

**PEASANT HOUSEHOLDS' ACCESS TO LAND AND INCOME  
DIVERSIFICATION. THE PERUVIAN-ANDEAN CASE 1998-2000**

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**Abstract:** Using data for a sample of households in six villages from the North and Central Peruvian Sierra, we investigate the role played by access to assets, land in particular, in determining farm and non-farm income sources. The empirical relationship between assets and income sources is derived from a household model. Ordinary Least Square and Tobit models were used for the empirical analysis. Evidence suggests that the relationship between land and income diversification is influenced by village specific characteristics. In general, results have demonstrated the importance of assets such as natural, physical, human and social as key determinants of rural income in Peruvian Sierra. For the particular case of this study, in which families are located in a poor region with low level of economic development, it is pertinent to assume that the push factors have a decisive influence in defining the participation of these families in rural non-farm activities. That is to say, non-farm rural activities are fundamentally activities of "refuge" that allow the family to have access to a source of an immediate and relatively secure income – being less risky than agriculture – although participating in activities of low productivity.

**Keywords:** Income diversification, farm and non-farm activities, peasant economy, Peru

**Resumen:** El documento investiga el papel desempeñado por el acceso a los activos, la tierra en particular, en la determinación de los ingresos agrícolas y no agrícolas de familias rurales del Perú. Para ello, la relación existente entre los activos (natural, físico, humano y social) y las fuentes de ingresos se deriva de un modelo del hogar (rural household model). La evidencia empírica proviene de encuestas aplicadas a hogares campesinos de seis comunidades de la sierra peruana y se utilizaron en la estimación los modelos Mínimos Cuadrados Ordinarios y Tobit. En general, los resultados han demostrado la importancia de los activos como factores determinantes de los ingresos rurales en Sierra del Perú. Para el caso particular de las zonas de estudio, ubicadas en una región pobre con bajo nivel de desarrollo económico, es pertinente asumir que los factores de expulsión (push factors) tienen una influencia decisiva en la participación de estas familias en las actividades no agrícolas. Es decir, estas actividades son fundamentalmente actividades de "refugio" que permiten tener acceso a una fuente de ingreso monetario inmediato y relativamente seguro - que es menos riesgosa que la agricultura - a pesar de participar en actividades de baja productividad laboral.

**Palabras clave:** Diversificación de ingresos, actividades agrícolas y no agrícolas, economía campesina, Perú

**JEL codes:** D13, Q12

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## 1. INTRODUCTION<sup>1</sup>

The non-farm rural sector has been an important area of research in economic development literature. Two main areas of study can be identified, comprising i) the inter-linkages between agriculture and the non-farm sector as a whole or within a region of a country; and ii) the role played by the non-farm sector in the process of rural development. An important line of research in this regard has been the analysis of the income diversification strategies employed by rural households (Islam, 1997). This approach will be explored in this chapter using household survey data from the Peruvian Andes.

According to Ho (1986), the participation of rural households in diversification activities is determined by a combination of push and pull factors. The former refer to the limited capacity of agriculture to absorb labour, given the constraint of limited arable land. Therefore, in a scenario of increasing population density and diminishing landholdings, households find themselves in need of alternatives to supplement their agrarian income. On the other hand, the pull factors are related to the availability of attractive and more profitable job opportunities in the non-farm sector. The author also notes that the relative importance of these factors depends partly on the stage of economic development and the intensity of population pressure on land use.

In Latin America, the non-farm rural sector is particularly relevant because of its effect on employment and productivity in rural economies. The income generated by this sector is not only an important, but also a growing part of rural income, even for the poor. This proportion was established in the 1960s and 70s, when pioneering research was carried out on rural Latin American households. Later investigations have not only confirmed the significance of these sources of income, but also their important role in guaranteeing food security in rural communities. In the last two decades, it has become evident that non-farm rural activities have grown and transformed. Moreover, accumulated survey evidence contradicts the conventional view that farm income is synonymous with rural income (Reardon, et al. 1998). Non-farm rural incomes are important as an off-season, part time or home-based income source for rural households. From a Latin American perspective, according to a number of case studies, it is estimated that non-farm income and employment account for 40per cent and 25per cent of the rural totals, respectively (Reardon, et al.:1998). In Peru, the share of non-farm rural income is even higher, 44.3 per cent (Escobal, 2001).

Against this background, the aim of this chapter is to analyse, the linkages between access to land and agricultural livelihoods, as well as other forms of income in the Andes, from a

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contemporary cross-section perspective. The chapter relies on primary data (in the shape of household surveys) collected in the north and central Peruvian Andes. The main question addressed in this chapter is: What role does access to assets, in particular land, play in explaining farm and non-farm income in the context of the Andean peasant economy?

Peru is an interesting case-study because like other developing countries, it underwent a dramatic socioeconomic transformation in the twentieth century. In 1940, the date of the earliest twentieth century census, the country's population was mostly rural (65 per cent) and lived in the highlands (63 per cent). By 2007, the date of the last census, the cities were home to the majority of the population (77 per cent) and the coast had become the principal region of settlement (55 per cent) (INEI, 2008).

Peru's agricultural sector employs a high proportion of the national workforce. According to the 2007 census, the Economically Active Population (EAP) in agriculture represents 24.7 per cent of the national EAP (INEI, 2008). However, agricultural production accounts only for some 9.2 per cent of total GDP and has been declining since 1950. In this light, there is a pressing need to raise the yield of production factors, given that the sector faces the triple challenge of increasing the national food supply, reducing the poverty that afflicts 64 per cent of rural households, and providing growth opportunities for agribusiness and exports. The primary data sources employed to address the objective of this paper comprise districts with significant numbers of peasant households in the Northern Highlands (Cajamarca) and Central Highlands (Ayacucho). Data from Cajamarca and Ayacucho were collected in the course of interviews conducted by one of the authors with 208 households in 2000 and 104 households in 1998.

Several studies have been carried out on the peasant economy of the Peruvian highlands. The main contributions of this chapter are the unique nature of the primary data collected from the Northern and Central highlands and the novel empirical approach applied to study income diversification in the context of the peasant economy in Peru.

The chapter is divided into seven sections. The next section presents an overview of studies on income diversification in the peasant economy in Peru. A theoretical framework is developed in the third section. The fourth section describes the research sites in the Peruvian Andes, while the fifth discusses the main features of rural households' access to land, as well as household income generating strategies according to the size of plots. Determinants of farm and non-farm income are discussed in the sixth section, and the chapter ends with our conclusions.

