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## Rural non-agricultural activities and poverty in the Brazilian northeast

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DEPARTAMENTO DE ECONOMIA  
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RURAL NON-AGRICULTURAL ACTIVITIES AND POVERTY IN  
THE BRAZILIAN NORTHEAST

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# **Rural Non-Agricultural Activities and Poverty in the Brazilian Northeast**

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**Keywords:** Rural Non-Agricultural Activities, Rural Poverty, Brazil, Northeast

**JEL Classification:** I32, J43

**Abstract:** This paper combines two complementary data sets to present a disaggregated spatial profile of poverty in the Brazilian Northeast, and to investigate the importance of non-agricultural activities for its rural dwellers. We present both univariate and multivariate profiles of non-agricultural employment and discuss its determinants. While the main occupational difference between the rural poor and the rural non-poor in Brazil seems to be the greater reliance of the former on paid agricultural employment (*vis-à-vis* own cultivation), rather than access to non-agricultural activities, the evidence nevertheless suggests that diversification into this growing sector provides both an important complement to the budgets of the poor, and possibly a self-insurance mechanism against negative shocks. Despite the substantial heterogeneity of the sector, two general findings are robust: returns to education are comparatively high; and location in relation to urban areas is an important determinant of both employment and earnings in rural non-agricultural activities.

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<sup>1</sup> Ferreira is with the Catholic University of Rio de Janeiro (PUC-Rio) and Lanjouw is with the World Bank and the Free University of Amsterdam. We are grateful for comments and suggestions from Johan Mistiaen, Alberto Valdes, and participants at a Workshop on Rural Non-Farm Employment at Wageningen University, Netherlands, May 8, and a Workshop on Rural Poverty held in Rio de Janeiro, May 30-31, 2000.

## 1. Introduction

Rural poverty in Brazil is a subject of widespread interest. This is true within Brazil itself, but also in the broader Latin American context. The country looms so large on the geographic, social and economic landscape of the continent that distributional outcomes in Brazil directly influence any assessment of aggregate welfare in the region. For example, at least one study estimates that in 1980 the rural poor in Brazil accounted for roughly 40% of rural poverty and as much as 25% of *total* poverty in Latin America as a whole (Morley, 1994).

Within Brazil, poverty has been highest in the Northeast for as long as records have existed. In 1996, the year with which we are primarily concerned in this analysis, 63% of all poor Brazilians lived in that region.<sup>2</sup> Within the Northeast, poverty is particularly severe in rural areas: just under half of the sixteen and a half million people who lived in the rural areas of the region in 1996 were poor. Interestingly, despite their rural status and poverty, non-agricultural activities generated nearly a fifth of their household incomes. In the region's rural population as a whole, 22% of primary occupations were outside agriculture and, when all non-agricultural income is counted, it amounted to a third of the total.

This paper aims to investigate the nature and determinants of rural non-agricultural (RNA) occupations in the Brazilian Northeast, as well as its distributional profile and poverty impact. The plan of the paper is as follows. In the next section, we briefly review the growing international literature on the interactions between RNA employment and poverty. Section 3 discusses the data and presents a spatial profile of poverty for the Northeast at an unprecedented level of geographical disaggregation. Section 4 profiles RNA employment, with a focus on its sectoral, spatial and gender dimensions. Section 5 extends that analysis to a multivariate setting, by estimating a probit model of RNA employment. Section 6 brings RNA occupations and poverty together by examining the distributional properties of the former. Section 7 concludes.

## 2. A Brief Literature Survey

The relationship between poverty and the rural non-agricultural (RNA) economy in Latin America has received attention by researchers and policymakers for some time.<sup>3</sup> Building on earlier work by Klein (1992), Reardon, Berdegue and Escobar (2000) indicate that non-farm<sup>4</sup> employment growth in rural Latin America has generally been rapid during the last three decades – certainly more so than farm employment growth.

Mellor (1976) highlighted the potential interrelationship between the non-farm sector and the agricultural sector, pointing to the myriad linkages that bind the two together. He pointed to potential forward linkages from agriculture to the non-agricultural sector, as well as backward linkages, supporting production and consumption growth. The argument stemming from these observations is that the farm and the non-farm sectors can mutually support each other in a ‘virtuous’ cycle of development in which both sectors strengthen simultaneously. While examples of such linkages can be readily identified in Latin America, it is also thought that the particularly skewed distribution of land in the region may act as a constraint (de Janvry and Sadoulet, 1993).

In Brazil, the evolution of employment in the rural non-farm sector has been described by del Grossi (1999) and by Graziano da Silva and del Grossi (2000). While employment in agriculture essentially stagnated between 1981 and 1995, rural employment in non-agricultural activities in Brazil as a whole grew by more than a quarter (nearly a million persons) over this time period (annual growth rate of 1.7%). The most rapid growth has occurred in the regions of the Southeast and Central West.

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<sup>2</sup> A person is considered poor in this paper if he or she lives in a household with total per capita monthly income below R\$65.07 at 1996 prices. See Ferreira, Lanjouw and Neri (2000) for a detailed derivation of this poverty line and a general discussion.

<sup>3</sup> Recent examples include de Janvry and Sadoulet, 1993; Elbers and Lanjouw, 2000; Lanjouw, 2000, Lanjouw 1999a, 1999b; Lopez and Valdes, 1998; Reardon, Berdegue and Escobar, 2000. For a broader survey see Lanjouw and Lanjouw, 2000.

<sup>4</sup> Throughout the paper, we use the terms ‘off-farm’ and ‘non-farm’ interchangeably with ‘non-agricultural’. Or definition excludes direct involvement in agriculture, animal husbandry, forestry, hunting, gathering or fishing, but includes agriculturally-related activities such as agro-processing, the production of chemical fertilizers, etc.

Much of the growth of non-farm employment is accounted for by a 5.3% annual growth of own-account<sup>5</sup> services (mainly domestic services). Between 1981 and 1992 the number of rural dwellers working in domestic services grew from 300,000 to about 620,000. Civil construction, on the other hand, was one of the main sources of non-farm employment in 1981, but lost about 300,000 participants over the interval between 1981 and 1995 (an annualized growth rate of -4.3% for Brazil as a whole). The particular significance of the construction industry is worth highlighting, as employment in this sector can be of great importance to the poor. In the Northeast, in particular, employment creation in civil construction projects is a well established government response to droughts. A large decline of employment in construction between 1981 and 1995 in the Northeast (at an annualized rate of 9.0% per year) is likely to be at least in part due to relatively favorable weather conditions in the early 1990s. Other important growth sub-sectors have included education (up 3.5% per annum), food sales (3.4%), food processing (4.2%), restaurants (6.1%) public administration (9.8%) street selling (8.1%). Growth of employment in manufacturing activities was slow, at 0.7% per annum.

On the whole, the evolution of employment in the non-farm sector in rural Brazil appears to be congruent to the trends observed in developing countries more generally, and particularly in Latin America (see Lanjouw and Lanjouw, 2000, and Reardon et al, 2000). The sector's growth and dynamism can be contrasted to the generally much lower growth in employment opportunities in agriculture over the same time period.

A second stylized fact that has proven quite general in most developing countries is that returns to formal education in the non-farm sector are high, especially in comparison with returns to education in agriculture. This has been documented extensively in Latin America (summarized in Reardon et al, 2000) as well as in Africa and Asia.<sup>6</sup> Reardon et al (2000) emphasize in addition the importance of transport infrastructure, mainly roads, in stimulating non-farm employment growth in Latin America.

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<sup>5</sup> 'Own account' stands for "conta própria", a common denomination for informal self-employment in Brazilian household and employment surveys.

<sup>6</sup> Some recent evidence for Africa is provided by Jolliffe, 1998, for Ghana and Lanjouw, Quizon and Sparrow, 2000, for Tanzania. Fafchamps and Shilpi (2000) provide some recent evidence for Nepal. Van de Walle (2000), and Lanjouw and Shariff (2000) do the same for Vietnam and India, respectively.

The relationship between the incidence of poverty<sup>7</sup> and the RNA sector is often rather subtle. The most direct impact on poverty can be discerned when the sector offers employment opportunities to the poor with remuneration levels that are sufficiently high to lift them out of poverty. However, Lanjouw and Lanjouw (2000) describe how heterogeneous non-agricultural activities can be, and suggest that they can be usefully divided into two groups of occupations: high labor productivity/high income activities, and low labor productivity activities which serve only as a residual source of employment - a "last-resort" source of income. These latter activities can be quite common among the very poor, particularly among women. Even if "last resort" non-farm incomes are very low and therefore offer no realistic prospect of lifting individuals out of poverty, such income sources are clearly very important from a social welfare perspective, since they help reduce the severity of deprivation for many families. In addition, for certain subgroups of the population who are without land and who are also unable to participate in the agricultural wage labor market (due perhaps to ill-health, discrimination and/or cultural restrictions), these non-agricultural incomes may offer the only means to some economic security (a safety net).

