

“Determinants of Rural Poverty and Implications for Public Policy in Brazil”

written for the project

“A Nova Cara da Pobreza Rural no Brasil:  
Transformações, Perfil e Desafios para as Políticas Públicas”

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## 1. Introduction

Rural poverty in Brazil has fallen considerably in the past two decades, but remains a serious problem and an important focus of public policy. Much of the decline is attributable to policy innovations regarding social security and conditional cash transfers. Both policies had a significant impact on poverty during their initial phases of expansion. The real plan in 1994 was another important factor. Now that a new and lower level of rural poverty has been achieved, how can poverty continue to be reduced? What are the key ways in which public policy can contribute to this process?

It is our view that the growth of earned income has lagged the growth of other sources of income, and that without robust income growth it will be difficult to sustain a continued decline in rural poverty in the future. Helfand et al. (2009) show that between 1992 and 2005 earned income fell as a share of total income for rural households from 81% to 72%.<sup>1</sup> At the same time, income received from social security rose by 6.8 percentage points (from 16% to 23% of total income), and income received from other sources—largely attributable to Bolsa Família—rose by 2.5 percentage points (from 1.8% to 4.3% of total income). Even though the coverage of Bolsa Família has continued to grow since 2005, and income from social security has continued to rise, it is difficult to imagine these two programs sustaining future rural income growth at the rates that they did in the past two decades. Thus, in what ways can policy contribute to increasing the growth of earned income in rural areas, and to making it more pro-poor?<sup>2</sup>

With the role of policy in mind, Section 2 of this paper provides a conceptual framework for income generation among rural households. The conceptual framework leads to a discussion of four principal “pathways out of poverty.” Discussion of these pathways is elaborated on in the remainder of the paper. The first is an agricultural path that relies on increasing income from agricultural sources. Agricultural income can be earned through own production or via

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<sup>1</sup> Neder et al. (2011) show that earned income accounted for only about 69% of total income for both the poor and extremely poor in rural areas in 2009.

<sup>2</sup> We recognize that by focusing on “income poverty” we are ignoring other dimensions of poverty that are important for human development and are greatly influenced by public policy. We make this choice because we believe that income growth is a necessary (but certainly not sufficient) condition for human development, because of limitations on the length of this paper, and because our work is complemented by other papers in this project that have adopted a multidimensional framework of analysis.

participation in the labor market. We focus on the potential for own-production to lift poor farmers out of poverty.<sup>3</sup> This allows us to address issues of access to land and land reform, obstacles and challenges to income growth for family farmers (*agricultura familiar*), and the determinants of productivity in agriculture. Non-agricultural income growth provides a second pathway out of poverty. We discuss some of the key findings from a growing international literature on this topic. Some households choose to exit from rural areas. Migration, therefore, provides a third potential pathway out of poverty. For those households without the potential to generate sufficient earned income, transfers provide a fourth possible exit path from rural poverty. The expansion of social security in rural areas following the 1988 Constitution, and the expansion of Bolsa Família since 2003, are the two most important examples of transfers in the context of rural Brazil.

Education is a key factor that ties in with all four pathways out of poverty. Education, and human capital more broadly, a) contribute to raising agricultural productivity via the adoption of new technologies and more efficient use of the technologies and inputs that farmers employ; b) is identified as a key determinant of access to better paying non-agricultural jobs for households that continue to live in rural areas; c) can make the difference between migration providing a pathway out of poverty versus a relocation of poor households from rural to urban locations; and d) is an important component of conditional cash transfer programs throughout the world as they seek to break the transmission of poverty from one generation to another. Thus, because education for rural households is related to all four pathways, continues to lag behind urban areas in both quantity and quality, and is an area that deserves more attention from policy makers and researchers, we will devote considerable attention to this topic.

In this paper we identify key determinants of rural poverty, and some of the most important policies that influence these determinants. We then explore lessons from Brazilian and international experiences that could assist in the formulation of public policies that address these issues in Brazil. The paper is organized as follows. Section 2 examines the determinants of rural poverty. It begins with a conceptual framework for income generation. Within this context, it discusses a typology of pathways out of poverty. Section 3 places rural poverty in Brazil within

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<sup>3</sup> See Buainain and Dedecca (2009) for a discussion of rural labor markets and poverty.

a global context, and then briefly discusses key facts about Brazilian rural poverty. Section 4 examines a number of specific topics that are of particular importance to income generation in rural Brazil. First, in the context of family farmers seeking to generate agricultural income, we explore issues related to land, productivity, physical capital, and human capital. We then discuss a growing international literature on small farms that identifies obstacles to participation in markets caused by transactions costs. Finally, we address some of the important linkages between urban and rural areas, and agricultural and non-agricultural activities. Section 5 provides conclusions and policy recommendations.

## **2. Determinants of rural poverty**

Section 2a presents a framework for conceptualizing income generation, and Section 2b discusses a typology of pathways out of poverty. Together these can help to identify key variables, and the relationships among them, that policy can influence.

### *2a. A conceptual framework for income generation*

Households have endowments of capital (physical and human) and labor, that can be allocated to alternative income generating activities (agriculture, rural non-agriculture, diversified, migration, etc.). The activities are conditioned by different contexts, and are also influenced by exogenous shocks (either covariant or idiosyncratic). The combination of endowments, strategies, contexts, and shocks contribute to the determination of income. Households update their strategies over time in responses to observed returns, shocks, learning, and changes in household composition. This framework, portrayed in Figure 1, is discussed in more detail below.<sup>4</sup>

Rural households are embedded within a number of environments: physical, social, legal and institutional, political and economic. The physical setting refers to natural phenomena such as the level and variability of rainfall, the natural fertility of soils, altitude and inaccessibility. The social setting captures factors such as the existence of social capital, mobility between classes, the determinants of status, and the existence of certain norms of behavior. The legal and

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<sup>4</sup> The conceptual framework presented in this section is based on the discussion in Baulch and Hoddinott (2000).

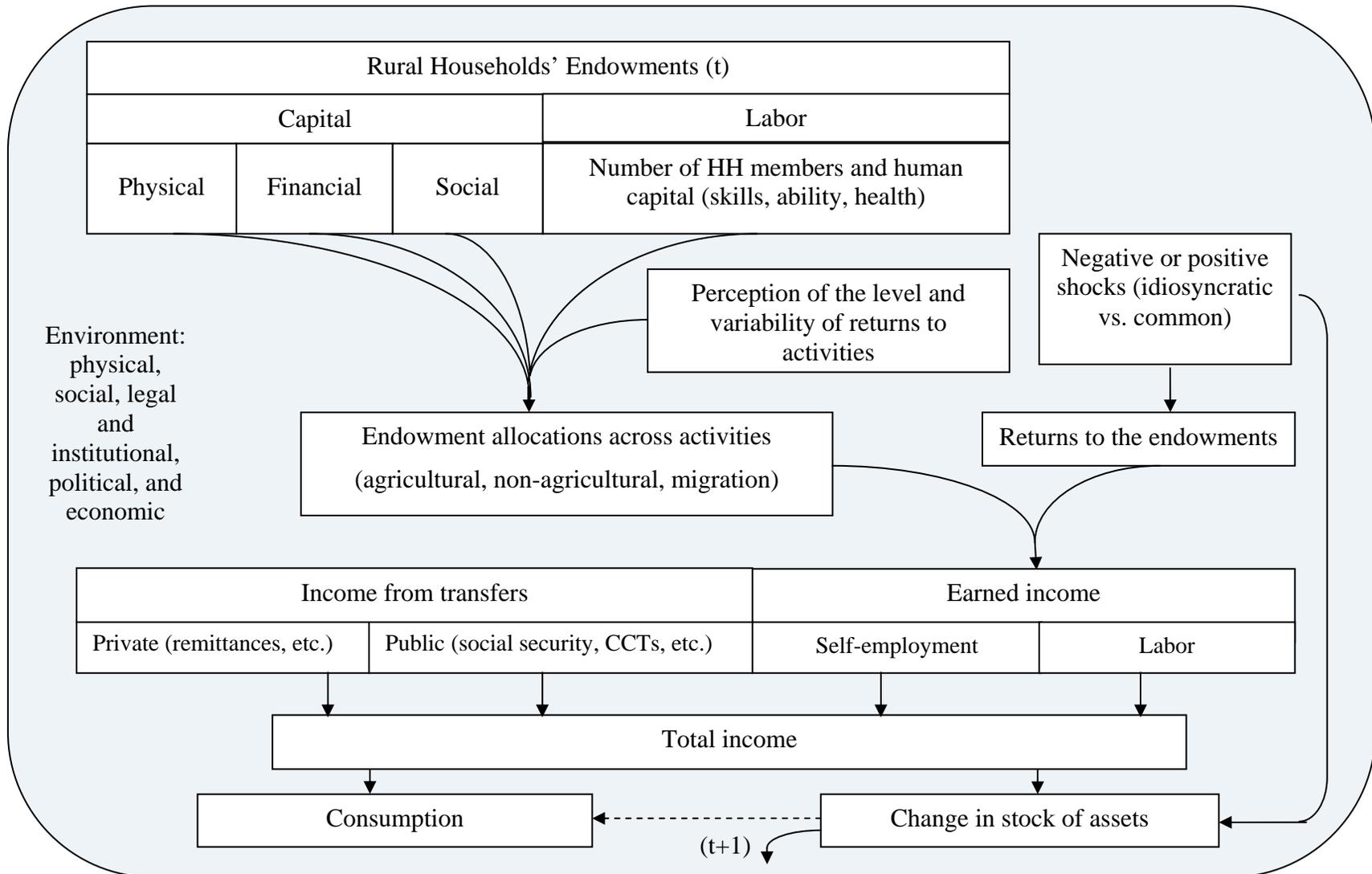
institutional setting can be thought of as the general “rules of the game” in which exchange takes place which, in turn, is partly a function of the political setting which captures the mechanisms by which these rules are set. The economic setting captures factors such as the competitiveness of markets, and policies that affect the level, returns and variability of returns to assets. These settings will vary between the local, regional and national levels. The overall environment is important for the definition of the household’s strategies and use of assets.

Within these environments, households have endowments of capital and labor. Capital can include physical capital (land, machinery, agricultural tools), financial capital (assets that are used as stores of wealth), and social capital (features of social organization such as networks, norms and social trust that facilitate coordination and co-operation for mutual benefit). Labor endowments are the number of household members and their knowledge, skills and health. They contribute to the household's ability to work productively either for itself or external employers.