## **2. INCOME DIVERSIFICATION IN THE PEASANT ECONOMY**

In order to analyse agrarian issues in Peru properly, it is necessary to take the country's geography into account, distinguishing between three natural regions, namely the Coast, the Highlands and the Amazon. The Coast is the centre of the country's industrial, commercial and agricultural activity. Lima, the political and economic capital is located here, holding around one third of the total population. The *Sierra* or the Highlands consist of the Andes mountain range with its high plateaus and deep valleys, which covers 27 per cent of Peru's land area. The Amazon is the most extensive but least populated region of the country. The rain forest makes up some 60 per cent of Peruvian territory. Smallholders are present in all three regions, but they are far more numerous in the Highlands, while larger scale commercial farmers are mainly found in the Coast and Amazon regions.

Table 1 summarises some case studies carried out on peasant households in the Peruvian *Sierra* between 1968-1993, providing an indication of the quantitative importance of income diversification. One salient feature of the peasant economy is the diversification of activities. Peasants not only work in agriculture and cattle breeding, but also participate in manufacturing, small-scale trading and wage employment.

Table 1. Income Portfolios in Rural Peruvian Sierra Based on Peasant Household Surveys, 1968-1993

Research Zone	Junin/Lima <sup>1</sup>	Cajamarca <sup>2</sup>	Cusco <sup>3</sup>	South Sierra <sup>4</sup>	Bambamarca <sup>5</sup>
Year	1968/1969	1972/1973	1977	1978/1979	1992/1993
Sample size	2,827	1,622	280	306	60
Income Source (%)					
Farm	9.3	14.1	35.9	11.1	20.2
Livestock	18.6	13.3	26.6	18.7	38.0
Manufacturing	nd	5.8	4.7	18.9*	37.5
Trading	nd	11.5	nd	nd	nd
Wage income	48.4	41.3	30.1	32	4.3
Rent	20.7	3.9	0.1	0.6	nd
Remittances	nd	6.6	2.6	8.9	nd
Other	3.0	3.5	nd	9.8	nd
Total	100	100	100	100	100

Sources: Own work based on:

1. Amat and Leon (1977, Table 9 and 16 of Statistic Annex) cited by Caballero (1981) (Table 36, pp. 215-216)

2. CRIAN (1974, Table 4), cited by Caballero (1981) (Table 36, pp.215-216)

3. Gonzales de Olarte, E. (1994) (Table 2.3, p.124).

4. Figueroa, A. (1989) (Table IV.5, p. 79)

5. Gonzales de Olarte, E. (1996) (Table 19, p.52)

nd: Not determined

\*Includes trade income

Rural income from sources other than agriculture is important for household maintenance. In a study of peasant families from Cajamarca province (CRIAN, 1974 quoted by Caballero, 1981), it was found that 27.4 per cent of total earnings came from self-employment in agricultural activities while 41.3 per cent, the highest share, consisted of wage income, indicating the importance of household participation in the labour market. The remaining 31.3 per cent came from the production of handicrafts, trading and transfers.

In a study that included eight communities from the Departments of Cusco, Huancavelica, Apurimac and Puno, Figueroa (1989) concluded, taking the whole sample as a reference, that Z activities<sup>2</sup> account for between 5 and 37 per cent of total income.

<sup>2</sup> Z goods comprise processed food products, textiles, tool making and repair, construction, fuel, commerce, transport and other handicrafts.

In the case of the Department of Cusco, Gonzales de Olarte (1994) reported that 62.5 per cent of total income was derived from farming and livestock, while wage income accounted for 30.1 per cent. Another study performed by the same author (1996) in Bambamarca showed that 58.2 per cent of income is earned from agriculture and 41.8 per cent from non-farm activities. The earnings provided by manufacturing were of major importance, accounting for 37.5 per cent of total income.

The case studies confirm the income diversification strategy followed by peasant households in the Peruvian *Sierra*. However, no previous attempt has been made to study the determinants of rural income in the context of the peasant economy. This chapter aims to make a contribution in this line of research.

### **3. DETERMINANTS OF RURAL INCOMES: AN ASSET BASED APPROACH**

The framework for livelihood analysis proposed by Ellis (2000) offers an asset-based explanation of the determinants of rural income diversification. According to this author (2000: 31) ‘...the assets owned, controlled, claimed, or in some other means, accessed by the households ... are the basic building blocks upon which households are able to undertake production, engage in labour markets, and participate in regional exchanges with other households’. Assets are related to activities as part of households’ income-generating strategies. As Barrett and Reardon (2000) put it:

‘Assets are stocks of directly or indirectly productive factors that produce a stream of cash or in-kind returns.(...) Portfolio theory, on which much of the diversification literature depends, emphasizes assets as the subject of agent choice when trying to maximize expected income, minimize income variability, or some combination of the two. So assets are a logical subject of the study of diversification behavior. Indeed, asset and income distributions are analytically inextricable from one another’ (Barrett and Reardon 2000: 10).

The materialization of a set of assets into a stream of income-earning activities is mediated by social factors, which are endogenous to social norms and structures such as social relations, institutions and organizations, and by exogenous factors such as economic trends, policies, and shocks, which have important implications for livelihood security and environmental sustainability. More specifically, the decision to engage in non-rural income earning activities will depend on i) the incentives – such as yield and risks – for people already engaged in farming, and ii) the capacity of households to undertake the rural non-farm activity, which in turn is determined by access to assets, including levels of education, income and credit (Reardon et al., 1998).

The literature reports a number of aspects of the relationship between assets and income generation. For example, there is an important body of research that links the process of asset accumulation with the household’s ability to manage and cope with risky environments. Along these lines, Alderman and Paxson (1992) summarize and discuss the literature on risk and consumption in the rural sectors of developing countries. The available empirical evidence analysed by the authors suggests that the effect of risk on production and investment decisions depends on how well households can cope with income risk. Poorer households appear to forgo potential income

in order to mitigate risk, and this strategy in turn affects production decisions such as the level of investment and technological innovation.

The theoretical model used here follows from Singh et al. (1986). In the context of farm household models, it has been common to assume that farmers' consumption and production decisions are separable, because the theoretical problem can then be analyzed in terms of an independent profit-maximizing producer and a utility-maximizing consumer. Assuming a separable model, households are price takers in the final and input markets.

In a typical rural household, members must aim for optimal decisions on production and consumption. The model captures the situation of a household engaged in farm activity, crop and livestock production, and non-farm activities like micro enterprise (e.g. handicraft production) and labour migration. It is assumed that assets are employed in two activities: farm and non-farm activities. The production process is assumed to be risk-free. The factors used in farm production are land, labour and purchased inputs. In the case of handicraft output, the factors required are labour and inputs. Farm output is either consumed on-farm or sold in markets. Handicrafts are sold only in markets. The household has endowments of time, farm and non-farm assets. A broad classification of assets, based on Siegel and Alwang (1999), is considered, including natural, human, physical, financial and social assets, location and infrastructure, and political and institutional assets.