### **3. Rural Poverty in Brazil<sup>8</sup>**

Since only 21% of the country's population lives in rural areas, poverty in Brazil is often described as a largely urban phenomenon. However, recent studies suggest that the traditionally stark rural-urban dichotomy might be a misleading notion. In particular, recent work by Ferreira, Lanjouw and Neri (2000) - henceforth FLN (2000) - concludes that the incidence of poverty is not only higher in rural vis-à-vis urban areas, but it is also typically higher in small urban areas compared to larger cities and metropolitan areas.<sup>9</sup> These findings are significant in the context of rural poverty for at least two reasons. Firstly, the urban versus rural dichotomy is inevitably somewhat subjective and secondly,

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<sup>7</sup> In this paper, due to space constraints, we will focus on poverty incidence, as measured by the simple headcount index. The reader is cautioned, however, that this restricts our ability to draw conclusions on the depth or severity of poverty, as well as about the distribution of incomes among the poor. Other FGT measures are more suitable for those purposes. See FLN (2000) for some calculations for Brazil in 1996.

<sup>8</sup> This section draws on joint work with Johan Mistiaen.

it is quite likely that the economies of smaller towns are linked more closely to the rural economy than they are to the economies of larger urban areas.

This section presents a poverty profile for the Brazilian Northeast, based on two data sets: the 1996 *Pesquisa Nacional por Amostra de Domicílios* (PNAD) and the 1996 *Pesquisa sobre Padrões de Vida* (PPV) survey implemented by the *Instituto Brasileiro de Geografia e Estatística* (IBGE) based on the World Bank's LSMS survey design. The PPV survey covers only the Northeast and Southeast of Brazil, and for this reason we will confine our comparisons of poverty, for both the PNAD and the PPV, to these regions. The data sets are combined because their respective strengths and weaknesses make them naturally complementary.<sup>10</sup> On the one hand, the PPV reports quite detailed consumption expenditure data and permits the construction of price indices to account for spatial price variation. However, the PPV sample size is not large enough to be representative at levels of spatial disaggregation much below the regional and large metropolitan area level. The PNAD sample is many times larger than the PPV and is representative at the state level. However, the PNAD does not report expenditure data and the income measures are somewhat unreliable (particularly in rural areas).<sup>11</sup>

By employing a recently developed small-to-large survey imputation technique, we are able to capitalize on the individual strengths of both data sets while eschewing their respective weaknesses. These econometric techniques essentially enable us to impute the expenditure data sampled via PPV into the larger PNAD sample. Based on the approach outlined in Elbers, Lanjouw and Lanjouw (2000) we use data from the PPV survey to estimate 10 regression models of per-capita *consumption expenditure* (corresponding in turn to each representative stratum in the PPV data-set). We divide the PNAD data set into the same strata, and then use the PPV parameter estimates to weight PNAD-based characteristics of the population (selected on the basis of their identical

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<sup>9</sup> These areas were defined according to population size criteria: small urban areas (population < 20,000), larger cities (20,000 ≤ population < 100,000), and metropolitan areas (population > 100,000).

<sup>10</sup> For a detailed discussion regarding the relative merits of these data sets, see Ferreira, Lanjouw, and Neri; 2000.

<sup>11</sup> For instance, the PNAD income measure for the self-employed is based on a single question which fails to distinguish between gross and net income from self employment activities (such as farming in rural areas), and which fails to recognize that agricultural incomes accrue on a seasonal or annual rather than monthly basis. Such omissions are likely to introduce substantial distortion into the reported real living standard measures, particularly in rural areas (e.g., see Ferreira, Lanjouw, and Neri; 2000).



definition to the characteristics in the PPV) in each respective stratum. We then calculate each household's expected welfare level. Elbers *et al* (2000) show that this merging of data sources yields an estimator which can be clearly interpreted, extended in a consistent way to any aggregated welfare measure (poverty rate, measure of inequality, etc.) and which can be assessed for statistical reliability.

Throughout the analysis below, except if explicitly otherwise indicated, the poverty measures refer to a distribution where the welfare indicator is total household expenditure per capita (from the imputed PNAD data set), and the unit of analysis is the individual. The poverty threshold is a household per capita income of R\$65.07 per month in 1996 reais, which was suggested by FLN (2000) as the appropriate extreme poverty line for the country in that year, once account is taken of regional cost-of-living differences.

#### *Regional Poverty Estimates for the NE/SE of Brazil*

Our preliminary regionally disaggregated headcount poverty estimates,  $P(0)$ , are presented in Table 1. The first column contains the headcount poverty measures,  $P_1(0)$ , based on the conventionally used PNAD per capita *income* data. We note that according to this welfare criterion the rural Northeast has the highest proportion of poor at 68.5%, and that the northeastern regions are poorer compared to the southeastern regions. These income-based numbers represent a useful upper bound benchmark against which to evaluate our subsequent consumption expenditure based estimates. This is because, as FLN (2000) argue, the income figures available from the PNAD are likely to understate self-employment earnings. Particularly in rural areas, where a large fraction of households are self-employed farmers, measured poverty is likely to be overstated.

**Table 1. Poverty Headcount Measures for the Different Data Sets**

<i>Region</i>	<i>Inc. PNAD</i>	<i>PPV</i>		<i>Exp. PNAD(ii)</i>	
	$P_I(0)$	$P_{ppv}(0)$	( <i>s.e.</i> )	$P_{ii}(0)$	$\mu(y)$
RM Fortaleza	0.263	0.185	(0.08)	0.167	192.9
RM Recife	0.277	0.221	(0.04)	0.159	189.37
RM Salvador	0.270	0.193	(0.03)	0.233	174.99
Urban NE	0.401	0.376	(0.04)	0.358	124.57
Rural NE	0.685	0.498	(0.06)	0.490	86.41
RM B. Horizonte	0.086	0.079	(0.03)	0.076	265.76
RM Rio de Janeiro	0.061	0.030	(0.006)	0.059	299.43
RM São Paulo	0.027	0.038	(0.018)	0.038	322.09
Urban SE	0.074	0.047	(0.014)	0.080	246.74
Rural SE	0.354	0.260	(0.047)	0.249	136.23

The next column presents the headcount poverty estimates,  $P_{ppv}(0)$ , and standard errors based on the PPV data only, and based on per capita consumption expenditure as the welfare criterion. Comparing these columns we notice that, with the exception of São Paulo, the PPV expenditure-based measures of poverty are indeed lower. Next we present our estimates for the PNAD imputed expenditure-based measures calibrated on the PPV estimates, after trimming the sample to resolve residual non-normality issues and by adjusting the model structure for Rio, Sao Paulo, and Salvador to correct for heteroscedasticity. These final results correspond to the  $P_{ii}(0)$  estimates presented in the last column. These represent our ‘preferred’ preliminary estimates and the poverty profile presented in subsequent sections is based on these.

In Figure 1, for each region, the  $P_{ii}(0)$  estimates are plotted against the estimated  $P_{ppv}(0)$  measures and the respective  $P_{ppv}(0)$  upper and lower bound standard error intervals.<sup>12</sup> Firstly, observe that for 6 regions our estimated  $P_{ii}(0)$  measures fall within one standard error deviation from the  $P_{ppv}(0)$  estimates. Indeed, for 3 regions the estimates are almost identical. Secondly, the two measures only differ substantially for 2 of the 10 regions—Recife and Rio.

<sup>12</sup> These standard errors take into account the PPV’s multi-stage sampling design. We are currently in the process of calculating standard errors on the estimated PNAD poverty rates, but are not yet in the position to report them. The figures presented here should thus be regarded as tentative. Some comfort can be drawn from the fact that the point estimates for our PNAD-based poverty measures generally fall within the confidence intervals for the PPV-based measures.