When a newly formed household is considered, these endowments can be regarded as exogenous. They reflect the intergenerational transmission of certain assets: investments in health and education, the provision of dowries or inter vivo gifts, as well as activities undertaken by household members prior to forming this household.

Households allocate their endowments across a set of activities in order to generate income. These activities include agriculture, non-agriculture, migration, or any combination of them along a continuum that runs from specialized in a single strategy to diversified among a number of strategies. The allocation depends on how household members perceive the level and variability of returns to each of these activities. The returns to endowments vary across activities. Once households define their strategies and allocate their endowments, they can also be affected by shocks. These could be shocks that affect all households in a particular locality – a common or covariant shock – or they could be restricted to a given household, an idiosyncratic shock. The latter tends to reflect the influence of diverse, difficult to predict factors.

Figure 1. The Determinants of Income/Consumption for Rural Households



Source: Adapted from discussion in Baulch and Hoddinott (2000).

Earned income, therefore, is influenced by the endowment allocations across activities and by the returns to the endowments. Earned income can come from self-employment or from the labor market, and these two sources can be either agricultural or non-agricultural. Agricultural earned income can be increased through agricultural productivity growth, increased participation in the agricultural labor market, or increased wages. Non-agricultural income has similar influences, and is affected by individual and geographical determinants of access to non-agricultural employment. Transfers are another source of income. A household can receive private transfers, such as remittances and gifts, or public transfers, such as social security and conditional cash transfers.

Total income is the sum of income from transfers and earned income. Part of total income is allocated to consumption, whereas another part can be allocated to investments in assets. The stock of assets changes when income is allocated to purchase additional assets, when assets appreciate in value, or when shocks or other factors reduce the stock. Negative shocks, for example, can destroy assets or lead to distress sales of assets. Stocks of assets can also be sold for consumption purposes as a natural part of the life cycle. The level of assets at the end of a period will have an impact on the subsequent period of time when households will once again be able to reallocate their portfolio of assets to activities.

Policies influence the income generating process in many ways. Policymakers need to choose where to allocate their scarce budgetary and manpower resources based on the relative effectiveness and costs of alternative policies. In order to make informed decisions about effectiveness and costs, high quality research must be done to evaluate the impact of policies, and to estimate values for their costs and benefits. Several examples of how policies influence the income generating process are discussed here. Some of these are developed more fully in the remainder of the paper.

There are many policies that can contribute to enhancing the portfolio of assets that households utilize in their income generating strategies. Policies that help provide access to physical assets for agricultural production, for example, include redistributive land reform (INCRA), market-

assisted land reform (Crédito Fundiário), and credit for investment purposes (PRONAF).<sup>5</sup> Because Brazil already has well established policies in each of these areas, it is natural to ask how well these work policies work, and at what cost. It is important that research move beyond counting the number of beneficiaries in each type of program, and strive to provide solid evidence on how cost effectively they contribute to increasing the income of the beneficiaries. It is also important to recognize that the success of policies that contribute to building the assets of the poor depends on the many different “environments” described in Figure 1, such as macroeconomic stability or physical infrastructure, as well as on the level of technology and complementary inputs used in production. As we show in Section 4 below, a high percentage of small farms in Brazil generate low levels of income both because they are small and because they have low levels of productivity.

Human capital is one of the most important determinants of earnings. Fortunately, there are many policies that can help to build the human capital of the poor. These include investments in the quantity and quality of education and healthcare in rural areas, as well as programs that provide training in specific skills that are relevant to agricultural or non-agricultural employment. Because the provision of education and health services are largely public sector responsibilities, issues related to human capital are of particular importance for policy. Unfortunately, the quantity and quality of these services are shockingly low in rural areas. We address this issue in much more detail below.

Returning to Figure 1, there are a variety of policies that can enhance the accuracy of the “perceptions” of the returns to activities by providing information about market opportunities, prices, and volatility. There are also many policies that can reduce the impact of volatility and negative shocks such as support prices or insurance. Again, the question is: which policies can generate the greatest benefits at the lowest cost?

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<sup>5</sup> There are other policies as well that can facilitate access to land, including programs that reduce transactions costs in land rental markets and increase the enforceability of rental contracts. Land rental markets are much more active in other parts of the world compared to Brazil and other Latin American countries. See de Janvry et al. (2001) for a discussion of these issues.

## *2b. A typology of pathways out of rural poverty*

Poor households normally have a fairly limited set of income sources: agricultural (self-employment and wage labor), non-agricultural (self-employment and wage labor), remittances, and government transfers. There is a growing international literature on pathways out of poverty. The pathways relate to different household level strategies for escaping poverty—e.g., agricultural intensification, diversification into non-agriculture, temporary or permanent migration, etc. Policies can be structured around finding way to increase the probability that these strategies will be successful. de Janvry and Sadoulet (2000) provide a discussion of poverty exit path for rural households in Latin America, and the *World Development Report 2008* applies the framework to developing countries throughout the world. We briefly comment on some of the key findings of this research.

de Janvry and Sadoulet (2000) show that migration was the most important factor for explaining the reduction in the ratio of rural poor to urban poor in Latin America in the 1970-1997 period. Thus, a considerable number of poor people relocated to urban areas and remained poor. Policy needs to focus on making migration a successful transition out of poverty, and not just a relocation of the poor. But if one restricts attention to poverty in rural areas, the *World Development Report 2008* concludes that migration was not the main reason why poverty fell in rural areas of developing countries between 1993 and 2002. Only about 20% of the reduction in the rural poverty rate in developing countries was due to migration. When China is excluded, the share attributable to migration only rises to 33%.<sup>6</sup> Helfand and Levine (2005) estimate that around half of the decline in the Brazilian rural poverty rate between 1991 and 2000 was due to migration. Thus, migration clearly matters, but income growth in rural areas was also an important part of the explanation for poverty reduction.

Migration can have an even larger impact on rural poverty when it leads to a steady flow of remittances to the family members who did not migrate. This is the case in Mexico and many Central American countries where there is a large number of migrants, and they have access to the U.S. labor market where wages are much higher than in the sending countries. In Mexico, remittances are the second largest source of foreign exchange (after oil), and in some Central

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<sup>6</sup> *World Development Report 2008*, pp. 47-48.

American countries as many as 25% of households receive remittances. There are communities in Brazil, such as in the North of Minas Gerais or in the Northeast, where remittances are significant as well. The international literature demonstrates that remittances are important not only to sustain current consumption, but also as a source of income for investment in housing, land, or to start a small business.

The agricultural path out of poverty requires not only sufficient land, but also adequate levels of productivity. Thus, land reform programs need to be accompanied by other institutional reforms that contribute to the competitiveness of the beneficiaries. Similarly, for existing small farmers, policy needs to help reduce high transactions costs by providing public goods, facilitating access to input and output markets and to technologies that can help raise productivity (de Janvry and Sadoulet, 2000). Technologies that are accessible to small producers are sometimes best provided by downstream industries, as in the cases of poultry and hog production, and access to high value markets is sometimes a result of direct links to supermarkets. Without these connections, it is often difficult for small producers to be competitive in terms of costs, quality, and other attributes. The international literature has increasingly become aware of the fact that the agricultural path to becoming a “viable” family farm that relies predominantly on agricultural production is not a necessary condition for escaping poverty. It might only be a successful pathway for a minority of the rural poor.

The pluriactive path out poverty has gained increasing attention in the past decade. A 2001 special issue of the journal *World Development*, for example, focused on rural non-farm employment and income in Latin America. In this special issue, Reardon, Berdegue, & Escobar (2001) showed that non-farm income represented an average of between 35% and 45% of rural income in Africa, Asia, and Latin America.<sup>7</sup> For rural Brazil, Jonasson and Helfand (2010) reported that around 30% of the rural labor force had principal employment in non-agricultural activities.

There are numerous types of non-agricultural employment that are available to rural residents, and thus the specific dynamic sector that might lead employment growth in a particular location

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<sup>7</sup> Winters et al. (2009) report similar numbers for a sample of 15 countries.

is highly context specific. Jonasson and Helfand (2010), for example, focus on proximity to population centers as a key factor that increases the probability that a rural household will find non-agricultural employment. These jobs might be in construction, commerce, small scale manufacturing, or domestic service. There are, however, many possible growth motors. In some regions there can be forward linkages from agriculture. The existence of irrigated agriculture, for example, might create linkages to non-agricultural jobs in fruit and vegetable processing. In other locations it might be an abundance of animal production that creates employment in a slaughter house. The dynamic sector need not be linked to agriculture. Some rural families have the geographical fortune of being located in areas in high demand by tourists, such as near the beaches of the Brazilian Northeast. Others might live close to a port or an oil refinery that increase the demand for labor.

Two important implications that follow from this body of research are, first, that it is not necessary to be a “viable” family farmer relying solely on agricultural income in order to escape rural poverty. Participation in agricultural and non-agricultural labor markets can be just as important. Second, the diversity of possibilities for growth and employment has led naturally to a focus on territorial development. If alternatives to migration are to be constructed, local territories must find or create their own dynamic sectors that have the potential to generate employment. It is not essential that these sectors be based on agriculture. What matters is that they create opportunities that are accessible to the rural (and urban) poor.

### **3. Rural poverty in Brazil and the world**

#### *3a. How does Brazil compare to other countries?*

The *World Development Report 2008: Agriculture for Development* provides a useful categorization of developing countries with regards to rural poverty and the role of agriculture with which Brazil can be compared. It divides countries into three groups based on the relative importance of agriculture in national growth, and the share of national poverty that is rural. Countries are classified as 1) agriculture-based countries, 2) transforming countries, and 3) urbanized countries. Brazil belongs to the urbanized group. Some main features include:

- The agriculture-based countries are quite poor, with an average GDP per capita of US\$379 in 2005<sup>8</sup>. Around 70% of the poor people in these countries live in rural areas, and half the rural population is poor (using a poverty line of \$1.08 a day in 1993 ppp dollars). Many of these countries are in Sub-Saharan Africa. Agricultural growth was more dynamic than non-agricultural growth between 1993 and 2005 in these countries.
- The transforming countries have an even higher share of the poor living in rural areas (82%) because income growth in urban areas has reduced poverty there first. Income per capita is significantly higher than in the first group of countries (\$1068), and GDP growth was much faster in the nonagricultural sectors than in agriculture between 1993 and 2005 (7.0% per year vs. 2.9%). This group of countries had a much lower incidence of rural poverty (28%) than the agriculture-based countries. The group includes China, India, and Indonesia.
- The urbanized countries include most of Latin American. GDP per capita was close to \$3500 in this group, and agriculture only represented 6% of GDP in 2005. However, once agriculture was combined with agribusiness and food industries, together they accounted for around 1/3 of GDP. Growth was more balanced across sectors (2.2% per year for agriculture and 2.7% for non-agriculture), yet poverty remained a significant problem in rural areas. Around 45% of poor people in these countries lived in rural areas.

