousehold	0.0823	0.0124	6.6412*	0.0000
Education	0.0638	0.0145	4.4116*	0.0000
Age	-0.0093	0.0020	-4.6103*	0.0000
Guaraní speaking	-0.3108	0.0655	-4.7415*	0.0000
Land	-0.0925	0.0543	-1.7026**	0.0889
Electr	0.1670	0.1076	1.5522	0.1209
Machinery	-0.2281	0.1805	-1.2638	0.2066
Migrant	0.0768	0.0624	1.2320	0.2182
Lambda1	0.2130	0.2220	0.9596	0.3375
C	12.7513	0.5517	23.1108	0.0000
R-squared	0.4276	Mean dependent var		13.1676
S.E. of regresión	0.7518	S.D. dependent var		0.9890
Sum squared resid	658.4293	F-statistic		79.1174
Log likelihood	-1328.2504	Prob(F-statistic)		0.0000

White Heteroskedasticity-Consistent Standard Errors & Covariance

* Statistically significant at 95% confidence level

** Statistically significant at 90% confidence level

Appendix 1

Definition of the utilized variables

Dependent variables

Non-farm: dichotomous variable, value 1, if employed in the secondary and tertiary sector (non-farm employment), value 0, if not.

Income: per capita income of the resident individuals in the rural area, employed in the secondary and tertiary sector (non-farm employment), logarithmic.

Independent variables

Poverty: dichotomous variable, value 1, if below the poverty line, value 0, if not.

Sex: sex of the head of family, value 1 if woman, value 0 if not

SizeHousehold: number of members of the household

Education: years of schooling

Age: age in years

Guaraní: majorly spoken language by the head of family, value 1 if only Guaraní is spoken, value 0 other languages.

Land: ownership of parcels, dichotomous variable, value 1 if true, 0 if not.

Electricity: availability of electricity, dichotomous variable, value 1 if available, value 0 if not.

Machinery: ownership of equipment, dichotomous variable, value 1 if true, value 0 if not.

Migrant: dichotomous variable, value 0 if resided “here in this same area.” Value 1 if resided in another within the past five years.

Appendix 2

Statistical description of the utilized variables

Variable	Media	Standard Deviation
Poverty	0.3353	0.4722
Sex	0.1340	0.3407
SizeHousehold	4.8531	2.5704
Educ	4.9565	3.2245
Age	45.1731	14.2054
Guaraní	0.7209	0.4486
Land	0.6686	0.4708
Electricity	0.8362	0.3701
Machinery	0.4400	0.4965
Migrant	0.1179	0.3225
lambda1	1.3684	0.5366
Lambda2	1.3527	0.5534