The consumption bundle consists of the staple food, market-purchased goods and leisure. The household is a price taker in all markets and faces no transaction costs. It is constrained by its resource endowments, a full income constraint, existing production technologies, and the exogenous market price. The household maximises a profit function with respect to production constraints. The solution to this maximisation problem gives the labour allocation among the different productive activities. The corresponding production levels are subsequently defined. As a result, monetary income is generated and decisions on consumption are taken based on the maximization of a utility function. What is interesting at this level of analysis is composition of income between farm and non-farm sources, which may be considered an outcome of this theoretical exercise. Once the different monetary income sources are known, it will be possible to identify the determinants and assess the impact of access to assets.

Following Escobal (2001), a reduced form equation of the income function is represented as:

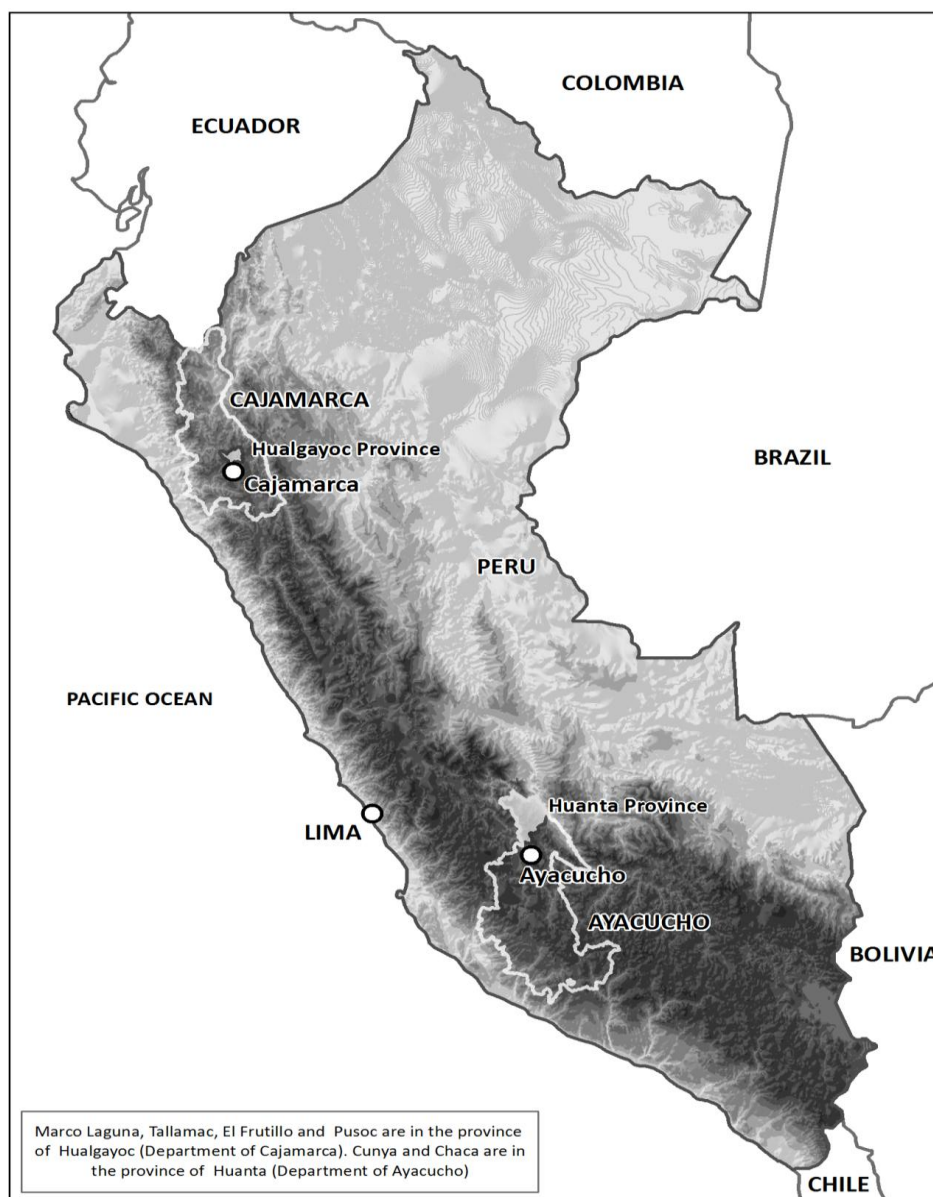
$$Y_i = f(p; Z_{ag}, Z_{nag}, Z_h, Z_g) \quad (1)$$

Where  $Y_i$  are the farm and non-farm income sources of household  $i$ ;  $p$  is the vector of exogenous input and output prices; and the  $Z$  vectors are fixed assets.  $Z_{ag}$  represents fixed farm assets (land and cattle),  $Z_{nag}$  denotes fixed nonfarm assets,  $Z_h$  represents human capital variables, and  $Z_g$  are other key assets depending on the characteristics of the area. This theoretical relationship will be analysed using household survey data from the Peruvian Andes. It is assumed that producers are price-takers in both input and output markets. If each producer in a village takes the same prices, the factors explaining changes in household incomes depend mainly on the profile of the asset. Therefore, the empirical analysis focuses on these variables.

#### 4. THE ANDEAN PEASANTRY IN THE LATE TWENTIETH CENTURY

This section describes some key features of the research sites in the Departments of Cajamarca and Ayacucho (see location of research sites in Figure 1). The fieldwork in Cajamarca took place in 2000 and in Ayacucho in 1998. The households surveyed were randomly selected. The information discussed in this chapter was mainly collected using a household survey which gathered information on household member socio-demographic characteristics, access to and use of productive factors, farm and non-farm production, income sources and participation in community work.

**Figure 1 Map of Peru and location of research sites**



One of the research areas consisted of four villages in Bambamarca, a district located in Hualgayoc province in the high altitude Sierra of northern Peru. Bambamarca town stands at



2,532 meters above sea level and is located 120 km. from the city of Cajamarca, the Departmental capital. Hualgayoc province serves as a commercial centre for the rural activities of the surrounding countryside. The main economic activities comprise agriculture and livestock, followed by commerce, mining and tourism. The rural population of the Bambamarca district represents 78 per cent of the total population, which is high compared with the national ratio of 30 per cent. Meanwhile, poverty rate in the Department of Cajamarca based on the poverty line criterion is among the highest in Peru at 77 per cent of the total population in 2001, compared with 47 per cent nationally. Physical infrastructure is rudimentary and many residents lack basic utilities, such as mains water, electric lighting and sewerage (INEI, 2001).