Unlike in agriculture-based countries where agriculture can still be a lead sector, in urbanized countries like Brazil, the World Development Report argues that agriculture can contribute to poverty reduction in a number of ways. These include a) finding ways to integrate family farms into modern (high value) food markets, b) ensuring that agriculture and agroindustry create good jobs, and c) introducing markets for environmental services. A variety of more specific proposals follow from these general recommendations.

In many ways, Brazil is a typical country in the “urbanized” group, but it has a number of advantages that it can use to its benefit. As is common in this group, agriculture by itself represents a small share of GDP, the population is largely urban, the share of the poor that is rural is less than half, and the incidence of poverty in rural areas is considerably higher than in

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<sup>8</sup> These are constant US\$ from the year 2000.

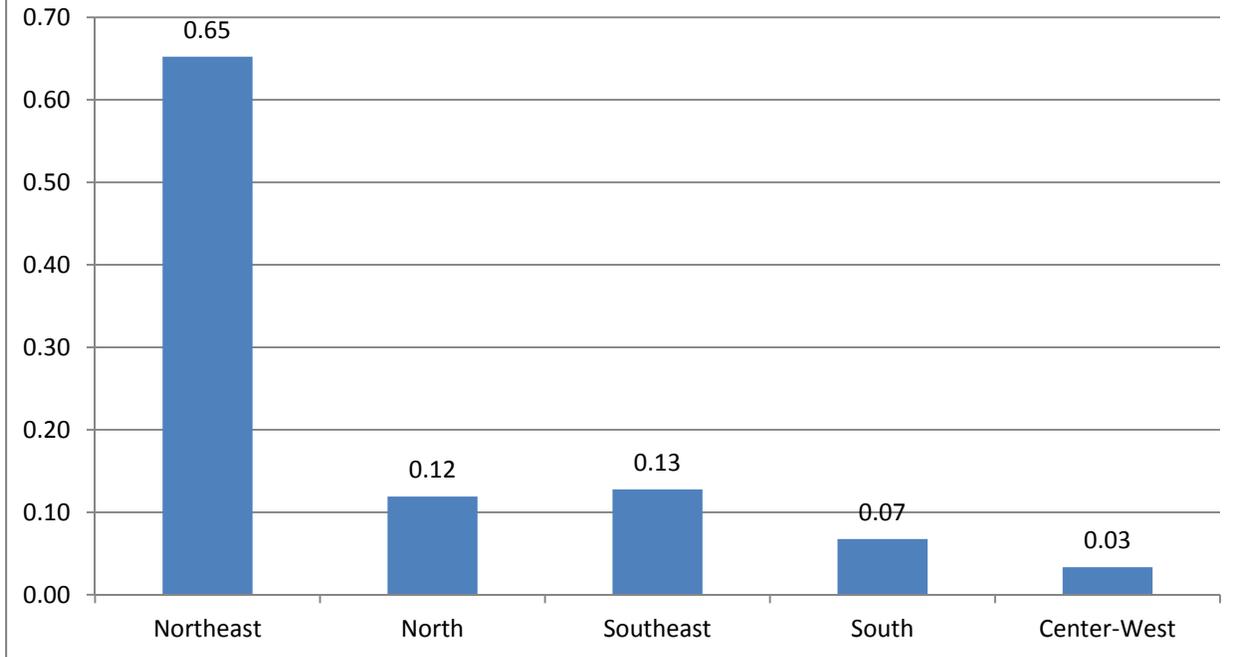
urban areas. In Brazil, as in many of these countries, rural poverty is concentrated in a “lagging region” within the country. Around two thirds of the rural poor in Brazil live in the Northeast. But unlike many of the countries in this group, Brazil has extremely dynamic and competitive agricultural and agroindustrial sectors, a large domestic market, and a state that is quite active in seeking to assist the rural poor through policies such as land reform, rural credit, and transfers (both social security and CCTs). Thus, Brazil is well positioned to examine how its policies could be refined and improved to contribute to a) raising income for family farmers, b) improving access to, the quality of, and earnings in agroindustrial and other non-agricultural jobs, and c) developing other strategies that contribute to a long term reduction in rural poverty.

### *3b. Rural poverty in Brazil*

Rural poverty in Brazil has declined significantly in the past two decades. After increasing in the 1980s, the share of the rural population that was poor fell from 0.62 to 0.48 between 1992 and 2005 (using a poverty line of ½ an August 2000 minimum wage). Using a similar poverty line, Del Grossi (2010) shows that the incidence of rural poverty fell to under 0.35 in 2009. Helfand et al. (2009) decompose the changes in poverty into components explained by growth and by changes in inequality. The authors conclude that income growth explained all of poverty reduction between 1992 and 1998, and that growth and a reduction in inequality were both important between 1998 and 2005.

Rural poverty in Brazil is extremely heterogenous across regions and types of families. Using the same poverty line as above, Helfand and Del Grossi (2009) provide information on the distribution of rural poverty across macro regions. They show that 65% of the rural poor in 2006 were located in the Northeast, and an additional 12% were in the North (see Figure 2). Figueiredo et al. (2007) provide additional evidence of heterogeneity when disaggregating rural households according to the occupation of the household head and measuring poverty with consumption-expenditure from POF 2002-03. First, as can be seen in Table 1, they show that when poverty is measured with consumption expenditure, the incidence of rural poverty in the Northeast is four times as high as in the South (57% versus 14%). Second, they show that

Figure 2: Share of National Rural Poverty by Region, 2006  
(13.5 million people)



Source: Calculated from Helfand and Del Grossi (2009).

Table 1: Income vs. Consumption Poverty by Position in Occupation of Household Head

Sub-groups	Income		Consumption*		Difference		
	Mean	Headcount	Mean	Headcount	Mean (%)	Headcount	
Agriculture	132.46	0.626	152.30	0.458	14.98	-0.168	
Non-Agriculture	188.14	0.446	200.43	0.300	6.53	-0.145	
Nobody employed	152.60	0.429	209.34	0.331	37.18	-0.098	
Other <sup>1</sup>	141.37	0.414	156.43	0.408	10.65	-0.006	
Agriculture	Employee	94.08	0.697	126.64	0.527	34.60	-0.170
	Employer	533.30	0.234	337.67	0.173	-36.68	-0.061
	Subsistence	82.63	0.713	123.40	0.551	49.34	-0.163
	Self-employed	143.47	0.590	163.48	0.413	13.95	-0.177
Self-employed	1st quartile	23.46	1.000	79.04	0.769	236.86	-0.231
	2nd quartile	64.18	1.000	125.31	0.445	95.27	-0.555
	3rd quartile	137.95	0.036	196.55	0.174	42.47	0.138
	4th quartile	471.80	0.000	323.66	0.057	-31.40	0.057

Source: Authors' calculations based on micro data from POF 2002/03

<sup>1</sup> This group comprises the households where someone other than the head is employed

\* Preferred scenario

Source: Figueiredo et al. (2007).

households in which the head works in agriculture, rather than in non-agriculture, have a much greater chance of being poor (46% versus 30%). Within agriculture, employees have a much higher incidence of poverty than employers or the self-employed (53%, 17%, and 41%, respectively). Finally, some self-employed households in agriculture are extremely poor, while others are quite affluent. In Section 4, we explore the extent to which these differences can be explained by assets, productivity, or other factors.

## 4. Key Determinants of Rural Poverty

### 4a. Introduction

Land reform is an important issue in Brazil that has the potential to address inequality in the distribution of land (an essential asset), as well as to contribute to poverty reduction. But the record around the world in achieving these objectives through land reform is mixed. Latin American history is full of examples of land reform programs that have not lived up to expectations in terms of a reduction in poverty and inequality (de Janvry, Sadoulet and Wolford, 2001). It is also not clear how much progress the recent Brazilian land reform has made in terms of reducing poverty and inequality.<sup>9</sup> While we are not able to answer these questions here, what we can do is explore the extent to which insufficient land is an important explanation for poverty among agricultural producers in Brazil. We do this in Section 4b.

The viability of family farms—or *Agricultura familiar*—is also an important issue in Brazil, both in terms of research and public policy. There is a large international literature on this issue, as it relates to farm size and productivity, integration into markets and/or industries, the relationship with supermarkets, and the future of family farming. For example, the journal *World Development* recently published a special edition in October, 2010 on “The Future of Small Farms.” A key issue in this discussion is to explore policies that contribute to supporting a

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<sup>9</sup> Hoffmann and Ney, for example, provide evidence that inequality in the distribution of land has remained remarkably stable in the past 30 years. Based on Agricultural Census data from 1975, 1980, 1985, 1995/96, and 2006, the Gini for the distribution of land has remained constant at 0.85 (with changes only appearing in the third decimal place). This does not mean that land reform has not reduced inequality, because there are other forces that might have increased it. But it does imply that land reform has not been sufficiently powerful to overcome these other forces and produce a significant reduction in inequality. Evidence of the impact of land reform on poverty remains scant.

vibrant family farm sector that lifts its members out of poverty. These policies do not exist in many developing countries, and family farms often end up as a refuge for poor, marginalized populations.

Brazil has a much more supportive set of policies than in most countries, yet the evidence on the evolution of Brazilian family farms between 1995-96 and 2006 is mixed. Restricting attention to family farms, Guanziroli et al. (2010) report that around 8% of these farms produced half of all agricultural production in 1995/96. By 2006, the top 8% of family farms were responsible for two thirds of this group's agricultural production. Clearly, this was a dynamic sub-group of family farms. In 2006, however, there was another sub-group, representing about half of all family farms, that did not generate enough production to cover half of the opportunity cost of a rural worker. On average, this group generated a little over R\$250 per year in net income, while the first group earned an average of over R\$50,000. There were also two intermediate groups that were shrinking in size, in share of establishments and output, and in terms of the average annual income that they produced.<sup>10</sup>

One of the key insights from the international literature is that productivity in agricultural production is a necessary, but not sufficient condition for family farm success. Some of the biggest obstacles for family farms exist outside of the farm, and relate to transactions costs that small farms face in accessing input and output markets, credit, and technology. These issues are discussed in Section 4e on obstacles to the success of family farms.