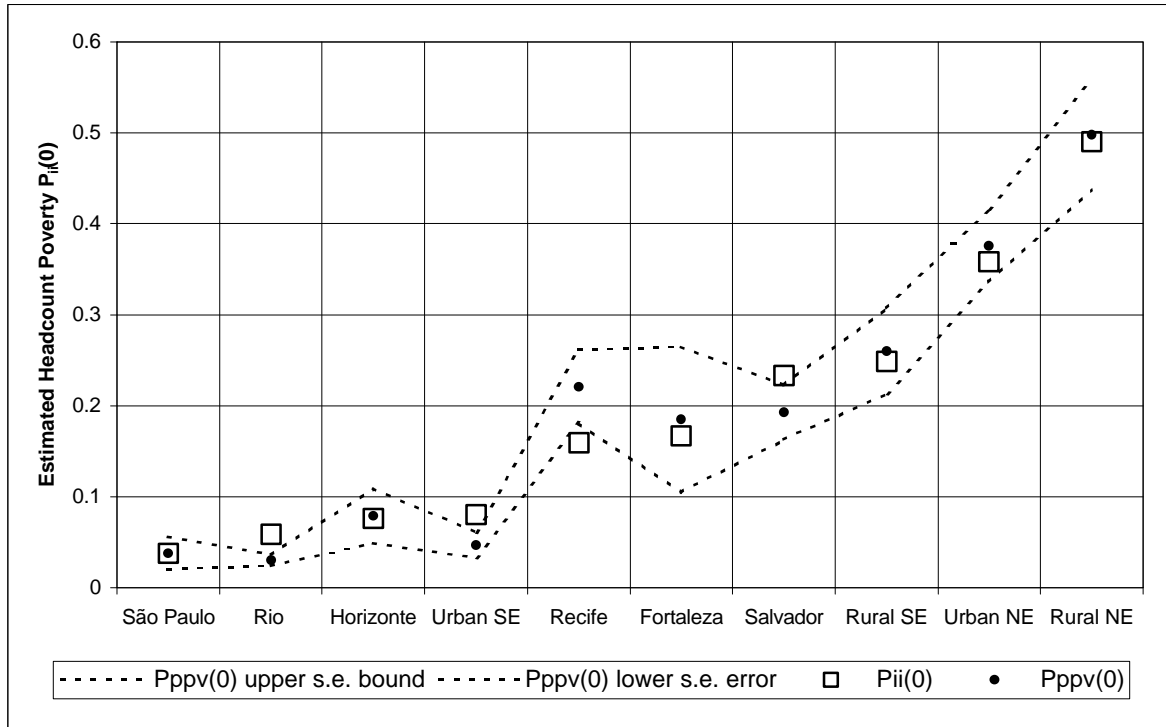
When extrapolating our poverty measures using population data we estimate that in 1996 for the NE and SE of Brazil combined, of the approximately 112.82 million people, some 20.1% (i.e., about 22,69 million) of the population lived in poverty. Only 20.7% of the total population in the two regions is rural, 41.7% of that rural population is below the poverty line versus only 14.4% of the urban population. Hence, as previous studies have reported, the incidence of poverty in rural areas appears to be much greater than in urban areas. In fact, despite the larger urban population, poverty is so widespread in rural areas that 43% of all poor are found in rural areas.<sup>13</sup>

Figure 2 presents our poverty estimates on a regional population basis. We notice that poverty in the NE is more severe in terms of both absolute numbers of poor as well as percent of population in poverty. The exceptions are the SE urban areas of Rio and Sao Paulo. In these two areas, compared to the three NE urban areas (i.e., Fortaleza, Recife, and Salvador), the incidence of poverty is low but there are large absolute numbers of poor.

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<sup>13</sup> Note we are taking a conservative stance here. If we had employed the conventionally used income figures in the PNAD the same conclusion would emerge much more strongly.

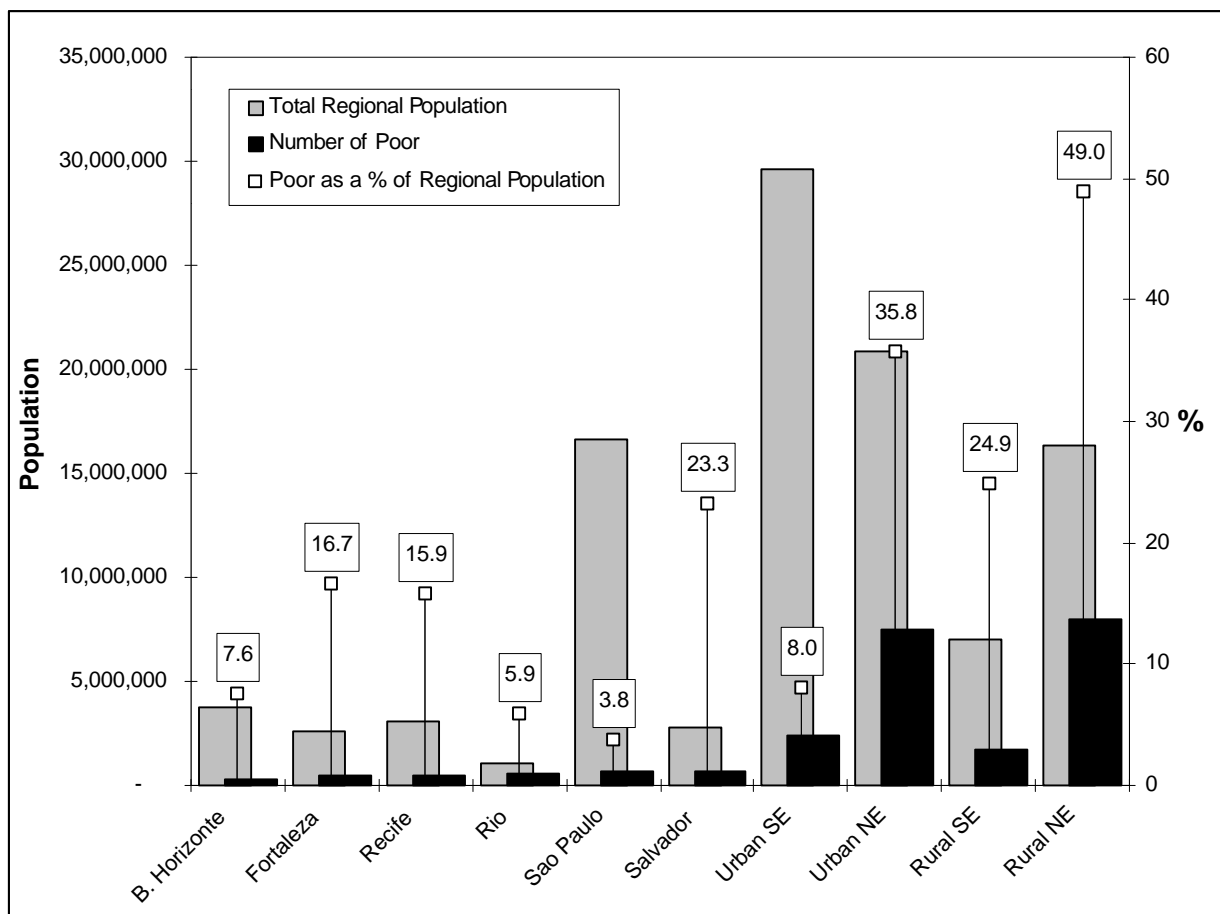
**Figure 1. Estimated Headcount Poverty: PPV-based versus Expenditure Imputed PNAD-based Measures**



### *State-Level Poverty Estimates*

A major attraction of employing the PNAD data set is that its large sample size permits the disaggregation of poverty down to a level considerably lower than what is possible with the PPV survey. Based on our imputed consumption technique, Table 2 presents estimates of poverty by state, and urban/rural location in the Northeast. Overall, the incidence of poverty in the region is estimated at 37%, corresponding to some 17 million persons in poverty. In rural areas the incidence is 48.8% while in urban areas the incidence is 30.7%. Given higher urban population figures the headcount estimates result in roughly similar numbers of poor in urban and rural areas of the northeast: some 8 million in rural areas and 9 million individuals in poverty in urban areas.

Figure 2. Regional Poverty in NE/SE Brazil



Poverty is estimated to be highest in the state of Maranhão. In the rural areas of this state, 55.8% of the population is estimated to be poor, (relative to 46.1% in urban Maranhão). The range of poverty estimates by state in the Northeast lies between the 56% in Maranhão to a low of 29.5% in the state of Sergipe. The single largest contribution to overall poverty in the Northeast comes from the state of Bahia. Given its large population size, the overall headcount rate of 39.1% represents more than 5 million persons, breaking down to roughly 2.3 million in rural areas and 2.7 million in urban areas. The biggest gap between urban and rural poverty is observed in the state of Ceará – 52% of the rural population is estimated to be poor in this state, compared to half that rate in urban areas. Once again, however, because of relative population sizes, the overall numbers of poor per region in this state are not far apart, and in fact suggest that more poor persons reside in urban areas. The overall impression is that the rural northeast is

not only vast geographically and agro-ecologically, but also masks a considerable diversity of poverty experiences.