Four villages in the Bambamarca district were selected randomly. The following criteria were used:

- a) Two villages with marginal non-farm rural activities were chosen (i.e. crop and livestock production were significant in terms of family income and employment).
- b) Two villages with significant non-farm rural activities (hat making) were selected.

In each of the two subgroups, one village was located near and the other at a distance from Bambamarca town and the main road. This was done to capture the relevance of distance to the market and city for household participation in non-farm activities. Hat making is a labour-intensive activity. The manufacture of a hat, depending on its quality, may take from two to four weeks. All the family members take part in the braiding process throughout the day and night. The sale of hats is a key mechanism for the monetization of farmers who have limited or no farm surpluses to sell. This means the higher the family's self-consumption of its total agricultural and livestock production, the greater will be the need to create additional income sources by manufacturing and selling hats. Hence, hat-making goes on almost the whole year round, requiring long hours of work from family members (Velazco and Caballero, 1996).

Pusoc and Tallamac were chosen as the farm villages, and Marco Laguna and El Frutillo as the non-farm villages. A random sample of 208 households was chosen to reflect the distribution of the population in rural Bambamarca. The household level information was complemented by a village questionnaire, which gathered data on access to public services, the main economic activities, transportation costs and local prices.

In the 1980s and 1990s, Peruvian society was severely afflicted by the spread of political violence across most of the country, in particular in rural areas. It is estimated that around 70,000 people died as a result of the internal conflict declared by the terrorist groups *Sendero Luminoso* (Shining Path), and *Movimiento Revolucionario Túpac Amaru* (CVR, 2004). The worst acts of political violence took place in the departments located in the central Andean region, and 69 per cent of the civilian victims were peasants (Separ, 1992). The Department of Ayacucho is considered one of the poorest in Peru and the effects of political violence have worsened this condition. Agriculture and animal husbandry are the main activities contributing to one-third of the department's GDP. The economically active population in this sector, organized mainly in peasant communities, represents 60 per cent of the total active population.

The response of most of the rural population was to flee the area of conflict. It is estimated that approximately 120,000 families were internally displaced by political violence, of whom 54 per cent moved to areas in the interior of their Departments (Ayacucho, Huancavelica, Apurímac and Junín) and 46 per cent to other regions. Although most of the internal migrants were from rural

areas, their profile is important. Coral (1994) reports that farmers belonging to the middle and higher segments faced more security problems and risk, and migrated to more distant places such as Lima, Ica or Huancayo. In places where security problems were not a major concern, the families moved to medium-sized cities, departmental capitals, other provinces or the Amazon. However, peasants belonging to the lower segment remained in their community or moved only to nearby communities and small towns. They decided to stay in their original locations, banding together in places that were safe from Shining Path attacks. These became known as the *comunidades resistentes* or “resistance communities”.

When compared with the Cajamarca case, a different approach was used for the selection of the surveyed households. Given that the unit of analysis was a rural household affected by the political violence, it was relevant to consider the prevailing profile of peasant communities emerging during the post-conflict period. By doing this, it was expected to carry out the study of the household income diversification strategy within the context of the new profile of peasant communities. Therefore, in Ayacucho, which was severely affected by political violence, the population surveyed included the so-called *comunidad de retorno* or “returning community”, consisting of internally displaced families who returned to their homes, which they had left only unwillingly in the face of life threatening conditions. Households living in the resistance community were also considered. The community of Chaca in the district of San Jose de Santillana, province of Huanta, was chosen to represent the *comunidad resistente* while Cunya, in the district and province of Huanta, was selected to represent the *comunidad de retorno*. The sample in Ayacucho consists of the 74 households in Chaca and 30 in Cunya. Table 2 shows general information about the selected villages.

Table 2 Information on Selected Villages

Village/Department	Distance to main town in Kms.	Altitude*	Main Economic Activity	Total Population	Number of families	Number of families surveyed
Pusoc/Cajamarca	21	3,100	Agriculture And livestock	538	128	52
Marco Laguna/Cajamarca	23	2,870	Hat making	1,200	300	52
Tallamac/Cajamarca	12	2,950	Agriculture and livestock	1,200	240	52
El Frutillo/Cajamarca	3	2,550	Hat making	1,500	260	52
Chaca/Ayacucho	50	3,400	Agriculture and livestock	850	200	74
Cunya/Ayacucho	75	3,800	Agriculture and livestock	200	40	30

Source : Survey conducted in Bambamarca (2000) and Ayacucho (1998).

\*Meters above sea level.

## 5. ACCESS TO LAND AND INCOME DIVERSIFICATION IN THE ANDEAN REGION

This section describes the main features of the research sites in terms of access to land and household income strategies.

### 5.1. Access to Land

Table 3 confirms the predominance of *minifundia* or smallholdings, a pattern of land tenure that is widespread in the Andean agriculture of Peru (INEI, 1996). Land is an asset that is in scarce supply, but even though it is a highly limited factor of production, it serves as the foundation for the principal activity of these family units. At the sample level in Cajamarca, 47 per cent of the households own less than one hectare, 46 per cent own one to five hectares and just seven per cent own more than five hectares. However, there are important differences between villages. For instance, the most land squeezed distribution pattern is found in the non-farm villages. In El Frutillo, 67 per cent of households own less than one hectare compared to 31 per cent in Pusoc. A similar pattern is found in Ayacucho: 49 per cent of the households own less than one hectare of land, 45.5 per cent own between one and five hectares, and 5.6 per cent own more than five hectares.

Table 3 Number of holdings by size in Cajamarca and Ayacucho

	Cajamarca				Ayacucho			
	Tallamac	Pusoc	El Frutillo	Marco Laguna	Total	Cunya	Chaca	Total
Number of households	52	52	52	52	208	30	74	104
Owned land <sup>a</sup> (ha)	1.82	3.15	0.72	1.99	2.24	2.30	1.50	1.63
Coefficient of variation	0.99	1.03	0.95	1.20	1.23	1.27	1.72	1.62
Farm size <sup>b</sup> (%)								
< 0.5 ha.	17.3	7.7	32.7	15.4	19.7	6.7	36.5	31.5
0.5 – 1.0 ha.	21.2	23.1	34.6	26.9	27.0	36.7	13.5	17.4
1.1 – 2.0 ha.	23.1	23.1	25.0	23.1	23.6	23.3	28.4	27.5
2.1 – 5.0 ha.	30.8	21.1	7.7	28.8	22.4	20.0	17.6	18.0
> 5.0 ha.	7.6	25.0	0.0	5.8	7.3	13.3	4.0	5.6

Source : Survey conducted in Bambamarca (2000) and Ayacucho (1998).

a. Sample mean.

b. Number of holdings in each farm size

Table 4 presents information on the use of plots and type of tenancy for the households surveyed. Farm villages in Cajamarca use their plots both to grow crops and for pasture, while non-farm village use their land exclusively for crops. In Ayacucho, plots are mainly used to grow crops or are left fallow. Fallow periods are more frequent in Ayacucho than in Cajamarca.