Section 4b draws on work by Moreira et al. (2010) that examines the extent to which insufficient land, or insufficient productivity, explain differences in poverty among agricultural producers. This work uses the 1995-96 Agricultural Census. The authors conclude that insufficient land and low levels of productivity are both important reasons for poverty among agricultural producers. In light of these results, Section 4c analyzes data from the 2006 Agricultural Census on assets. We seek to quantify the extent to which productive assets—or the lack thereof—contribute to explaining low levels of income among agricultural producers. Section 4d discusses insufficiency of human capital, and in particular education, among rural residents of Brazil.

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<sup>10</sup> See Tables 17 to 20 in Guanziroli et al. (2010).

Section 4e explores obstacles to the success of family farms. Finally, Section 4f examines key issues related to rural non-agricultural employment and poverty.

*4b. The determinants of poverty among agricultural producers: land versus productivity?*

Moreira et al. (2010) use the 1995-96 Agricultural Census to study the extent to which insufficient land, low levels of productivity, or both, explain differences in poverty among agricultural producers in Brazil. The Agricultural Census has advantages and disadvantages as a source of data for studying poverty. First, the use of the Census requires a change in focus. Rather than study rural Brazil, with the Census it is only possible to analyze employers and self-employed agricultural producers. Thus, rural residents employed in non-agricultural activities and agricultural wage workers are excluded from the analysis. Second, the Agricultural Census captures agricultural income more fully than do PNAD or the Demographic Census which only measure monetary income. This is a significant advantage of the Agricultural Census, because own consumption of agricultural production—i.e., non-monetary income—can be quite sizeable for family farms. Third, the Agricultural Census only captures agricultural income whereas PNAD captures all sources of income. This is a limitation of the Census, but it can be overcome by reframing the question in terms of the extent to which “agricultural income”—rather than all sources of income—can lift agricultural producers out of poverty. Fourth, the unit of analysis in the Agricultural Census is the establishment, whereas it is the domicile in PNAD and the Demographic Census. This is another limitation for studying poverty because it is not possible to accurately measure the number of members who belong to the household. This can also be overcome by slightly changing the focus of analysis. Rather than study poverty among agricultural households, one can study low levels of earnings among household members employed on the farm. Given these limitations, the authors focus on the extent to which agricultural income alone can generate  $\frac{1}{2}$  minimum wage per full time equivalent family member engaged in agricultural production.

Moreira et al. (2010) begin their analysis by arguing that the Agricultural Census is a valid source of information for studying rural poverty. They show that there is a very high degree of correlation between their results based on the Agricultural Census and other results based on the

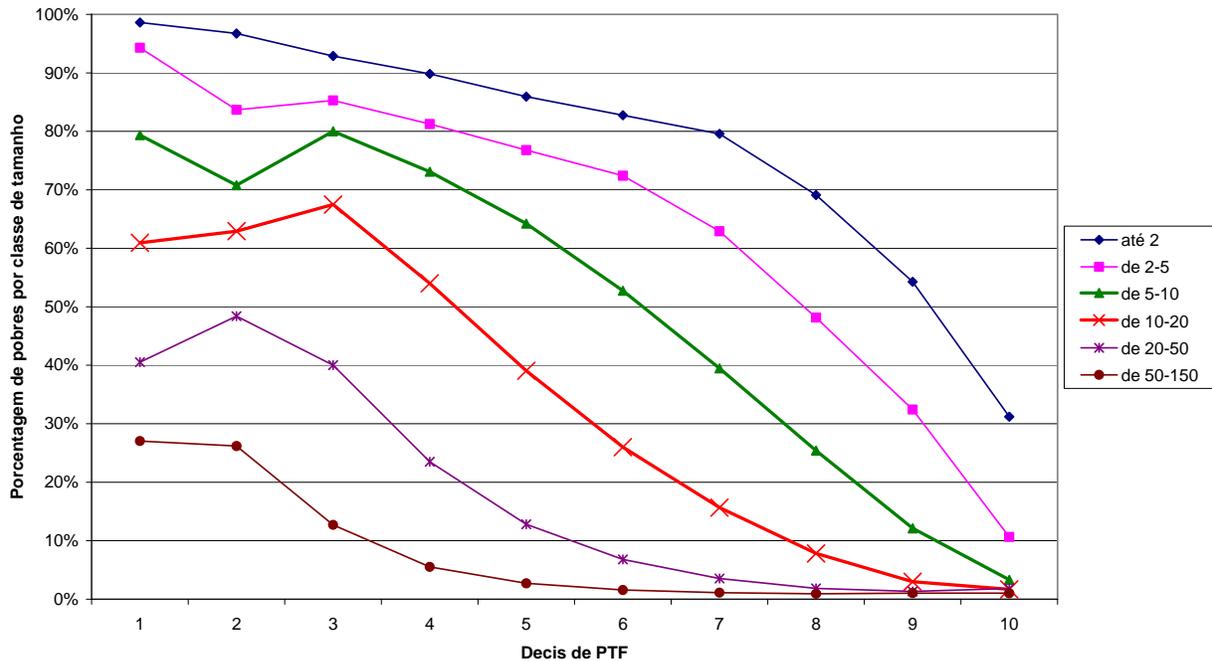
2000 Demographic Census. In fact, they show a correlation of 0.8 between municipal level measures of poverty drawn from the two sources. They also show a high degree of consistency across macro regions. Whereas the 2000 Demographic Census calculates the incidence of rural poverty in Brazil at 0.61, the Agricultural Census estimates 0.53. Both sources show the Northeast with the highest incidence of poverty (0.77 and 0.76 respectively), and the South with the lowest (0.35 and 0.32). The conclusion that the authors draw is that although the informational content of the Agricultural Census is somewhat different than PNAD or the Demographic Census, it nevertheless contains a significant amount of relevant information for studying poverty among agricultural producers in Brazil.

The methodology used by Moreira et al. (2010) involves 1) the estimation of an average profit function in order to calculate total factor productivity for all farms. This is used descriptively to study the relationship between farm size, productivity, and poverty. 2) the estimation of a stochastic frontier production function to calculate the efficiency of each establishment. 3) the use of semi-parametric counterfactual simulations that examine the impact on the distribution of income, and on poverty, of differences between groups in the distribution of a number of variables. These include land, the number of family members employed on the farm, efficiency, and the determinants of efficiency as revealed by the coefficients in the stochastic frontier production function. The groups analyzed were poor/not poor, macro regions, family/not family, etc. The counterfactual simulations seek to answer the question: what would happen to the distribution of income among farmers in group A (the Northeast, for example) if they had the distribution of land (or the distribution of efficiency, or the distribution of input  $x$ ) among farmers in group B (the South, for example). We briefly summarize some of their main results below.

Figure 3 shows the relationship between farm size, total factor productivity (TFP), and poverty in the South of Brazil. Recall that the incidence of “poverty” is measured as the percentage of establishments that do not generate one half of an August 2000 minimum wage per full time equivalent family member working on the farm. The Figure shows that around 65% of the farms are poor that have between 5 and 10 hectares, and total factor productivity in the 5<sup>th</sup> decile of the TFP distribution. Poverty could be reduced by either increasing farm size while holding TFP

constant, by increasing TFP while holding farm size constant, or by a combination of the two. For example, the incidence of poverty falls to around 40% for farms in the 10-20 hectare group, holding TFP constant in the 5<sup>th</sup> decile. Poverty also falls to around 40% for farms in the 7<sup>th</sup> decile of the TFP distribution, holding farm size constant at 5-10 hectares. Thus, in the South of Brazil, it appears that increasing either farm size or productivity could have a significant impact on poverty among agricultural producers.

Figure 3: Incidence of Poverty by Farm Size and Decile of TFP: South

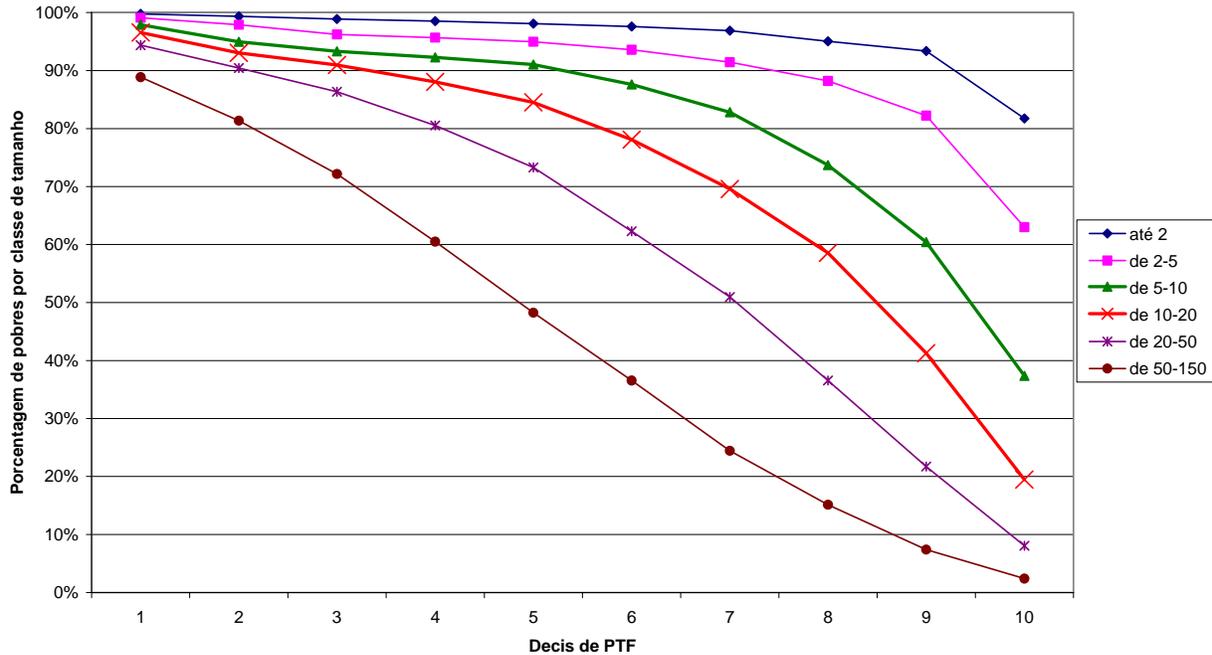


Source: Moreira et al. (2010)

The situation in the Northeast of Brazil is much more complicated. Figure 4 shows the same relationship between size, TFP, and poverty for the Northeast of Brazil. In contrast to farms in the South, around 90% of the farms with 5 to 10 hectares in the 5<sup>th</sup> decile of TFP are poor. The incidence of poverty only falls to around 85% for farms with twice as much land and the same level of TFP. Similarly, poverty remains above 80% for farms with 5 to 10 hectares in the 7<sup>th</sup> decile of TFP. For farms with 5 to 10 hectares, it was necessary to be in the 10<sup>th</sup> decile of TFP in order for the incidence of poverty to fall below 40%. Clearly, either substantially more land or significantly higher TFP is necessary in order to make a large impact on the incidence of poverty

among agricultural producers in the Northeast. The potential to make a significant impact on poverty through agricultural income alone appears to be much smaller than in the South.