It turns out to be useful, in this regard, to consider the *IBGE's* own geographical partition of rural areas, into four distinct categories: (i) *rural extensão urbana* are relatively urbanized areas, adjacent to (less than 1km away from) the urban perimeter of municipalities but not formally incorporated into the urban perimeter; (ii) *rural povoado* refers to agglomerations in rural areas with some permanent structures (at least one commercial establishment, and at least two of the following three structures – school, health center, religious establishment); (iii) *rural núcleo* refers to isolated rural agglomerations with between 10 and 51 households, usually attached to some commercial entity (such as a factory); (iv) *rural exclusive* refers to rural areas which do not meet any of the above criteria.<sup>14</sup>

We can see that in the Northeast, the highest incidence of poverty is estimated in the *rural exclusive* areas. This is also where the bulk of the rural population resides, so that the number of poor in these areas is far greater than in the other locational categories for rural areas. Rural poverty is estimated to be particularly low in the regions just adjacent to urban perimeters (*extensão urbana*), and is in fact estimated to be lower here than in any of the urban areas. On the other hand, poverty rate estimates in the urban areas known as *área isolada* are remarkably high, 41.9% of this population is poor. Numerically this urban category is not of great significance, however.<sup>15</sup>

As a comparison, in the Southeast, overall poverty is estimated at 8.4%, less than a quarter of poverty in the Northeast. In rural areas the overall incidence is estimated at 23.8%, representing just under 2 million individuals. While poverty rates in the urban Southeast are much lower than in rural areas, the overwhelmingly urban population in this region implies that the urban poor still outnumber the rural poor by a factor of 2.

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<sup>14</sup> Note that the distinction between rural and urban areas in Brazil is based on administrative as well as population density criteria.

**Table 2: Poverty Estimates in the Rural Northeast**

<i>Incidence of Poverty based on Consumption Expenditures Imputed into the 1996 PNAD</i>				
State/Sector		Headcount (%)	Population Poor	# of observations in PNAD survey
<b>Maranhão</b>				
	Urban	46.1	1,101,532	619
	Rural	55.8	1,632,191	749
	Total	51.4	2,731,660	1,368
<b>Paiuí</b>				
	Urban	33.5	538,160	677
	Rural	50.9	589,921	489
	Total	40.8	1,128,295	1,166
<b>Ceará</b>				
	Urban	26.6	1,174,234	3,643
	Rural	51.8	1,240,375	1,012
	Total	35.4	2,410,372	4,655
<b>Rio Grande do Norte</b>				
	Urban	25.2	416,489	765
	Rural	43.0	418,436	387
	Total	31.8	835,019	1,152
<b>Paraíba</b>				
	Urban	25.1	547,849	998
	Rural	42.9	511,519	493
	Total	31.4	1,059,756	1,491
<b>Pernambuco</b>				
	Urban	26.2	1,514,499	4,735
	Rural	43.7	766,274	843
	Total	30.2	2,275,274	5,578
<b>Alagoas</b>				
	Urban	32.2	553,536	687
	Rural	50.1	507,304	375
	Total	38.8	1,059,876	1,062
<b>Sergipe</b>				
	Urban	25.3	299,343	924
	Rural	40.3	182,739	351
	Total	29.5	482,803	1,275
<b>Bahia</b>				
	Urban	34.0	2,749,080	5,284
	Rural	47.5	2,269,218	1,890
	Total	39.1	5,029,367	7,174
<b>Rural Northeast</b>				
	Urban	30.7	8,907,297	18,332
	Rural	48.8	8,120,749	6,589
	Total	37.3	17,029,268	24,921
<b>Location</b>				

<sup>15</sup> It is useful to note that in these calculations, major metropolitan areas have been separated from the other urban areas, and that consistent with the findings of FLN (2000) most of the urban poor are not found to reside in the large metropolitan cities.

Metropolitan area	18.6	1,575,835	9,762
Other Urban: área urbanizada	35.7	7,375,228	8,815
Other Urban: área não urbanizada	36.9	52,993	69
Other Urban: área isolada	41.9	18,503	21
Rural: exensão urbana	15.9	114,061	242
Rural: povoado	46.0	1,167,745	926
Rural: núcleo	31.8	25,468	28
Rural: exclusive	51.5	6,694,967	5,058
Source: PNAD 1996			
Notes: 1. Expenditures Adjusted for Spatial Price Variation (see Ferreira, Lanjouw, and Neri, 2000).			
2. Poverty Line of R\$65.07 in 1996 Sao Paulo reais (see Ferreira, Lanjouw, and Neri, 2000).			

#### 4. A Profile of Non-Agricultural Activities in Northeastern Brazil

We turn now to an examination of the 1996 PNAD data on economic activity and occupation in order to obtain a “snapshot” overview of the non-farm sector in rural Northeastern Brazil during the mid-1990s.

Table 3 presents a breakdown of the entire economically active population in Northeast Brazil by sector of principal activity (“occupation”), distinguishing between urban and rural areas. The table does not separate wage labor from self-employment activities. In rural Northeastern Brazil, 57.7% of the working population is engaged in agricultural activities (“cultivation”). Even in urban areas the percentage of the working population engaged in agricultural activities as a principal occupation is as high as 9.3%. Turning to rural non-farm activities, we can see that 6.3% of the working population is primarily engaged in manufacturing and related activities, 3.7% in commerce, and 11.5% in various service sector activities. In total, about 21.8% of the rural working population is engaged in non-agricultural activities as a primary activity. These figures are likely to be conservative estimates of the importance of non-agricultural activities because they do not include non-farm activities which are secondary. For example, in rural Ecuador Lanjouw (1999) finds that about 40% of the rural population is engaged in non-agricultural activities as either a primary or secondary occupation.



	Northeast		Southeast	
	Rural Sector	Urban Sector	Rural Sector	Urban Sector
Cultivation	57.7	9.3	41.7	3.7
Animal rearing	15.1	3.3	25.9	1.7
Forest product	3.5	0.2	0.4	0.1
Fishing	1.7	1.3	0.2	0.1
<i>1. Mining/Extraction</i>	0.3	0.3	0.5	0.3
<b>2. Manufacturing</b>				
Ceramics	0.9	0.9	1.1	1.0
Metals	0.1	0.6	0.3	2.4
Machinery	0.0	0.3	0.1	1.0
Electronic goods	0.0	0.1	0.1	0.8
Vehicles	0.0	0.5	0.3	1.4
Wooden goods	0.5	0.7	0.2	0.4
Furniture	0.1	0.8	0.3	0.9
Paper	0.0	0.1	0.1	0.4
Rubber	0.0	0.0	0.0	0.2
Leather	0.0	0.0	0.0	0.1
Chemical/dyes	0.0	0.3	0.4	0.8
Pharmaceuticals	0.0	0.1	0.0	0.2
Cosmetics	0.0	0.1	0.1	0.2
Plastics	0.0	0.2	0.1	0.4
Textiles	0.5	0.7	0.1	0.8
Clothing	0.1	0.7	0.4	1.3
Footwear	0.1	0.3	0.1	0.5
Food processing	1.1	2.2	1.3	2.8
Beverages	0.1	0.2	0.2	0.3
Tobacco products	0.0	0.0	0.1	0.0
Printing	0.0	0.3	0.1	0.8
Precision instruments	0.0	0.2	0.2	0.6
Construction	2.6	6.9	4.0	7.7
Utilities	0.2	1.3	0.5	0.9
<b>Sub-Total</b>	6.3	17.5	10.1	25.9
<b>3. Sales</b>				
Wholesaling	0.1	0.1	0.0	0.2
Food/beverage sales	1.6	5.2	0.9	2.7
Clothing sales	0.2	1.2	0.1	2.3
Street sales	1.1	5.2	0.7	2.3
Other sales	0.7	6.4	1.5	8.0
<b>Sub-Total</b>	3.7	18.1	3.2	15.5
<b>4. Services</b>				
Transport	0.7	3.9	1.4	4.3
Hotel	0.1	0.4	0.1	0.4
Restaurant	0.7	4.1	1.2	4.3
Servicing/repair	0.4	3.4	0.6	3.7
Personal services	1.0	3.7	0.9	3.3
Own account services	2.9	10.5	7.9	11.2
Financial services	0.1	1.1	0.2	2.3