As expected, the way villages are organized explains the sharp differences found in land tenure patterns. Thus, about 44 per cent of plots in Ayacucho are held under the community ownership

system, compared to 96 per cent of plots owned by individual farmers in Cajamarca. Tenancy and sharecropping are relatively uncommon in the research districts.

Table 4 Land Use and Tenancy of Survey Households

	Cajamarca				Total	Ayacucho		
	Tallamac	Pusoc	El Frutillo	Marco Laguna		Cunya	Chaca	Total
Number of Plots	715	369	385	505	1973	194	1220	1415
Use of Plot (%)								
Crops	85.1	62.6	89.6	89.7	79.7	40.4	87.8	76.6
Pasture	11.0	26.0	0.0	2.3	12.0	0.0	0.0	0.0
Fallow	3.9	11.4	10.4	8.0	8.1	59.6	11.6	23.4
Type of Tenancy (%)								
Owned	94.1	96.7	96.1	98.9	96.2	62.3	52.4	55.0
Rented	1.3	2.7	1.3	0.0	1.5	1.4	0.7	0.7
Share-cropping	4.6	0.6	2.6	1.1	2.3	0.0	0.0	0.0
Communal	0.0	0.0	0.0	0.0	0.0	36.3	46.9	44.3

Source: Survey conducted in Bambamarca (2000) and Ayacucho (1998). Use of weighted sample.

n.a.: Not available

The Peruvian Andes are characterized by dispersion and fragmentation of scarce arable land and strong demographic pressure on this resource (Zegarra, 1999). Land fragmentation is much greater in the Highlands, with an average of 4.1 plots per farm holding. Table 5 shows that land fragmentation is a feature of the rural households in the research sites. The average number of plots per holding is 2.1 in Cajamarca and 5.9 in Ayacucho, where 50.6 per cent of total land holdings are split into more than six plots.

Table 5 Land fragmentation in the research sites

	Cajamarca		Ayacucho	
	Number of holdings	%	Number of holdings	%
1 plot	354	38.1	1	0.6
2 to 3 plots	465	49.9	45	19.0
4 to 5 plots	81	8.7	71	29.8
6 to 9 plots	31	3.3	102	42.3
10 or more plots	0	0	21	8.3
Holdings reporting plots, total	931	100	240	100
Average number of plots per holding	2.1		5.9	

Source : Survey conducted in Bambamarca (2000) and Ayacucho (1998).

Table 6 summarises the main production features of the households in the sample. The chief activity of households in Tallamac and Pusoc is agriculture. Livestock production is second in importance in the district and is carried on by more than two thirds of rural families, with the exception of the villages of Frutillo and Marco Laguna where hat production is the main activity. The main livestock kept consist of oxen, horses and donkeys, which are used as draft and pack animals, although they also provide food and by-products for self-consumption and can be sold for cash in the market.

Given the environment in which these families live, the most significant development is how they have diversified their production activities away from their agricultural and land-based core activity. Crops vary, but the most common are potatoes, maize and natural pasture in Cajamarca. Related to crop utilisation, potatoes and maize are the main cash crops for farm villages, and maize is the core food crop for non-farm villages. It was found that between 2 to 27 per cent of potato production in the sample villages was destined for sale, compared to between 0 to 14 per cent of maize. The main market in which both products are sold is the town of Bambamarca.

Crops like potatoes, maize, broad beans and oca are grown mainly for self-consumption by peasants in Ayacucho, although a percentage is reserved for seedstock and barter. In contrast, potatoes are grown as a cash crop to generate income in Cunya and Chaca, together with oca and broad beans.

The pattern of water availability is similar in both Ayacucho and Cajamarca. The agricultural system is mostly rain-fed (*secano*) and irrigation is limited. The vast majority of farmers do not use fertilizers, a pattern found in 72 per cent of plots in Cajamarca and 42 per cent in Ayacucho. The incidence of fertilizer use is higher in Ayacucho than in Cajamarca. This is due to the presence of private and public aid allocated to households affected by political violence as part of the rehabilitation process undertaken after the end of political violence in the research districts.

The comparison of yields per hectare is interesting. For the sake of simplicity, potato and maize are the crops selected for this exercise, and yield data is only available for the Cajamarca villages. In the case of the potato, non-farm villages display significantly smaller yields averaging only about one third of the yields obtained in farm villages. Maize yields are also lower in non-farm villages.

The high dispersion of yields is another important point. This phenomenon can be explained by: i) the geographical location, land quality and use-intensity of plots; ii) limited access to irrigation, which represents a serious constraint on crop yields in a district where only 17 per cent of fields are watered by irrigation systems and the rest depend on rainfall, because families lack the necessary savings to invest in irrigation infrastructure; and iii) limited access to fertiliser, improved seeds and technical assistance. The expenditure allocated to the purchase of agricultural inputs for the crop year 1992-1993 was 2.3 per cent of total expenditure in the research area (Gonzales de Olarte, 1996).