Figure 4: Incidence of Poverty by Farm Size and Decile of TFP: Northeast



Source: Moreira et al. (2010)

Table 2 shows the results of the counterfactual simulations between regions. The table shows what would happen to the poverty rate in each region if it had the distribution of land, of family labor, or of profitability (a concept closely related to productivity) from another region, holding all else constant. The first row of the table shows the difference in poverty between each region of the country. Poverty among producers in the Northeast was between 28 and 54 percentage points higher than in the other four regions. If producers in the Northeast had the distribution of land from any other region, poverty would fall between 31 and 51 points. Thus, a big part of the explanation for higher poverty rates in the Northeast relates to the distribution of land. Even compared to the South, which is a region with a strong presence of family farms, poverty would be 36 percentage points lower in the Northeast if they had the distribution of land from the South.

Table 2: Counterfactual simulations of the effect on poverty  
of substituting each component between regions

Components	Compared regions									
	NE N	NE SE	NE S	NE CW	N SE	N S	N CW	SE S	SE CW	CW S
Difference in poverty	-0.28	-0.44	-0.54	-0.41	-0.16	-0.26	-0.23	-0.10	-0.07	-0.03
Farm size	-0.31	-0.42	-0.36	-0.51	-0.10	-0.03	-0.19	0.10	-0.06	0.23
Family labor	0.00	-0.06	-0.03	-0.06	-0.08	-0.03	-0.09	0.04	-0.01	0.04
Profitability	-0.22	-0.16	-0.28	-0.17	0.00	-0.15	-0.01	-0.14	0.00	-0.11

Source: Moreira et al. (2010)

Table 2 shows that profitability is also an important part of the reason for higher poverty rates in the Northeast. If producers in the Northeast had the distribution of profitability from the South, for example, poverty would fall by 28 percentage points (*ceteris paribus*). Although differences in profitability between the Northeast and other regions are important, differences in the distribution of land have a larger impact on poverty rates.

Table 3, also drawn from Moreira et al. (2010), shows the results of the counterfactual simulations between poor and non-poor producers within each region. In contrast to Table 2, the effect of differences in the distribution of profitability between the poor and non-poor within each region is always larger than the effect of differences in the distribution of land. In most cases, however, the two effects are of a similar magnitude. In the Northeast, for example, poverty would fall by 40 percentage points if the poor producers had the distribution of land of the non-poor producers. Similarly, poverty would fall by 44 percentage points in the Northeast if the poor producers had the distribution of profitability of the non-poor. The authors conclude that both insufficient land and low levels of productivity among the poor are important reasons for poverty in each region.

Table 3: Counterfactual simulations of the effect on poverty of substituting each component  
between the poor and non-poor within each region

Component	Regions				
	N	NE	SE	S	CW
Poverty incidence	0.48	0.76	0.32	0.22	0.25
Farm size	-0.19	-0.40	-0.18	-0.12	-0.17
Family labor	-0.11	-0.12	-0.08	-0.06	-0.07
Total profitability	-0.34	-0.44	-0.25	-0.18	-0.19
Profitability – Inefficiency	-0.15	-0.09	-0.13	-0.10	-0.13
Profitability – Production factors	-0.13	-0.13	-0.10	-0.04	-0.06

Source: Moreira et al. (2010)

#### *4c. Assets among agricultural producers*

In light of the conclusion that insufficient land and low levels of productivity are both important reasons for poverty among agricultural producers in Brazil, we now ask to what extent insufficient assets other than land might represent an obstacle to generating income for small farms. The underlying idea here is that assets, either in the form of land or other forms of physical capital, are necessary to raise the marginal productivity of labor and thus the returns to family labor on the farm. Productivity can be increased as a result of increasing the quantity of physical capital, holding technology constant, or by raising the level of technology embodied in the capital. In this section we abstract from these differences and simply examine the value of non-land assets held by small farms.

Table 4 shows the value of assets on Brazilian farms according to the 2006 Agricultural Census. The first two rows refer to all farms in Brazil, and to farms between 0 and 10 hectares. The remaining rows report the same information for selected states. 49% of all farms in Brazil had between 0 and 10 hectares in 2006. These 2.48 million farms had 7% of all assets reported in the Agricultural Census. The value of the land held by small farms represented 56% of their assets. We exclude land from our analysis here because we want to focus on investments in physical capital that contribute to increase the productivity of family labor. After excluding the value of land, small farms had an average of R\$15,523 in assets per establishment. This is an

Table 4: Value of Assets on Brazilian Farms (2006)

		Establishments		Value of assets		Value of land		Land share	Assets / Estab. (without land) R\$	Income per month p.c. (10% ROR, family of 4) R\$
		#	%	R\$1000	%	R\$1000	%			
Brazil	Total	5,090,960		1,238,572,593		874,206,542	71	71,571	149	
	0-10ha	2,477,071	49	86,737,919	7	48,286,078	56	15,523	32	
Santa Catarina	Total	192,795		59,452,816		34,325,077	58	130,334	272	
	0-10ha	69,390	36	7,059,189	12	3,793,130	54	47,068	98	
Sao Paulo	Total	227,024		191,774,691		148,568,403	77	190,316	396	
	0-10ha	84,298	37	11,956,097	6	7,700,777	64	50,479	105	
Matto Grosso do Sul	Total	64,764		90,983,839		67,454,336	74	363,311	757	
	0-10ha	13,396	21	781,003	1	507,844	65	20,391	42	
Pernambuco	Total	300,211		11,588,374		6,377,153	55	17,359	36	
	0-10ha	208,110	69	3,234,560	28	1,668,507	52	7,525	16	
Alagoas	Total	121,271		12,970,929		10,823,045	83	17,711	37	
	0-10ha	95,791	79	1,894,151	15	1,425,889	75	4,888	10	

Source: Agricultural Census 2006.

upper bound estimate of the productive capital held by small farms because this figure includes the value of their home, and other items, such as the value of the entire stock of animals, only a portion of which should properly be counted as productive capital.<sup>11</sup> If one were to assume a 10% rate of return on these assets, and a family of four, the assets held by small farms in 2006 generated a flow of income equal to about R\$32 per capita. The poverty line of ½ an August 2000 minimum wage per capita was R\$122.72 in real terms in December 2006 when the assets were valued. Thus, small farms on average had enough capital to generate approximately ¼ of the income necessary to bring them up to the poverty line.

The situation was far from uniform across states. In Santa Catarina and São Paulo, where farms 0-10 hectares only represented around 1/3 of all farms, these farms were sufficiently capitalized (on average) to generate around R\$100 of income per capita, or over 80% of the poverty line. In Pernambuco and Alagoas, in contrast, farms 0-10 hectares accounted for 69% and 79% of all farms, and they only had sufficient assets to generate R\$16 and R\$10 per capita respectively. Thus, in the Northeast, in addition to insufficient land, small farms have insufficient productive

<sup>11</sup> In the case of cattle, for example, dairy cows and cows used for reproduction should be counted as capital, whereas animals raised for meat should not.

capital, and this could be part of the reason why productivity is so low relative to other regions of the country.

#### *4d. Human capital in rural Brazil: The education gap*

The formation of human capital is extremely important for economic and other reasons. However, the supply and quality of education in rural areas are usually below what is offered in urban areas, especially in developing countries. This suggests that education for rural households deserves special attention in order to reduce this gap. In this section we first highlight some lessons from the international literature on education in rural areas. We then provide information on the low levels of education that exists for adults in rural Brazil. This reality creates considerable obstacles for current income generation. Finally, we present some data on education levels, and educational inputs and outputs for rural children today. This situation will affect earnings in the future, and the intergenerational transmission of poverty.

#### *Education in rural areas*

Education in rural areas can be provided through formal and non-formal channels, as well as through training.<sup>12</sup> Formal education is delivered in the system of schools, colleges, universities and other formal educational institutions that normally constitute a continuous ‘ladder’ of full-time education, generally beginning at age five to seven and continuing up to 18 years old or more. On the other hand, non-formal education can be any organized and sustained educational activity that does not correspond to the definition of formal education. Non-formal education may therefore take place both within and outside educational institutions, and cater to persons of all ages. In general it should be designed to complement formal education. Finally training is usually provided as a way to improve productivity and income generation. Training programs assist in the acquisition of specific skills related to agricultural activities, and can also supply knowledge and techniques useful for work in non-agricultural activities.

The effect of education and exposure to extension services on productivity in low-income countries has been analyzed in many studies. Overall these studies confirm that higher levels of

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<sup>12</sup> The definitions of formal and non-formal education come from Atchoarena and Gasperini (2003).

formal education increase farmers' efficiency. Exposure to extension and other non-formal educational experiences also have a positive effect on agricultural output, although the results are not as robust. There is likely to be a complementary relationship between formal and non-formal education (Lockheed et al., 1980).

The economic returns to education are generally estimated to be high (both privately and socially), and they usually decline with the level of the country's per capita income. Rates of return to schooling also vary with educational level within countries. Primary education has the highest social profitability among the three main levels of education, and thus should be the highest investment priority in developing countries. Similarly, the academic secondary school curriculum is a better investment than technical or vocational tracks (Psacharopoulos, 1994).

Investments in the formation of human capital can contribute to escaping poverty through a variety of channels. The relationship between the educational level of the agricultural labor force and productivity may take a variety of forms: education can increase technical efficiency and thereby enable farmers to produce more with their available stock of factors of production; education can increase allocative efficiency by permitting better decisions to be made over the mix of inputs used in production; and it can increase the probability of adoption of new technologies. At the same time, with basic education farmers are better equipped to make more informed decisions for their lives and for their communities and to be active participants in promoting the economic, social and cultural dimensions of development (Atchoarena and Sedel 2003). Education also increases the probability of finding employment (especially in rural non-agricultural activities) and can contribute to successful migration (so that poverty is not displaced from rural to urban areas).