Post/telecoms	0.1	0.5	0.1	0.6
Arts/entertainment	0.1	0.7	0.2	0.8
Professional services	0.3	2.7	0.7	5.2
Private organization	0.8	4.7	1.0	5.6
Education	2.9	6.9	2.2	5.4
Government	1.3	6.4	1.2	4.9
Informal activity	0.1	0.6	0.2	0.5
<b>Sub-Total</b>	11.5	49.6	17.9	52.5
<b>Non-Agricultural Total</b> (1+2+3+4)	21.8	85.5	31.7	94.2
<b>Total</b>	100.0	100	100	100
Working population (% of total population)	7,932,229 (47.7)	11,261,726 (38.9)	3,729,313 (49.1)	25,907,114 (43.4)
Source: PNAD 1996				

Focusing now only on the non-agricultural working population in rural areas, the information in the above table reveals that the most important activities within the manufacturing (and related) sub-sector comprise textiles, food processing and construction. Overall, about a third of rural non-farm employment in the Northeast (as well as the Southeast) is associated with manufacturing and transformation of goods. Commercial activities in the rural Northeast account for about 17% of total rural non-farm activities, compared to 10% in the Southeast. On the other hand, self-employment service activities are particularly important in the rural Southeast, accounting for about a quarter of all non-farm activities, compared to 13% in the rural Northeast. Employment rates in the education and government sector accounts for a considerable fraction of total non-farm employment in the rural Northeast (13 and 5% respectively) while in the rural Southeast the comparable percentages are 7 and 4% respectively. Overall, in both the rural Northeast and rural Southeast, service sector activities account for more than half of all non-farm activities.

Table 4 breaks down the RNA sector in the Northeast along the spatial dimension. At the bottom of Table 4 we can see that although the *rural exclusive* area accounts for 82% of the entire rural working population, it accounts for only 59% of the total participation in the non-farm sector. Rural areas on the perimeter of urban municipalities (*extensão urbana*) and rural towns (*povoado*) account for a disproportionate share of employment in the non-farm sector (representing about 18% of the rural working population but accounting for nearly 40% of total participation in the

non-farm sector). This lends credence to the notion that non-farm activities are closely linked to market centers and the basic infrastructure supporting them. The evidence suggests that manufacturing (and related) activities are not specifically concentrated in the more urbanized rural settlements, although commercial activities do tend to be more common there.

<b>Table 4: Percentage of the Rural Non-Agricultural Working Population by Location and Sector of Primary Occupation</b>				
	<i>Extensão Urbana<sup>b</sup></i>	<i>Povoado<sup>c</sup></i>	<i>Núcleo<sup>d</sup></i>	<i>Exclusive<sup>e</sup></i>
<b>1. Mining/Extraction</b>	0.1	0.1	0.0	1.3
<b>2. Manufacturing</b>				
Ceramics	0.1	0.7	0.0	3.1
Metals	0.3	0.0	0.0	0.3
Machinery	0.0	0.1	0.0	0.0
Electronic goods	0.0	0.0	0.0	0.0
Vehicles	0.0	0.0	0.0	0.0
Wooden goods	0.1	0.3	0.0	1.9
Furniture	0.0	0.2	0.0	0.3
Paper	0.0	0.0	0.0	0.0
Rubber	0.0	0.0	0.0	0.0
Leather	0.1	0.0	0.0	0.1
Chemical/dyes	0.0	0.0	0.0	0.1
Pharmaceuticals	0.0	0.0	0.0	0.0
Cosmetics	0.0	0.0	0.0	0.0
Plastics	0.1	0.0	0.0	0.1
Textiles	0.1	0.3	0.0	1.8
Clothing	0.2	0.0	0.0	0.2
Footwear	0.0	0.2	0.0	0.1
Food processing	0.4	0.4	0.5	3.7
Beverages	0.1	0.1	0.0	0.1
Tobacco products	0.0	0.0	0.0	0.1
Printing	0.0	0.0	0.0	0.0
Precision instruments	0.0	0.1	0.0	0.2
Construction	1.1	2.8	0.0	7.8
Utilities	0.2	0.4	0.0	0.3
Sub-Total	2.8	5.6	0.5	20.2
<b>3. Sales</b>				
Wholesaling	0.1	0.2	0.0	0.1
Food/beverage sales	0.8	2.7	0.0	3.7
Clothing sales	0.5	0.1	0.0	0.1
Street sales	1.1	1.2	0.0	2.9
Other sales	1.1	0.5	0.0	1.6

Sub-Total	3.6	4.7	0.0	8.4
<b>4. Services</b>				
Transport	0.6	0.9	0.0	1.9
Hotel	0.0	0.2	0.0	0.0
Restaurant	0.4	1.6	0.0	1.2
Servicing/repair	0.5	0.5	0.1	0.7
Personal services	0.6	0.9	0.0	2.8
Own account services	2.3	2.6	0.3	8.1
Financial services	0.4	0.0	0.0	0.0
Post/telecoms	0.2	0.2	0.0	0.2
Arts/entertainment	0.0	0.0	0.0	0.2
Professional services	0.6	0.2	0.0	0.8
Private organization	1.4	0.8	0.2	1.4
Education	1.6	2.8	0.1	8.7
Government	1.4	1.5	0.0	2.9
Informal activity	0.0	0.1	0.0	0.2
<b>Sub-Total</b>	<i>10.0</i>	<i>12.1</i>	0.7	29.1
<b>Total<sup>a</sup> (1+2+3+4)</b>	<i>16.6</i>	<i>23.1</i>	1.3	59.0
<b>Working Population (% total Working Pop.)</b>	<i>317,289 (4.0)</i>	<i>1,083,146 (13.7)</i>	23,796 (0.3)	6,504,428 (82.0)
Source: PNAD 1996. Notes: <sup>a</sup> Total may not equal the sum of sub-totals due to rounding.				
<sup>b</sup> Urbanized areas adjacent to the urban perimeter of municipalities (less than 1km distant), but not formally incorporated into the urban perimeter.				
<sup>c</sup> agglomerations in rural areas with some permanent structures: at least one commercial establishment, and at least two of the following three establishments (school, health posts, religious establishment).				
<sup>d</sup> Isolated rural agglomeration with between 10 and 51 households, usually attached to some commercial entity (factory, agro-processing unit, etc).				
<sup>e</sup> Areas which do not meet any of the criteria defining an agglomeration.				

A further breakdown of the PNAD data is presented in Table 5, where we consider the participation of men and women separately. The table indicates that roughly the same number of men and women are active in the rural non-farm sector in Northeast Brazil. Just under 52% of total non-farm participation is accounted for by men relative to about 48% by women. However, because women are less involved in agricultural activities, the non-farm sector accounts for a much larger share of total economic activities carried out by women than it does for men. Nearly 30% of economically active women are primarily engaged in the non-farm sector, compared to 18% of men. Men and women are also engaged in quite different activities. For example, while more than 22% of men who participate in the non-farm sector are involved in construction activities, only 0.2% of women are engaged in such activities. Women are particularly involved in education (24.9%) own account services (23.4%) and personal services (8.4%)

	Male	Female
<b>1. Mining/Extraction</b>	2.9	0.1
<b>2. Manufacturing</b>		
Ceramics	6.6	1.0
Metals	1.0	0.1
Machinery	0.2	0.1
Electronic goods	0.0	0.0
Vehicles	0.0	0.0
Wooden goods	2.7	1.8
Furniture	1.0	0.0
Paper	0.0	0.0
Rubber	0.0	0.0
Leather	0.2	0.1
Chemical/dyes	0.2	0.0
Pharmaceuticals	0.1	0.0
Cosmetics	0.0	0.0
Plastics	0.2	0.1
Textiles	1.0	3.6
Clothing	0.2	0.6
Footware	0.2	0.4
Food processing	6.7	3.2
Beverages	0.4	0.2
Tobacco products	0.1	0.1
Printing	0.0	0.0
Precision instruments	0.2	0.5
Construction	22.5	0.2
Utilities	1.1	0.6
<b>Sub-Total</b>	44.8	12.6
<b>3. Sales</b>		
Wholesaling	0.7	0.1
Food/beverage sales	9.1	5.0
Clothing sales	0.4	1.2
Street sales	5.3	5.1
Other sales	4.3	2.0
<b>Sub-Total</b>	19.8	13.4
<b>4. Services</b>		
Transport	6.1	0.4
Hotel	0.4	0.3
Restaurant	3.6	3.0
Servicing/repair	3.4	0.1
Personal services	0.5	8.4
Own account services	3.8	23.4
Financial services	0.4	0.6
Post/telecoms	0.6	0.5
Arts/entertainment	0.4	0.1
Professional services	1.8	1.3
Private organization	2.2	5.6