Table 6 Production Characteristics of Rural Households in Cajamarca and Ayacucho

	Cajamarca				Total	Ayacucho		
	Tallamac	Pusoc	El Frutillo	Marco Laguna		Cunya	Chaca	Total
Crop Utilization %								
Potato								
Own-consumption	53.4	53.0	81.4	75.3	60.6	56.6	70.9	64.1
Sale	26.5	22.6	3.1	2.3	17.5	8.5	3.6	5.9
Barter	1.5	0.7	0.0	0.0	0.7	3.4	2.8	3.1
Seed	18.6	23.7	15.5	22.4	21.2	31.5	22.7	26.9
Yield (Kg/ha) <sup>a</sup>	3,547	3,293	1,719	1,109	3,097	n.a	n.a	n.a
Variation coefficient	1.05	0.96	1.42	1.35	1.05			
Maize								
Own-consumption	74.6	77.7	85.9	83.6	80.7	93.6	81.1	81.5
Sale	13.7	6.4	0.5	0.0	5.0	0.0	4.2	4.1
Barter	2.3	0.3	1.1	0.03	1.1	0.0	5.7	5.5
Seed	9.4	15.6	12.5	16.37	13.2	6.4	9.0	8.9
Yield (kg/ha) <sup>a</sup>	893	532	483	413	580	n.a	n.a	n.a
Variation coefficient	1.08	0.81	0.76	0.94	1.08			
Availability of water ( % of total plots):								
Year-round irrigation	13.0	6.0	5.0	6.0	8.0	13.7	4.0	6.5
Part of year irrigation	11.0	3.0	1.0	21.0	9.0	8.9	1.2	3.1
Rain-fed	76.0	91.0	94.0	73.0	83.0	77.4	94.8	90.4
Type of fertilizer used for crops (% of total plots)								
Organic	17.4	2.7	24.7	9.3	12.3	25.9	59.4	55.1
Chemical	18.1	32.9	6.8	16.3	20.7	5.1	2.5	2.8
Both	3.4	6.2	5.5	2.3	4.4	0.0	0.2	0.3
None	61.1	58.2	63.0	72.1	62.6	69.0	37.9	41.8

Source: Survey conducted in Bambamarca (2000) and Ayacucho (1998).

a. The estimates are the sample mean

## 5.2. Household Strategies According to Access to Land

This sub-section explains the relationship between the size of landholdings and household income. In order to do this, it is important to be precise in the definitions used, in particular with regard to the specification of non-farm rural activities and total household income and the disaggregation of income sources between farm and non-farm earnings.

Rural non-farm activities are defined as employment, income and livelihoods that are not directly related to agriculture (defined as crops and livestock, woodlot production, hunting, fishing and forestry), including both local non-farm rural employment and urban jobs. These activities are carried on by individuals living in an area defined as “rural” (Reardon et al., 2001). In the case of Peru, “rural” means settlements having a maximum of 2,000 inhabitants in the context of household national surveys (*Ministerio de Trabajo y Promoción Social*, 1999).

Net household income was measured and defined based on the following criteria. All incomes were measured in terms of annual household income for the item concerned, and the estimation of total net household income included both crops and other self-produced goods consumed at home, and cash earnings. Unsold crops were measured on the basis of mean town prices. Farm income includes both self-employment farm income (i.e. net income from all crop production and returns generated on livestock trading) and farm wage income. Non-farm income was defined as profit from non-farm activities such as food processing, textiles and garment manufacture, production of wood and straw hats, petty commerce and wage earnings from non-farm labour. The remaining item in total household income consisted of remittances from long-term non-residents. No data on remittances were collected in Ayacucho, which implies that income could be slightly higher than estimated.

Table 7 shows the sources of household income classified by farm size. An analysis of the income structure in these villages demonstrates just how diversified the activities conducted by local families actually are. A positive relationship was found between farm size and total net and per capita income. The net income per capita ratio between larger and small farms was 2.2 to 1 in Cajamarca and 1.7 to 1 in Ayacucho.

The same positive relationship was found between farm income and farm size in Cajamarca, both in percentage and in absolute terms. There is a negative relationship between non-farm income and farm size in both absolute and percentage terms. In other words, households with smaller landholdings obtain a higher share of their income from non-farm activities. Furthermore, non-farm self-employment income, 91 per cent of which comes from hat making, displays the same trend. The sale of processed foods like cheese, textiles and other products makes up the remainder.

This trend was not found in Ayacucho, however, where farm income makes up a large part of total income across the different farm-size groups. At the level of the whole sample, 84 per cent of total household income was generated from farming, while non-farm activities provided supplementary sources of cash earnings.

In terms of wage earnings, farm income appears to be more important than non-farm income. In particular, households with only limited access to land of their own are more likely to participate in the farm labour market. This may be because they do not have enough land to support their families, forcing them to seek other sources of income. Non-farm wages are commonly earned in mining, trading and services, mostly by heads of household and grown-up children. This phenomenon involves temporary labour migration for periods ranging between three and six months, in parallel with the agricultural year.

Table 7 Sources of Income in Rural Cajamarca and Ayacucho by Farm Size

Farm Size in has.	Total Sample <sup>a</sup>	< 0.5	0.5 – 1	1 – 2	2 – 5	> 5
<b>Cajamarca households</b>						
Number of households	931	183	252	220	208	68
Per cent	100	19.7	27.0	23.4	22.3	7.3
Total Income in New Soles <sup>b</sup>	3,694.2	2,881.6	2,914.3	3,344.5	5,065.0	5,701.7
Total Income per capita	935.7	715.4	789.5	911.5	1,124.6	1,570.0
Farm income per capita	547.7	204.5	408.7	519.6	772.1	1,391.0
Non-farm income per capita	388.0	510.9	380.7	391.9	352.5	179.0
Share in total income						
Total Farm Income	48.7	25.4	39.0	51.0	51.8	84.7
Self-employment	44.0	18.9	32.1	46.0	49.3	81.8
Wages	4.7	6.5	6.9	5.0	2.5	2.9
Total Non-farm Income	50.5	74.5	59.8	47.2	47.6	14.5
Self-employment	47.9	70.5	59.1	44.4	43.8	14.2
Wages	2.6	4	0.7	2.8	3.8	0.3
Remittances	0.8	0.1	1.2	1.8	0.6	0.8
<b>Ayacucho households</b>						
Number of households	240	76	42	66	43	13
Per cent	100	32.0	17.5	27.5	17.9	5.1
Total Income in New Soles*	1,178.6	1,045	1,097	1,046	1,417	2,070
Income per capita	237.2	198.4	227.9	240.1	278.9	337.5
Farm income per capita	200.6	180.5	199.3	200.4	204.5	307.3
Non-farm income per capita	36.6	17.9	28.6	39.7	74.4	30.2
Share in Total Income						
Total Farm Income	83.6	89.5	86.8	80.3	73.9	91.0
Self-employment	72.5	79.2	75.4	67.0	64.5	82.0
Wages	11.1	10.3	11.4	13.3	9.4	9.0
Total Non-farm Income	16.4	10.5	13.2	19.7	26.1	9.0
Self-employment	12.9	3.1	12.5	18.5	21.5	8.2
Wages	3.5	7.4	0.7	1.2	4.6	0.8

Source : Survey conducted in Bambamarca (2000) and Ayacucho (1998).

a. Weighted sample.

b. At the time of the survey, the exchange rate was £ 1.00 = 5.6 New Soles, Peruvian currency.



No clear pattern was found linking remittances to farm size. This may be because the receipt of remittances depends on the presence of permanent migrants among a household's members. In general, these are grown-up children who have left the village indefinitely to work, study or marry, and who periodically send money home to their parents. The evidence seems to suggest that family age composition may be the main factor explaining the presence of remittances as a component of household income.