The benefits of schooling may extend beyond the individuals receiving education, and also reach their households and community. In considering external benefits, Weir and Knight (2000) suggested two channels. First, education may have externality effects if educated people raise the productivity of others, e.g., early adopters of innovations may be educated farmers who demonstrate the value of new inputs and techniques to less educated individuals. Second, education, particularly of girls, may be associated with improved health and nutrition, and with

reduced fertility. Finally, education is passed on from one generation to the next thus reducing the probability that poverty is transmitted between generations.

The international literature highlights a number of aspects that can contribute to these benefits being achieved in developing countries. It is important that local communities actively cooperate in defining the basic learning needs of its members and in establishing and maintaining basic educational programs and activities. Rural communities often can offer significant human, material and intellectual resources. Once these resources are mobilized and given adequate support and direction, rural communities and their members can become important actors in the provision of basic education and in the transformation of the rural space. The involvement of local communities can expand and improve the range of basic educational opportunities in rural areas at the same time that it contributes to other rural development objectives Lakin and Gasperini (2003).

The international literature also highlights some positive experiences with education and training around the world. The case of SENAR (Serviço Nacional de Aprendizagem Rural, National Service for Rural Learning), founded in 1991 by the Federal Government of Brazil, is pointed to as a rather successful experience in occupational education and training in rural areas. Flexibility and articulation between decentralized management and central level governance are considered to be one of SENAR's competitive advantages. Reduced fixed costs are also a relevant feature of SENAR's activities. Another key element is the focus on the economic performance of small productive units. This is appropriate for the Brazilian agricultural context because small and medium-sized establishments generate relatively more jobs than big business. Furthermore, the integration of occupational training and social promotion of rural workers is one of the most successful features of SENAR's experience. (Gomes 2003).

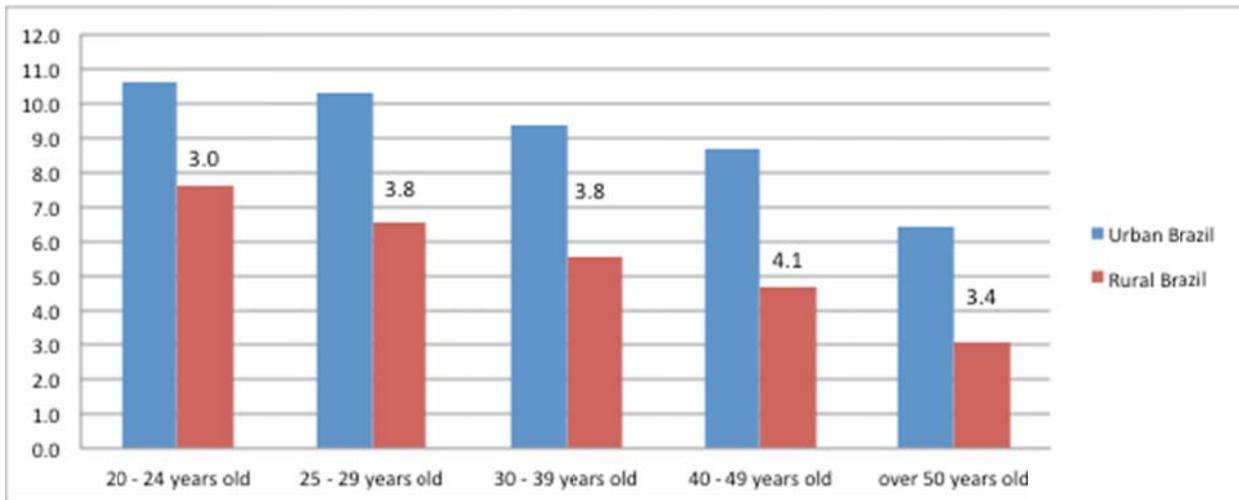
In spite of the widely agreed upon benefits, the quantity and quality of education is a problem in most developing countries, and is almost always lower in rural relative to urban areas. In many cases, rural children have to commute large distances to get to school each day. It is also common to have to move to nearby towns or cities in order to continue studying beyond a certain level (4<sup>th</sup> grade in some locations, 8<sup>th</sup> grade in others). Although educational levels have been

rising in rural areas of Brazil, it is important to explore the extent to which the rural-urban gap has been widening or closing. This is key for the ability of residents who are educated in rural areas to be able to compete for rural non-agricultural jobs and in urban labor markets.

*Education levels for adults in Rural Brazil: The legacy of the past*

Figure 5 shows years of schooling by cohort for urban and rural residents in 2006. For Brazilians who were over 50 years old, urban residents had 6.4 years of schooling, rural residents had 3.0, and the gap was 3.4. The schooling gap rose to 4.1 years for people who were 40-49 because educational opportunities in urban areas increased more rapidly than in rural areas when this cohort was of schooling age. The schooling gap fell to 3.8 years for people who were 30-39 years old in 2006 (born between 1967 and 1976), and remained at 3.8 years for people between 25 and 29 years of age. It was not until the re-democratization of Brazil in the 1980s, affecting people who were 20-24 years old in 2006, that the education gap finally fell below the level that exists for the cohort that is 50 years and older. Nevertheless, a schooling gap of 3 years represents a substantial deficit for rural residents. The elimination of this deficit would contribute to improve the capacity to generate income in rural areas.

Figure 5: Average Years of Schooling by Age Cohort, Urban and Rural (2006)



*Education for rural youth: the present and the future*

In this section we review recent evidence on current levels of education in rural Brazil. The data presented below reveal that a) *access* to education is not a major obstacle in primary school, but is a problem in middle school, b) repetition and delay are serious problems for rural residents at all levels of education, c) the quality of education and learning outcomes are deficient relative to schools in urban areas (which also suffer from low quality), and d) international evidence suggests that the poor begin to fall behind even before ever attending school. Thus, education and nutrition between zero and six years of age also need to enter the policy discussion because they have long term impacts on the development of children.

Figure 6 shows the percentage of children by age who were not attending school. The Figure shows that around 3% of rural children appear to start school one year later than their urban counterparts, but that 95% of rural children were in school at age 7. Over 97% of children between 8 and 12 years of age were in school, suggesting that access to school for kids this age was not a major problem in 2006. The urban-rural gap was not large prior to 13 years of age, at which point it begins to grow rapidly. At age 16 there was a 10 percentage point gap between urban and rural youth.

Figure 6: Percentage of Children who were not Attending School by Age, Urban and Rural (2006)

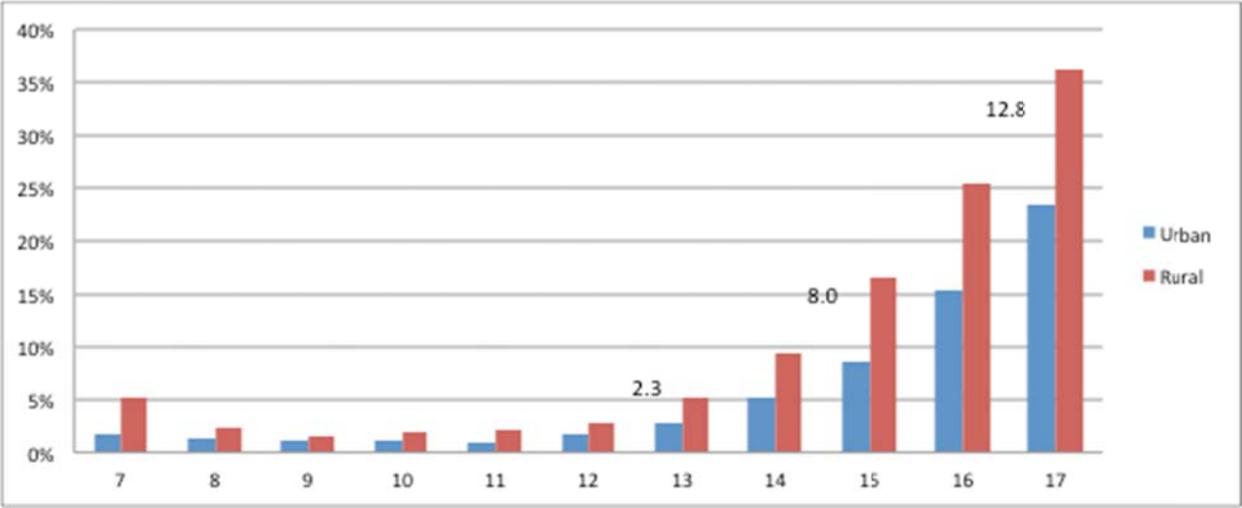
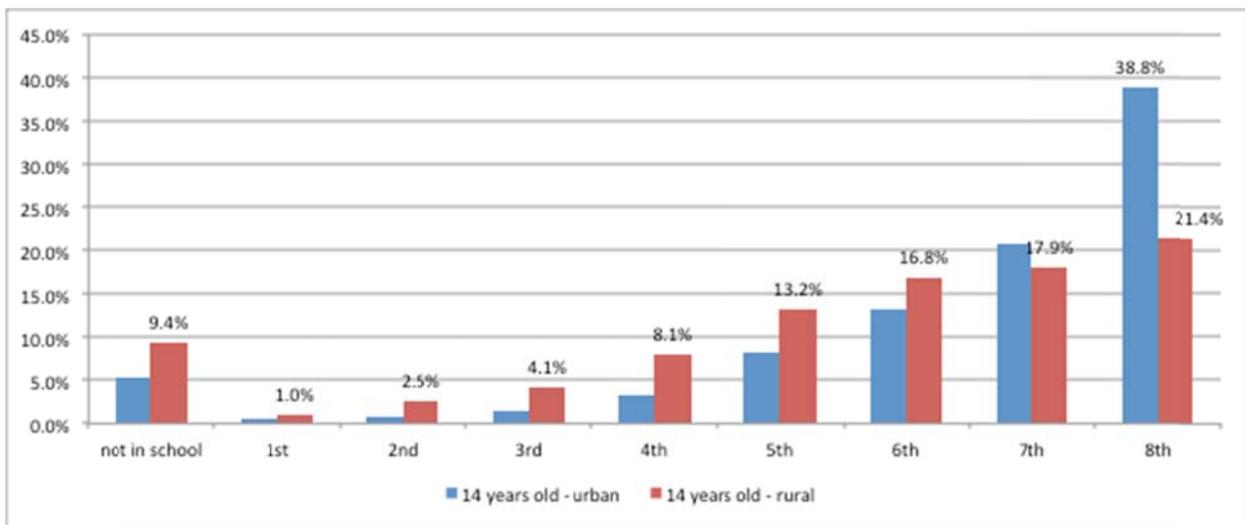


Figure 7 focuses on the question of school delay for 14 year olds. It shows the percentage of urban and rural 14 year olds in each grade. Depending on their month of birth, 14 year olds

should be in 7<sup>th</sup> or 8<sup>th</sup> grade when they are surveyed by PNAD.<sup>13</sup> Figure 7 shows that approximately 60% of urban 14 year olds were in 7<sup>th</sup> or 8<sup>th</sup> grade in 2006. The corresponding number for rural 14 year olds was only 39%. Thus, there was a 21 percentage points gap in grade progression by this age. 55% of rural 14 year olds were either in school in a grade below 7<sup>th</sup> grade or not in school at all. The data suggest that the gap in completed years of schooling for adolescents not only relates to rural children leaving school at a higher rate after 14 years of age (Figure 6), but also is a reflection of rural children advancing in school at a much slower pace. Thus, while policy has been successful at keeping the overwhelming majority of children in school through 14 years of age, school delay remains a significant challenge.