Education	2.4	24.9
Government	6.3	5.3
Informal activity	0.5	0.3
<b>Sub-Total</b>	32.4	74.2
	100.0	100.0
<b>Non-Agricultural Workers ( % of Total Non- Agricultural Working Population)</b>	899,220 (51.7)	841,169 (48.3)
<b>% Share of Total Working Population (Agriculture plus Non-Agriculture)</b>	18.0	28.6
Source: PNAD 1996		

### 5. The Determinants of RNA Employment: a Multivariate Analysis

We turn finally to a multivariate analysis of participation in non-farm activities. We estimate a probit model of involvement in non-farm activities as a primary occupation on a range of individual, household and geographic characteristics. The specification of the model draws on the findings of Section 4, which suggest that the choice of a primary occupation in the RNA sector is affected by the size and location of the household (both in terms of state and in terms of rural sub-area), as well as the gender, age, education and migrant status of the worker. Dummies for the worker's race were also included, in keeping with standard specification in other countries. Rather than reporting the parameter estimates, which are difficult to interpret on their own, we present in Table 6 the marginal effects associated with each explanatory variable. These can be interpreted as indicating the effect of a percentage change in the explanatory variable on the probability of involvement in non-farm business activities, taking all other variables in the specification at their means.<sup>16</sup>

Following on from the discussion in Section 2 regarding the non-farm sector as a source of both high-return employment as well as a “last resort” option, we estimate two additional models with the same specification of regressors, but differentiating between involvement in high return non-farm activities as opposed to low return non-farm activities. We designate non-farm sub-sectors as either high return or low return

depending on the average monthly earnings accruing to individuals whose primary occupation is in that sector. If the average monthly income accruing to particular sub-sector of the non-farm sector is below the poverty line employed in Section 3, the sub-sector is designated as a low return sector. All those engaged in this sub-sector are then regarded as involved in a low-return, last resort, activity. Conversely, if the average monthly return from a sub-sector is above the poverty line, the sub-sector is designated as high return. In the event, it was found that the following sub-sectors could be regarded as low-return activities: cloth weaving; street and market vending; own account services; personal services and informal activities.

<b>Table 6: Probit Model of Non-Agricultural Employment</b>			
	Any Non-Agricultural Employment	Low-Productivity Non-Agricultural Employment	High-Productivity Non-Agricultural Employment
<b>Explanatory Variables</b>	<i>DF/dx</i> <i>(prob value)</i>	<i>DF/dx</i> <i>(prob value)</i>	<i>dF/dx</i> <i>(prob value)</i>
Male (dummy)	0.015 (0.000)	-0.025 (0.000)	0.037 (0.000)
Age in years	0.016 (0.000)	0.002 (0.000)	0.011 (0.000)
Age squared	-0.0002 (0.000)	-0.00003 (0.000)	-0.0001 (0.000)
Black (dummy)	0.0075 (0.315)	0.0057 (0.139)	0.0013 (0.810)
Mulatto (dummy)	0.001 (0.787)	0.0017 (0.303)	-0.0012 (0.660)
Asian (dummy)	0.044 (0.379)	n/a	0.051 (0.204)
Indian (dummy)	0.027 (0.495)	0.019 (0.364)	0.004 (0.889)
Household Size	-0.0005 (0.406)	0.0008 (0.006)	-0.0015 (0.001)
% of Family involved in cultivation	-0.263 (0.000)	-0.044 (0.000)	-0.183 (0.000)
Locally-born (dummy)	-0.011 (0.003)	-0.004 (0.009)	-0.004 (0.160)
Elementary schooling Only (dummy)	0.020 (0.000)	0.009 (0.001)	0.008 (0.041)

<sup>16</sup> For dummy variables, the marginal effect is calculated as the change in the dependent variable associated with a move from a value of 0 for the dummy, to 1, holding all other variables constant at mean values.

Médio 1 (dummy)	0.059 (0.006)	0.012 (0.203)	0.036 (0.018)
Grau 1 (dummy)	0.047 (0.000)	0.017 (0.000)	0.022 (0.000)
Médio 2 (dummy)	0.233 (0.000)	0.008 (0.543)	0.173 (0.000)
Higher schooling (dummy)	0.237 (0.000)	-0.014 (0.030)	0.232 (0.000)
Extensão urbana (dummy)	0.107 (0.000)	0.019 (0.000)	0.064 (0.000)
Povoado (dummy)	0.036 (0.000)	0.004 (0.043)	0.027 (0.000)
Núcleo (dummy)	(0.098) (0.000)	0.054 (0.001)	0.047 (0.011)
Piauí (dummy)	0.010 (0.205)	-0.004 (0.198)	0.015 (0.017)
Ceará (dummy)	0.030 (0.000)	0.008 (0.017)	0.017 (0.001)
Rio Grande do Norte (dummy)	0.026 (0.001)	0.010 (0.008)	0.009 (0.103)
Paraíba (dummy)	0.036 (0.000)	0.002 (0.549)	0.029 (0.000)
Pernambuco (dummy)	0.007 (0.317)	0.002 (0.542)	0.002 (0.670)
Alagoas (dummy)	-0.007 (0.382)	-0.012 (0.000)	0.007 (0.269)
Sergipe (dummy)	0.051 (0.000)	0.006 (0.166)	0.037 (0.000)
Bahia (dummy)	-0.008 (0.181)	-0.009 (0.001)	0.002 (0.653)
Metropolitan Area (dummy)	0.024 (0.002)	0.017 (0.000)	0.003 (0.597)
<i>Nr. of Observations</i>	<i>23,631</i>	<i>23,598</i>	<i>23,631</i>
$\chi^2$ (27)	<i>4420.49</i>	<i>1073.67</i>	<i>3781.47</i>
$Prob > \chi^2$	<i>0.0000</i>	<i>0.000</i>	<i>0.000</i>
<i>Pseudo R<sup>2</sup></i>	<i>0.2359</i>	<i>0.1490</i>	<i>0.2459</i>
<i>Log Likelihood</i>	<i>-7158.84</i>	<i>-3066.74</i>	<i>-5797.67</i>
<b>Observed Probability</b>	<b>0.135</b>	<b>0.035</b>	<b>0.100</b>
<b>Predicted Probability</b>	<b>0.071</b>	<b>0.017</b>	<b>0.043</b>
Source: PNAD 1996			

Model 1 in Table 6, comprising all non-farm activities in the rural Northeast combined, indicates that men are more likely to be engaged in the non-farm sector than women, controlling for all other variables. The probability of non-farm employment rises



with age up to a turning point of around 37 years and then declines. Controlling for other characteristics, the probability of non-farm participation does not appear to be associated with race. This is in contrast with the experience in other countries, where for example ethnicity, caste, religion, etc. are often associated with different participation rates, irrespective of education levels, and other characteristics.

While household size does not seem to be associated with non-farm participation, the data do suggest that households which concentrate on agricultural activities (have a high proportion of family members engaged in cultivation) are less likely to have a particular member engage in non-farm activities. An interesting additional finding is that individuals who were born in the same municipality as the one in which they were interviewed for the PNAD survey were slightly (although significantly) less likely to be involved in the non-farm sector.

Our two main results relate to the effects of education and location. As has been found in other studies (see Section 2), the probability of involvement in the non-farm sector is positively and significantly related to education levels. Holding other variables constant at their sample means, having achieved even an elementary school education raises the probability of involvement in the non-farm sector by 2 percentage points, compared to a person with no education at all. If the highest education level achieved is primary (1<sup>o</sup> grau, formerly ciclo médio 1), then the probability is 4.7 percentage points higher than the baseline of no education at all. With a completed secondary education (2<sup>o</sup> grau, formerly ciclo médio 2), the probability of participation in the non-farm sector is 24 percentage points higher.

Location influences probabilities of non-farm sector participation – even after controlling for other characteristics. Relative to those residing in the *rural exclusive* regions, those residing in the *extensão urbana* areas have 11 percentage point higher probabilities of non-farm sector involvement. The other two types of rural settlement, *rural povoado* and *rural núcleo* are also associated with higher probabilities of non-farm sector participation, by 3.6 and 9.8 percentage points, respectively.

When we break non-farm employment activities into two types, low and high productivity some interesting changes are observed. While men were more likely than women to be employed in the non-farm sector in general, this finding is reversed when

we focus on low remuneration non-farm activities. Here men have a 2.5 percentage point lower probability of participating in these activities. Household size is now positive and significantly related to employment in non-farm activities, suggesting that households with many family members may well need to spread their net more widely in order to make ends meet than small households. Elementary and primary education levels are still positively associated with low-return non-farm employment participation, but at higher levels of education the statistical association disappears and even becomes negative for the highest education category. Locational effects are still positive and significant, but smaller in size. Coefficients on state dummies also tend to become smaller. While one must be very cautious with inferences based on reduced form models as estimated here, the overall impression is that low return RNA activities are a coping mechanism that enables families to alleviate the hardships associated with poverty, rather than a route out of poverty altogether.