Despite backwardness and neglect of agriculture in Ayacucho as a consequence of political violence, farm activities still provide the main source of household income, followed by self-employment non-farm income and wage income. However, non-farm income is the main source of cash earnings. This is a significant finding because investment in and support for agriculture and animal husbandry has been a key demand in these areas, given the perception among farmers that these activities should form the economic basis for the existence of their communities, as they did before the period of political violence. However, we may suppose that after the destruction and/or abandonment of productive assets related to livestock and agriculture, wage labour and small-scale manufacturing activities, like weaving *mantas* (blankets) in female-headed households in Chaca, have become "shelter activities" that provide the largest source of cash earnings. In this light, this allocation of labour may prove only temporary only until the resettlement process is completed and the assets required for agriculture and animal husbandry are provided or upgraded.

## 6. DETERMINANTS OF RURAL INCOME

### 6.1 Specification of the Empirical Model

This section examines the theoretical relationships and the determinants of non-farm and farm income discussed in section 3 empirically. The findings are then compared to those of certain key studies on the issues and conclusions are drawn about the importance of assets in explaining rural incomes in the context of a peasant economy.

Since 31 per cent of sample households in Cajamarca and 53 per cent in Ayacucho did not report non-farm income during the agricultural year, the presence of censored observations of the dependent variable has been addressed using a Tobit model. However, all households reported at least some level of farm income, so an ordinary least squares (OLS) model was used. In general, the basic model to be estimated may be expressed as:

$$Y_i = \beta_0 + \beta_1 x_i + \varepsilon_i \quad (2)$$

where  $Y_i$  is household non-farm income and farm income,  $x_i$  is a vector of household characteristics and access to assets,  $\beta_1$  is a set of parameters that denote the effect of  $x_i$  on  $Y_i$ ,  $\beta_0$  is the intercept, and  $\varepsilon_i$  is the error for household  $i$ .

Both farm and non-farm income per capita are expressed in log terms. The first independent variable to be considered was natural assets in the form of arable land in hectares (Landsize).

Physical assets were also included, expressed as the ovine equivalence of livestock<sup>3</sup> (Cattle) and as a dummy variable for household access to irrigation water, use of fertilizer and pest control (Ferpestirri). The Ferpestirri variable captures the main input requirements for potato production. It represents the joint use of water, fertiliser and pest control and is expected to have a positive impact on potato yields (Velazco and Caballero, 1996). This variable only represents the use of fertilizer for the case of research sites in Ayacucho.

It would be reasonable to expect a positive and significant relationship between physical assets and per capita farm income. Numerous studies have obtained this result for the Landsize variable, both at the national level in Peru (Escobal, 2001) and in other Latin American countries like Nicaragua (Corral and Reardon, 2001) and Mexico (De Janvry and Sadoulet, 2001; Winters et al., 2002), not to mention in Africa (Appleton, 2001; Jayne et al., 2001). However access to land may not be sufficient to secure higher household incomes when the policy context is adverse for farm profits, competitiveness is undermined by a lack of supportive institutions, asset transfers are not supported by supplementary public goods, and investment is deterred by insecurity of access and tenure (Janvry et al., 2001). A positive relationship between livestock and self-employment unskilled agricultural income was found in Peru (Escobal, 2001). On the other hand, previous studies offer conflicting results with regard to the relationship between farm size and non-farm incomes (Escobal, 2001; De Janvry and Sadoulet, 2001; Corral and Reardon, 2001; Abdulai and CroleRees, 2001; Winters et al., 2002).

Indicators of human assets were also included. One was the estimated number of equivalent man hours per year allocated to farming, which represents the farm labour force (Labour). A positive relationship was expected between this variable and per capita farm income, in line with the findings from studies performed in other countries (Appleton, 2001).

A second indicator represented education measured by the number of years' schooling received by the household head (Headedu), and the average number of years of formal education received by household members aged 15 years and over (Famedu). Various authors have investigated the importance of education in farm activity, as it can affect income, output and technical innovation<sup>4</sup>. One of the issues discussed by Schultz (1975) is the role of education and experience in influencing people's ability to perceive and interpret relevant factors, and then to take appropriate action to reallocate their resources. However, these effects are not directly realized in the context of traditional agriculture, and therefore the linkage between education and farm income is weak. Empirical evidence offers mixed results about the effect of education on farm incomes, but it seems conclusive that schooling can be considered a key factor in explaining access to high-productivity and better-remunerated activities, which are mainly offered by the non-farm sector (Taylor and Yúñez-Naude; 2000; Fafchamps and Quisumbing, 1999). Peruvian

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<sup>3</sup> Livestock has been standardised to ovine equivalents (*borregas*). This criterion is related to the forage requirement for each type of animal (Maletta, 1990). The conversion factors used are: 1 ovine = 0.6 sheep; 1 bovine = 5.0 sheep; 1 Andean camel (vicuña/alpaca) = 1.5 sheep; 1 caprine = 1.5 sheep, and 1 porcine = 1.8 sheep.

<sup>4</sup> The literature on determinants of agricultural innovation emphasize socio-economic factors such as farm size, risk, human capital, availability of labour, credit and form of land tenure (Feder, Just and Zilberman, 1982; Feder and Slade, 1984). In the Southern Sierra of Peru, Cotlear (1989) identified education as a key factor behind the adoption of new technologies.

(Escobal, 2001) and international empirical evidence, most of which is based on national household surveys, shows a positive relationship between education and non-farm income. (Corral and Reardon, 2001; Lanjouw, 2001; Elbers and Lanjouw, 2001; Fafchamps and Quisumbing, 1999; Abdulai and Delgado, 1999; Canagarajah et al., 2001; Lanjouw et al., 2001; Winters et al., 2002).

A third indicator reflects the characteristics of the household head in terms of age (Headage) and sex (Headsex). The age variables (Headage and Age\*Age) denote the stage of the household in its life cycle, as well as its experience. The effect of age may be non-linear, and hence the age squared variable was included. Finally, the labour migration experience of household members was represented by a dummy variable (Migrant) and a dependency ratio was also considered.

Social assets were represented by a dummy variable which has a value of 1 if the household takes part in communal work and 0 otherwise. Other variables are the distance in kilometres from the village to Bambamarca town (Farcity) and the share of total potato and maize production which is sold for cash (market). This variable captures the level of household integration in the food market. Lastly, a dummy variable is used to show whether a household belongs to a *comunidad de retorno* (displaced village).