Figure 7: Percentage of Children of Age 14 Enrolled in Each Grade, Urban and Rural (2006)



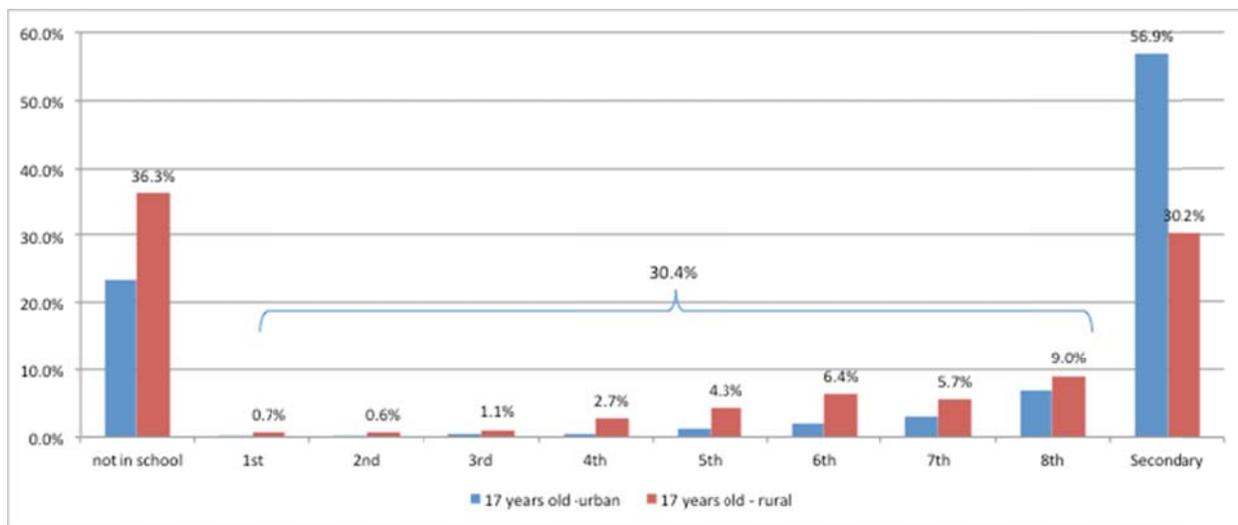
Source: PNAD, 2006.

Figure 8 shows the same information as Figure 7, but for children 17 years of age. By the time rural youth reach the age of 17, only 30% of them were still in secondary school. Another 30% continued to attend primary school, and 36% had abandoned their education. Urban youth, in contrast, were almost twice as likely to still be in secondary school, and 13 percentage points less likely to be out of school. These numbers are alarming because they reflect significant

<sup>13</sup> Note that we are considering 8 years of obligatory primary education in 2006. The Brazilian system switched to a 9 year system shortly after 2006.

disadvantages that rural children will face when they seek to enter the labor market. Jonasson and Helfand (2010), for example, show that the probability of finding non-agricultural employment is 18 percentage points higher for rural residents with 9-11 years of schooling relative to those with only 5-8 years of schooling. Similarly, earnings in non-agricultural employment are 23 percentage points higher for rural residents with 9-11 years of schooling rather than only 5-8. These schooling deficits will translate into earnings gaps that will accumulate throughout their lives.

Figure 8: Percentage of Children of Age 17 Enrolled in Each Grade, Urban and Rural (2006)



Source: PNAD, 2006.

So far we have focused on school abandonment and grade delay. We now turn briefly to insufficient inputs into rural schools, and to lagging performance of students relative to those in urban areas. Data presented in World Bank (2003) showed that in 1998 only 7% of rural 1<sup>st</sup> to 4<sup>th</sup> grade schools had libraries, 2% of them had computers, and 25% had audiovisual equipment. The corresponding figures for urban elementary schools were 58%, 39%, and 90%. The lack of adequate pedagogical infrastructure is one factor that could contribute to school abandonment and grade delay. Some progress was made in the subsequent decade, but the situation was still critical. Data presented by Montenegro (2010) at the V Fórum Internacional de Desenvolvimento

Territorial showed that in 2009 69% of rural schools still did not have a library, 85% did not have access to the internet, and 77% did not have a computer laboratory.

There is ample evidence as well that the quality of public schools and learning in rural areas lags considerably behind public schools in urban areas. The same World Bank (2003) study on rural poverty showed 4<sup>th</sup> grade test results from the Sistema Nacional de Avaliação da Educação Básica (SAEB) test in rural versus urban areas for Portuguese and math. The percentage of children that achieved key levels of Portuguese proficiency (scores of 100, 175, and 250) in urban areas was 87%, 43%, and 9%, whereas it was only 76%, 25%, and 4% in rural areas. The percentage of urban children that achieved 175 and 250 on the math test was 57% and 11%, whereas in rural areas it was only 39% and 4%. In 2005, there was still a significant gap in performance between urban and rural primary schools (Ministério de Educação, 2007). Children in urban public schools (without including Federal schools) had average scores on Portuguese and Math of 175.5 and 185.7, while in rural areas they were 148.3 and 157.8. Thus, for children in the same grade, rural students lagged behind their urban counterparts. The cumulative effects of abandonment, grade delay, insufficient infrastructure, and poor quality contribute to create enormous obstacles for children raised in rural areas.

The educational deficits discussed above are even more troubling in light of the low average quality of education in Brazil. The 2009 OECD Program for International Student Assessment (PISA) scores placed Brazil 13<sup>th</sup> from the bottom in a group of about 75 countries (OECD, 2010). The group included 34 OECD countries and 41 others. While Brazil scored above Argentina, it was at the same level as Colombia, and behind Mexico, Uruguay, and Chile in reading, math and science. Thus, rural areas lag behind urban areas, and Brazil as a whole lags behind many countries at a similar level of development.

Finally, what happens prior to the beginning of primary school matters as well. There is considerable evidence that nutritional intake in the first three years of life can have a long term effect on human capital acquisition later in life.<sup>14</sup> The educational environment at home and exposure to preschool can also matter. A study on cognitive development in Ecuador by Paxon

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<sup>14</sup> See Maluccio et al. (2009).

and Schady (2007), for example, revealed little difference at age 3 in the performance on standardized tests for children in the lowest four deciles of the distribution of wealth. By the age of 6, however, children in the bottom two deciles only achieved scores of around 65% of the national average, whereas children in the 3<sup>rd</sup> and 4<sup>th</sup> poorest deciles scored close to the national average. Thus, poverty tends to reproduce itself, and this is already apparent by the age of 6.

#### *4e. Obstacles to the success of family farms: transactions costs and market participation*

Since the 1990s in Brazil it has become the norm to talk about “family farms” rather than “small farms.” The book by Guanziroli et al. (2001) was instrumental in this regard,<sup>15</sup> and the concept of *agricultura familiar* has now been codified in law (Law no. 11,326 from 2006). Based on the legal definition, the 2006 Agricultural Census counts 4.367 million family farms, or 84% of the total. In terms of farm size, 25% of all farms in Brazil have less than 2ha, 53% have less than 10ha, and 67% have less than 20ha.

Farms tend to be much larger in Brazil than in other countries. In much of the developing world, most family farms are small, most small farms are family farms, and both types tend to be poor. In a recent special issue of *World Development*, Wiggins et al. (2010) state: “Of the developing world’s three billion rural people, over two-thirds reside on small farms of less than two hectares; there are nearly 500 million small farms. These people include half of the world’s undernourished people, three-quarters of Africa’s malnourished children, and the majority of people living in absolute poverty.” Similarly, while discussing “effective instruments in using agriculture for development,” the *World Development Report 2008* highlights the importance of making “smallholder farming” more productive and sustainable (p. 10). Because we believe that many of Brazil’s “family farms” share the same obstacles as “small farms” in other developing countries, we will use these terms interchangeably here.

Many of the obstacles that small farms face stem from high transactions costs in accessing input and output markets. Transactions costs in accessing markets tend to be higher for small farms due to the small average size of their transactions and because of their geographical dispersion.

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<sup>15</sup> These authors cite Abramovay (1981) as one of the first to introduce the concept in Brazil.

In analyzing the transaction costs advantages of small and large farms, Poulton et al. (2010) conclude that the only areas in which small farms have lower transactions costs relate to motivation and supervision of unskilled family labor, and superior local knowledge. There is a long list, in contrast, of transactions costs advantages for large farms. These include market knowledge, technical knowledge, input purchases, finance and capital, output sales, product traceability and quality assurance, and risk management. Poverty, limited collateral, and low levels of education compound many of the disadvantages that small farms have.

High transactions costs in accessing markets increase the likelihood of low productivity subsistence farming. An indication of the importance of these obstacles can be found in the 2006 Agricultural Census in Brazil. According to this source, only 18% of farms used credit and only 33% used fertilizers. Guanziroli et al. (2010) show that fully half of family farms in 2006 were what they call “type D” family farms, those that do not even produce enough output to cover the opportunity costs of one half of a local worker.

Overcoming these transactions costs obstacles to market participation represents the essence of the challenge to making “smallholder farming more productive and sustainable.” The obstacles vary by type of product (traditional exports, staple foods, high value commodities), agrarian structure, and market structure. When supermarkets can find local production from medium and large sized farms, as in many parts of Latin America, the opportunities available to small farms are likely to be diminished. With a much more egalitarian farm structure, as in China, the growth of supermarkets was accompanied by institutional innovations that permitted incorporating small farms (Poulton et al., 2010). Finding ways to increase participation in high value markets is extremely important. As the *World Development Report 2008* notes, 43% of agricultural and food exports from developing countries now comes from non-traditional exports such as fish, fruits and vegetables, meat, nuts, flowers and spices.