## **6. RNA Incomes and the Welfare Distribution.**

How are incomes from RNA activities distributed across households along the overall rural expenditure distribution? In Tables 7a and 7b we tabulate income shares from all sources of income against quintiles of the per capita consumption distribution, in turn for the rural Northeast and Southeast (for comparison). In Table 7a we can see that in the rural Northeast as a whole, cultivation income accounts for about 58.3% of household income and agricultural labor accounts for 8.3%. Non-farm sources of income account for 33.4% of household income. These non-farm sources can be broken down to a contribution of 13.1% from non-farm wage income, 5.3% from non-farm self-employment/enterprise income, and 15% from other sources (remittances, transfers, pensions, etc.).

Across quintiles we can see that cultivation income is of particular importance to the higher quintiles in the population. While the top quintile in the rural Northeast receives 62.3% of income from cultivation, on average, the poorest quintile receives only 36.3% from this source. For the poor, agricultural labor income is particularly important, accounting for 39.1% of income while for the richest quintile this source represents only

2.1% of income. Non-farm *labor* income is distributed rather evenly across the consumption quintiles. While the lowest two quintiles receive a greater share of income from low-return non-farm activities, than the median household, it is also interesting to note that households in the 4<sup>th</sup> quintile also receive an relatively large share of income from these low return labor activities. High return labor activities are of importance to the upper quintiles, but also appear to be particularly important to the poorest quintile. Taken together, high and low return non-farm labor activities account on average for 13.1% of household income across all quintiles, with the bottom and 4<sup>th</sup> quintiles receiving the largest shares (16.1% and 17.2% respectively).

Non-farm *enterprise* (as opposed to labor) income shares are much more strongly (and positively) correlated with per capita consumption. Against an average share of 5.3% over all households, the lowest quintile receive on average no income from this source, the middle three quintiles receive between 1-2% of income from this source, and the richest quintile receives 8.6%. Remittance incomes are a very small fraction of overall income and tend to be concentrated among the middle consumption quintiles. The residual sources of income, accounting for an average 14.2% of income across all households, tends to be distributed regressively, with the poorest quintile receiving about 7.9% from this source, while the richest quintile receives 15%.

It is also useful to divide the rural population into the poor and non-poor, based on the poverty line applied in Section 3, and to examine income shares in the same way. The poor earn, on average, just over half of their income from agriculture, compared to just under two thirds (62.5%) for the non-poor. 16% of income comes from agricultural labor (compared to 1.8%), and 14.7% from non-agricultural labor (compared to 11.8% for the non-poor). Non agricultural enterprise income accounts for 1.8% of total income (compared to 8.4%), remittances account for 1.1% (compared to 0.5%) and other income sources account for 13.3% (compared to 15%). In general, the poor are those who rely disproportionately on agricultural labor income, and to a much lesser extent, non-farm wage labor income, while the non-poor tend to be more concentrated on cultivation or non-farm self-employment activities.

Table 7b presents the analogue for the rural Southeast. In this region, cultivation accounts for a smaller share of total income on average, and non-farm sources are much

more important. Across all households, 35.4% of income comes from cultivation, 21.1% from agricultural labor, 12.8% from non-farm wage employment, 13.4% from non-farm enterprise activities, 1.7% from remittances, and 15.5% from other sources. Across quintiles, the importance of different income sources varies markedly. While the bottom quintile receives about 28.7% of income from non-farm sources, the top quintile receives about 47.6% of income from such activities. Agricultural labor income shares decline monotonically with consumption quintiles, from 47.4% of income for the poor to 6.1% for the top quintile.

Low return wage labor shares are highest for the bottom quintile (3.3%) and the third quintile (7.3%), and lowest for the top quintile (1.0%). High return wage labor shares are particularly high for the 3<sup>rd</sup> and 4<sup>th</sup> quintiles (19.0 and 16.7% respectively). Overall, non-farm wage labor shares are particularly high for the 3<sup>rd</sup> and 4<sup>th</sup> quintiles (26.3 and 18.5%, respectively). Non-farm self-employment/enterprise income shares are very high among the richest quintile (23.6%), while for the poorest two quintiles they are less than 1%. Breaking the population of the region into the poor and non-poor, the basic picture is one of the poor with only limited involvement in cultivation, but heavy involvement in agricultural labor. Non-farm labor activities are also relatively important, compared to the non-poor. In contrast, non-farm enterprise incomes are of importance particularly to the non-poor, with the poor having almost no involvement in these activities. Remittances tend to go to the poor, as do transfers and other sources of income.

Because the importance of the RNA sector to household welfare is generally thought to depend on land ownership, it is of interest to examine in a similar manner to Tables 7a and 7b the distribution of income shares across landholding classes. This is done in Table 8. Six landholding classes were constructed, based on reported land ownership holdings: the landless; those with 0-0.5 hectares per family member; between 0.5 and 1 hectare per person; between 1 and 3 hectares per person; 3-5 hectares per person; and 5 or more hectares per person. It would have been ideal, of course, to adjust these land holdings for quality variation, but that was not readily achievable with the data at hand.

**Table 7a**  
**Income Shares by Source and (Consumption) Quintile**  
**Rural Northeast**

Within-region Per capita consumption quintile	Agriculture		Non-Agricultural Income Sources						Total <sup>3</sup>
	Cultivation Income <sup>1</sup> (%)	Agricultural labor Income (%)	Low-Return Nonfarm Sector <sup>2</sup> Labor Income (%)	High-Return Nonfarm Sector <sup>2</sup> Labor Income (%)	Total Non-Farm Labor Income (%)	Nonfarm Enterprise Income	Remittance Income	Other Income Sources	
Bottom	36.3	39.1	1.5	14.6	16.1	0.0	0.6	7.9	100.0
2 <sup>nd</sup>	50.1	23.9	2.0	8.1	10.1	1.4	1.1	13.3	100.0
3 <sup>rd</sup>	62.1	6.4	1.3	13.1	14.4	1.1	2.0	14.0	100.0
4 <sup>th</sup>	56.0	9.6	3.0	14.2	17.2	1.8	0.7	14.8	100.0
5 <sup>th</sup>	62.3	2.1	0.6	11.9	12.5	8.6	0.5	15.0	100.0

**Table 7b**

Poor/Non-Poor (national poverty line)	Agriculture		Non-Agricultural Income Sources						Total
	Cultivation Income (%)	Agricultural labor Income (%)	Low-Return Nonfarm Sector Labor Income (%)	High-Return Nonfarm Sector Labor Income (%)	Total Non-Farm Labor Income (%)	Nonfarm Enterprise Income	Remittance Income	Other Income Sources	
Poor	53.4	15.9	2.1	12.6	14.7	1.8	1.1	13.3	100.0
Non-Poor	62.5	1.8	0.6	11.2	11.8	8.4	0.5	15.0	100.0

Source: PPV 1996

Notes:

1. Agricultural income shares include income from fishing. However, this component was nowhere found to represent more than 0.1% of total income.
2. Low and high return non-farm activities are identified on the basis of average monthly earnings associated with primary employment in different sectors of employment. Those sectors in which average monthly earnings are below the poverty line of R\$132 per month are identified as low return sectors. Persons whose primary occupation is in these sectors are identified as employed in low return activities. The converse holds for high return activities. Low return activities comprise essentially: textiles (but not clothing); street and market vending; own-account services; personal services; informal activities.
3. Row totals may not sum to 100 due to rounding.

We continue to focus on the Northeast, where the landless receive a non-negligible share of income from cultivation, despite being notionally landless. The 53.1% of the rural population so classified does retain some access to land, both through leasing and informal occupation. Table 8 indicates that landless households were leasing in on average 0.31 hectares of land, and were observed to occupy (without title or formal property rights) an average of 8.35 hectares of land. Income from cultivation thus accounts for 31.8% of total income to the landless. For those households which do actually own some land, cultivation shares are not surprisingly higher. Cultivation shares are highest for households with 3-5 hectares per person (97.1%) and somewhat lower for the largest landowning class (74.7%).