There are different forms of coordination (vertical, horizontal, complementary, and focal) that can facilitate market participation and service provision for small farms. Repeated transactions along a supply chain (vertical coordination) are sometimes sufficient to reduce transactions costs associated with product quality or the risk of default. The term “focal coordination” is used by

Poulton et al. (2010, p. 1415) to describe a situation “when a single service provider (most commonly an agribusiness) supplies a full package of pre- and post-harvest services to smallholder producers.” This is common in the cases of poultry and hog production in Brazil, and in contract farming for other products. While these arrangements assist small farms to enter these markets, they often have little influence over the terms of the contracts. Collective action by family farms, whether it be through cooperatives, associations, or local organizations can provide an avenue for acquiring scale and bargaining power, and for reducing transactions costs and enhancing competitiveness.

Whether through integration, contract farming, collective action, or with assistance from the state, small family farms need assistance in overcoming the obstacles created by transactions costs. Without enhanced participation in input and output markets, they are likely to retreat into low productivity subsistence farming. While this might be a rational survival strategy, it is not likely to be a successful pathway from poverty.

#### *4f. Rural non-agricultural employment (RNAE) and poverty*

With economic development, there is a natural transition from rural agricultural societies to urban societies in which industry and services play a much more important role. The growth of non-agricultural employment can happen in the development process in many ways: rural families can migrate to urban areas in search of non-agricultural employment; urban areas can expand and incorporate rural areas through suburbanization; non-agricultural poles of employment—such as tourism, petroleum or mining activities, animal or fruit processing—can be created within commuting distance of rural families; or non-agricultural employment can be created within farms (processing of farm products, handicrafts, etc.). Many authors believe that it is desirable to slow migration to large metropolitan areas. Thus, policy can play a supportive role in assisting the growth of employment in small and medium sized cities, and in locations that are accessible to rural residents. These policies should take a territorial approach to development. They should aim to benefit the rural poor, but not only through agricultural development.

In most countries poverty is lower among households who have family members working in non-agriculture. For this reason, most authors believe that access to non-agricultural employment can contribute to poverty reduction. Yet most studies are based on cross sectional data. These merely point to a negative correlation between RNAE and poverty. Few studies are able to disentangle *self-selection* into RNAE from a *causal effect* of RNAE on poverty. Jonasson and Helfand (2010), for example, show that wealth, education, and proximity to large population centers have a positive relationship with the probability of rural residents having non-agricultural employment. The rural poor, however, lack wealth, have lower levels of education, and tend to live in more remote locations. Thus, are they poor because they lack access to non-agricultural employment, or do they lack access because they are poor?

Several recent papers have utilized panel data to examine this question. McCulloch et al. (2007) analyze Indonesian panel data for 1993 and 2000. They conclude that there were many pathways out of poverty for rural agricultural households in this period. Around 80% of the individuals working in rural agricultural activities in 1993 were still in rural agricultural activities in 2000, but nearly half of the households had exited poverty. Productivity growth in agriculture was key for this group. Switching from agricultural to non-agricultural employment, as expected, did tend to increase income and lower the probability of being in poverty. Migration, while often successful, only played a small role as an exit path from rural poverty in this period. The authors suggest that this might be due to the Asian financial crisis that began in 1997. In terms of policy implications the authors conclude that investments in education remain among the most important priorities. Higher levels of education increase the probability of accessing higher productivity employment, whether it be in agriculture, rural non-agriculture, or urban areas.

A paper by Hung et al. (2010) uses panel data from Vietnam to examine much the same question: does non-farm employment provide a pathway out of poverty for the rural poor? They use four rounds of panel data spanning the 1993-2006 period. This was a period of rapid growth, with national poverty falling from 58% to 16%. Rural non-farm employment more than doubled, rising from 23% to 56% of the rural labor force. The econometric estimates from two stage least squares and propensity score models indicate that participation in the non-farm sector significantly increases expenditure per capita. The improvements, however, were larger for the

non-poor than for the poor. This result, together with other finding on the determinants of access to non-farm employment, leads the authors to conclude that growth of non-farm employment is essential for rural poverty reduction, but policy must focus on increasing the poor's access to non-farm employment so that they can participate more fully in the benefits of growth.

A number of lessons can be drawn from the discussion above.<sup>16</sup> First, there is no doubt that non-farm employment—both urban and rural—will grow with the process of development. A key challenge for the rural poor resides in obtaining access to that employment. Participation depends on individual, household, and local characteristics that tend to favor the non-poor such as education, wealth, and location. Even if the rural poor only access lower paying non-agricultural employment, this can be extremely important both for the income it provides and as a mechanism for diversifying risk by obtaining a more stable source of income. Second, non-agricultural employment can serve as a safety net for the rural poor when they are pushed out of agriculture due to a drought, for example. Third, Lanjouw (2007) identifies a number of indirect channels through which non-farm growth can benefit the rural poor. The channels could work through increased demand for goods that poor farmers produce, thus increasing their incomes, increased demand for labor that drives up local non-agricultural and agricultural wages, or investment in agriculture (financed by non-farm income) that increases the demand for agricultural labor. Finally, it is likely that many of the same policies benefit both agricultural development and the growth of non-agricultural employment. As the *World Development Report 2008* suggests, a dynamic rural economy—agricultural and non-agricultural—requires a good investment climate, infrastructure that can reduce transactions costs in the flow of goods and information, and an increasingly educated population.

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<sup>16</sup> The discussion in this paragraph draws from Lanjouw (2007, pp. 62-64).

## 5. Conclusions

We have argued in this paper that there are multiple pathways out of rural poverty. Public policy can contribute to making these more accessible, and to increasing the likelihood that they will be successful. The most important include a) an agricultural pathway that requires increasing income for family farms and for workers in the agricultural labor market, b) a non-agricultural (or pluriactive) pathway that depends on rural households gaining access to non-agricultural employment, c) a migration pathway that involves exit from rural areas, and d) a pathway based on government transfers which can be permanent (old age pensions) or tied to the acquisition of human capital (as with conditional cash transfers). There is an enormous amount of heterogeneity in the asset positions of rural households and in the local contexts of rural areas. Thus, there is no single recipe, or set of policies, that can be applied uniformly across households and territories. In order for policies to be flexible enough to account for this diversity, participation by local actors is essential.

Relative to many countries at a similar level of development—the “urbanized” group of countries according to the *World Development Report 2008*—Brazil already has a fairly extensive set of policies in place aimed at reducing rural poverty. Among others, Brazil has a Ministry of Agrarian Development focused on solving the problems of family farms, several active land reform programs, a credit program for family farms (PRONAF), a territorial development program targeted at locations with the lowest level of human development, and a large conditional cash transfer program (Bolsa Familia). Brazil can be thought of as a leader in this regard. It has identified many key problems that the rural poor face, and has sought to address them through public policy.

Yet Brazil lags other countries in terms of conducting rigorous impact evaluation studies to determine which policies work best. In the 21<sup>st</sup> century, it is no longer sufficient to measure success by comparing the number of beneficiaries of one program vs. another. Success depends not only on the magnitude of programs, but also on their effectiveness. It is also important to conduct benefit/cost analyses among the set of policies that work in order to determine which ones can achieve the best outcomes per unit of spending. Thus, an important recommendation

for policy is to place a higher priority on studying policy impacts and the cost effectiveness of alternative policies.

With regard to the agricultural pathway out of poverty, we provided evidence that a high percentage of farms in Brazil have insufficient land, physical capital, and human capital to generate enough agricultural income to lift the employed family members out of poverty. We argued that if these farms were to succeed in escaping poverty based on agricultural income, they would need more land, and more physical and human capital so that they could increase productivity. The question of insufficient land is particularly acute in the Northeast of Brazil where neither land nor productivity alone could eliminate poverty for the majority of farms. This implies that the agricultural path can only be successful for a subset of farmers in this region. For this group, policy needs to prioritize access to technologies, inputs, and services that can contribute to enhancing productivity.

The success of family farms does not only depend on their level of agricultural productivity. Small farms face considerable obstacles to participating in input and output markets that result from high transactions costs. Success in high value product chains, for example, depends in part on productivity and costs, but also on product quality and uniformity, reliability, traceability, and other factors. Public policy can play a direct role in reducing transactions costs by investing in physical and communications infrastructure that reduces transactions costs in accessing markets and information. In some cases, such as with integration and contract farming, downstream industries can provide packages of technology, inputs and services that allow small farms to overcome these obstacles. In other cases, collective action in the form of cooperatives and associations can contribute to increasing bargaining power and reducing transactions for small farms. In all of these cases, public policy can play a supportive role.

For many rural residents, agriculture is unlikely to provide the primary pathway from poverty. A significant body of recent research has demonstrated that it is not necessary to be a “viable” family farmer relying solely on agricultural income in order to escape rural poverty. Participation in agricultural and non-agricultural labor markets can be just as important. If alternatives to migration are to be constructed, local territories must find or create the dynamic

sectors that have the potential to generate employment that is accessible to the rural poor. There are many possible sources of employment creation. These include fruit and vegetable processing, animal slaughter houses, tourism, an oil refinery, a port, or demand for services that originate in a nearby city. In all of these cases, local territories can play a role in shaping the dynamic sectors, and public policy has a function related to education, training, and providing assistance to the rural population in accessing the employment opportunities.

Among the highest priorities for public policy in Brazil should be to improve the quantity and quality of education for young people who live in rural areas. This is perhaps the only policy that contributes positively to all pathways out of rural poverty. Education is associated with higher agricultural income as a result of its relationship with productive efficiency, technological adoption, and the ability to participate in input and output markets. Education is also associated with higher non-agricultural income because it increases the probability of finding employment and the earnings of individuals once employed. Education is an important factor that contributes to more successful migration histories. Finally, education is a key component throughout the world in conditional cash transfer programs such as Bolsa Familia. In spite of these benefits, we provided evidence that school abandonment, grade delay, and educational quality in rural areas are all more significant problems than in urban schools. The urban-rural school gap is even more troublesome in light of the low average quality of Brazilian education relative to other countries. The international literature has shown convincingly that the social returns to investments in education—especially at the primary level—are quite high. In order to reap the full long term benefits of Bolsa Familia, and provide a more promising future for rural youth, Brazil needs to improve the quality of schools for its rural population.

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