Agricultural labor earning are most important to the landless and marginal land owners. The landless earn about 14.5% of income from agricultural wage labor earnings, while those with up to 0.5 hectare of land per person receive 13% from this source, and those between 0.5 hectare and 1 hectare receive 12.2% from this source. For households with more than 1 hectare of land per person, agricultural wage labor earnings are of negligible importance.

Non-farm wage labor activities are carried out by households with and without land. However, Table 8 indicates that low-return non-farm wage income is important essentially only to the landless. This is consistent with the notion that low return non-farm activities are viewed by households as residual activities that they undertake alongside agricultural wage labor, in order to meet subsistence needs. High return non-farm activities, on the other hand, are important not only to landless households (to whom they provide a fifth of household income) but also to household with landholdings. Households with 1-3 hectares of land per person, for example, earn as much as 16.7% of income from high return wage labor activities. Even the largest landowning class earns 5.9% of income from such sources.

Table 8

**Income Shares by Source and Land Ownership Class  
Rural Northeast**

Per Capita land ownership class <sup>1</sup>	Agriculture		Non-Agricultural Income Sources						% of population	Average land owned (ha)	Average land leased in (ha)	Average untitled land occupied (ha)	Average land other status (ha)
	Cultivation Income <sup>2</sup> (%)	Agricultural labor Income (%)	Low-Return Nonfarm Sector <sup>3</sup> Labor Income (%)	High-Return Nonfarm Sector <sup>3</sup> Labor Income (%)	Total Non-Farm Labor Income (%)	Nonfarm Enterprise Income	Remittance Income	Other Income Sources					
Landless	31.8	14.5	2.7	19.8	22.6	8.4	1.2	21.7	53.1	0	0.31	8.35	0.50
0-0.5 ha.	53.3	13.0	0.5	9.4	9.9	7.4	0.8	15.7	21.1	1.19	0.33	0.09	0.11
0.5-1.0 ha.	59.5	12.2	0.0	7.5	7.5	2.7	0.6	17.7	9.0	3.54	0.13	0.09	0.13
1.0-3.0 ha.	66.1	2.9	0.1	16.7	16.8	0.0	0.2	13.9	9.4	8.86	0.37	0.06	0.11
3.0-5.0 ha.	97.1	0.0	0.3	0.2	0.5	0.3	0.4	0.2	2.8	13.74	0.13	0.27	0.0
5.0+ há	74.7	0.0	0.0	5.9	5.9	9.2	0.1	10.2	4.6	78.2	0.23	0.0	1.83

**Income Shares by Source and Land Ownership Class  
Rural Southeast**

Per Capita land ownership class <sup>1</sup>	Agriculture		Non-Agricultural Income Sources						% of population	Average land owned (ha)	Average land leased in (ha)	Average untitled land occupied (ha)	Average land other status (ha)
	Cultivation Income <sup>2</sup> (%)	Agricultural labor Income (%)	Low-Return Nonfarm Sector <sup>3</sup> Labor Income (%)	High-Return Nonfarm Sector <sup>3</sup> Labor Income (%)	Total Non-Farm Labor Income (%)	Nonfarm Enterprise Income	Remittance Income	Other Income Sources					
Landless	19.6	29.0	2.7	12.8	15.5	18.8	1.9	15.0	71.8	0.00	1.07	4.83	2.16
0-0.5 ha.	21.2	14.5	6.6	17.6	24.2	6.8	2.5	30.9	9.6	0.53	0.88	0.28	0.29
0.5-1.0 ha.	36.5	19.6	0.0	3.0	3.0	0.0	0.5	40.3	2.8	3.48	5.26	0.27	0.00
1.0-3.0 ha.	48.6	14.8	1.0	4.8	5.8	1.9	2.5	26.4	6.0	6.91	1.23	0.00	0.00
3.0-5.0 ha.	63.0	4.2	2.1	13.6	15.7	1.6	2.5	9.5	3.3	16.8	0.80	0.00	0.00
5.0+ há	83.0	1.1	0.00	3.1	3.1	3.5	0.00	9.4	6.5	107.7	0.24	2.67	1.60

Source: PPV 1996

Notes:

1. Land ownership class are based on reported *land owned* only. The classes are defined in terms of per-capita land ownership.
2. Agricultural income shares include income from and fishing. However, this component was nowhere found to represent more than 0.1% of total income.
- 3 Low and high return non-farm activities are identified on the basis of average monthly earnings associated with primary employment in different sectors of employment. Those sectors in which average monthly earnings are below the poverty line of R\$132 per month are identified as low return sectors. Persons whose primary occupation is in these sectors are identified as employed in low return activities. The converse holds for high return activities. Low return activities comprise essentially: textiles (but not clothing); street and market vending; own-account services; personal services; informal activities.

## 6. Concluding Comments

Rural poverty remains a crucial part of the poverty story in Brazil as a whole. Brazil is a largely urbanized country, but poverty in rural parts of the country is so widespread and persistent that about two fifths of the country's poor are still found in the countryside. Add to this that urban poverty itself appears to be concentrated in smaller towns (and therefore likely to be more closely linked to the surrounding rural sector), and it seems clear that the rural economy must remain a central focal point for policy makers aiming to combat poverty.

Given the rapid growth of the rural non-agricultural sector in Brazil - of around 1.7% per year between 1981 and 1995 - it is natural that attention is increasingly focusing on the role that these occupations play in ameliorating living conditions and reducing poverty. Even in the rural Brazilian Northeast, half of whose people can be classified as extremely poor and where the sector is less developed than in the Southeast, more than a fifth of the economically active rural population has as principal occupation a non-farm sector job.

We investigated the distributional profile of the sector, and found that non-agricultural income shares vary little with overall consumption levels. The composition of non-farm income, however, changes more markedly. The lower quintiles of the consumption distribution tend to earn a larger share of their non-farm incomes from wage labor activities. For the poorest, low return wage labor activities tend to be more important, while high return activities are spread rather evenly over the consumption distribution. What is striking is that non-farm *enterprise* income rises very sharply with consumption quintiles: income shares from self employment/enterprise activities are concentrated among the richer quintiles.

Non-farm income shares are also distributed in an interesting way with landholding classes. The landless, unsurprisingly, receive a large share of their income from non-farm activities. These non-farm incomes also include self-employment/enterprise incomes, and as such this indicates that the landless are not uniformly poor. In the rural Northeast, the very largest landholding classes also receive a sizeable share of income from non-farm sources.



We suggest that the key to an understanding of the link between the rural non-agricultural sector and poverty reduction is the heterogeneity of the sector. It encompasses a great variety of activities and productivity levels. Access to non-agricultural occupations can accordingly be said to reduce poverty in two distinct but equally important ways. First, higher-return activities seem to provide sufficient income to allow rural dwellers with limited access to land to escape poverty altogether. Second, vulnerable segments of the population, such as women, minority groups, and many of the poorest, tend to be concentrated in the less productive rural non-farm activities - largely due to educational deficiencies. These occupations nevertheless provide a critical contribution to their livelihoods, preventing further destitution. Measures of poverty sensitive to the depth of deprivation would certainly be sensitive to this contribution.

Having thus linked rural non-agricultural activities and welfare, we investigated the determinants of employment in the sector. A breakdown of non-farm activities by sub-sector reveals the importance of services, such as domestic service. Construction, food processing, commerce, education, and general administration activities are also numerically important. While a wide range of manufacturing activities can be discerned, they do not dominate the non-farm landscape.

As has been observed in other countries, women are well represented in the non-farm sector. As a percentage of the overall labor force, non-farm activities account for a much larger share of employment of women than of men. Women tend to be concentrated in two sub-sectors: own-account services, and education.

Multivariate analysis, examining the correlates of non-farm employment in rural Brazil suggests that there are two main determinants of access to employment and of productivity in non-rural agricultural activities. In both the Northeast and Southeast, there is strong evidence that the educated, particularly those with secondary education or higher, have better prospects in the non-farm sector. This is emphasized when non-farm activities are divided into low-return and high-return activities. Education is a particularly important determinant of employment in the better paid non-farm activities. Breaking the non-farm sector into two types of activities also reveals that men and women tend to concentrate in different non-farm sectors: the women in the low return activities and the men in high return activities.

The non-farm sector in Brazil has also been found to be closely linked to location. In particular, there seems to be clear evidence that the non-farm sector is more vibrant in those areas which are well connected to markets and which enjoy certain minimum standards of infrastructure. This connection between the non-farm sector and infrastructure is not new. It poses important challenges to policy makers, however. There is a strong movement to enlist the participation of the private sector in the provision of infrastructure in many Latin American countries. What remains to be determined is to what extent these initiatives are able to secure the kind of rural infrastructure provision which is most necessary to promote the non-farm sector.

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