## **6.2 Results**

This section discusses the results of the farm and non-farm income regression, which are shown in Table 8.

### **6.2.1. Farm Income**

The results indicate a reasonably good overall fit. Caution should be taken when assessing the relevance of arable land and livestock owned in explaining farm income due to the endogeneity of these variables. Thus, a household may have relatively large landholdings, herds or flocks precisely because they have high farm income, rather than the other way about. Clearly, the decision on land and livestock demand implies an inter-temporal framework, which is not properly captured by the cross section characteristics of the data set. The Hausman procedure was proposed to test for endogeneity, but this requires a set of instrumental variables that are correlated with either arable land or livestock owned, but not with farm income. However, such variables were not available from the data set.

The size of landholdings is positive and highly significant in explaining farm income. An additional hectare owned is associated with higher farm income by about 14.2 per cent<sup>5</sup> in Cajamarca and 28.7 per cent in Ayacucho. Livestock is another variable that is positive and significantly associated with farm income. Based on the parameter estimates in Table 8, a household with access to irrigation, use of fertiliser and pest control would expect to earn about

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<sup>5</sup> The estimated land coefficient could be downward biased if the land quality variable omitted is negatively correlated with farm size but positively correlated with income. López and Valdés (2000) report a similar problem for the case of Latin America, and Jayne et al. (2001) in Africa.

Table 8 Determinants of Income per capita in Rural Cajamarca and Ayacucho

	Cajamarca		Ayacucho	
	Farm Income OLS Model (1)	Non-Farm Income Tobit Model (2)	Farm Income OLS Model (3)	Non-Farm Income Tobit Model (4)
<b>Natural asset</b>				
Landsize	0.1420** (2.31)	-0.1959 (-0.89)	0.2866* (1.75)	0.9137* (1.86)
<b>Physical asset</b>				
Cattle	0.0387*** (6.07)	-0.0737*** (-3.25)	0.0083*** (3.08)	0.0142 (1.00)
Ferpestirri	0.8437*** (3.66)	-1.4539* (-1.79)	0.1181 (0.64)	
<b>Human asset</b>				
Labour	0.001*** (6.43)			
Headage	-0.140*** (-3.69)	0.3408*** (2.70)	-0.0103** (-1.87)	
Age*age	0.001*** (3.77)	-0.0031*** (-2.29)		
Sexhead	0.093 (0.21)	-0.7732 (-0.64)	0.5516*** (2.76)	-0.5467 (-0.53)
Headedu	0.0575* (1.80)	0.1533 (1.46)		
Famedu	-0.089 (-1.27)	0.4412** (2.11)		0.1858 (0.63)
Migrant	0.7863*** (3.61)		0.1508 (0.83)	-0.5022 (-0.59)
Dependency ratio		0.6739* (1.74)	-0.6468 (-1.52)	
<b>Social asset</b>				
Comwork	0.252 (1.26)			2.4024** (2.34)
<b>Other</b>				
Farcity	0.0175 (1.58)			
Market		-1.7238 (-1.13)		8.7274** (2.00)
Displaced village			0.1779 (0.90)	1.2632 (1.26)
Constant	6.4772*** (6.00)		4.599*** (8.68)	
<b>Goodness of fit</b>				
R <sup>2</sup>	0.53		0.29	
F	24.97		4.40	
Prob. > F	0.000		0.000	
Left-censored observations		64		53
Uncensored observations		143		50
Log likelihood value		-436.5		-164.2
Prob. (LR Statistic) > Chi <sup>2</sup>		0.000		0.015
Number of observations	208	207	103	103

Note: Figures in parenthesis are t-values. \*, \*\*, \*\*\* Coefficients are significant at the 10%, 5%, and 1% levels, respectively. Robust standard errors were computed. The hypothesis that all independent variables have a zero

coefficient is rejected by the F-test, which is highly significant. White's robust covariance matrix was used in calculating the standard errors (Greene, 2000) to account for heteroscedasticity.

132 per cent more<sup>6</sup>, *ceteris paribus*, than a household with no access. This outcome supports the conclusion that adequate management of potato production guarantees higher farm income. This variable was not significant for Ayacucho. Our results are therefore consistent with the studies cited above, which showed a positive relationship between natural and physical assets and income per capita.

A positive and highly significant relationship between farm income and household time allocated to farming was found in Cajamarca. One additional male equivalent day per year, assuming a working day of 8 hours, will increase farm income.

Household head education has a positive impact on farm income in Cajamarca. However, the average years' education of adult household members was not relevant.

Female-headed households are an important feature in rural Ayacucho, because many women were widowed as their husbands fell victim to political violence. Such households made up 31 per cent of total households in Chaca. Evidence shows that female-headed households had a lower farm income per capita than male-headed households in Ayacucho, but this variable was not significant in Cajamarca, where only 4.5 per cent of households are headed by a woman.

The age of the household head is a highly significant variable in both research districts, having a negative impact on farm income.

The farm income of a household with a member who migrated temporarily outside the Bambamarca district would be 119 per cent higher than that obtained by a household with no migrant. This finding confirms that migrants work as farm wage labour in the provinces of the Coast and Amazon regions where the average daily wage is three times the local wage in Bambamarca town. Migrant household members are mainly heads of households and grown-up sons. This result shows the importance of participation in the rural labour markets as a household income-generating strategy.

In general, the estimation of farm income has demonstrated the importance of natural, physical and human assets as positive determinants of farm income in rural Cajamarca and Ayacucho.

### **6.2.2. Non-Farm Income**

This section discusses the estimated non- farm income function. Table 8 presents the likelihood-ratio test as a goodness of fit indicator. Equations (2) and (4) fit the data reasonably well.

Farm size has a positive effect on non-farm income in Ayacucho but it was not significant in Cajamarca. The effect of livestock stock was negative and significant in Cajamarca. An extra

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<sup>6</sup> For dummy variables, the effect is estimated by using  $[\exp(\beta) - 1]$ , where  $\beta$  is the regression coefficient of the dummy variable (Halvorsen and Palmquist, 1980).

ovine unit results in a decline in non-farm income. As expected, households with access to irrigation water, fertilizer and pest control (i.e. potato farmers) had lower non-farm income in Cajamarca.

Education variables have a positive but not significant effect on non-farm income in both research sites, the exception being average household years of education for members older than 15 years in Cajamarca. It might be supposed that this outcome is due to the relatively low levels of educational attainment among the survey respondents. For instance, 70 per cent of heads of household have some level of primary schooling but most wives never went to school, suggesting that the sample consists mainly of households formed by low-skilled workers. This means that when decisions on labour market participation are taken, members engage mainly in low-labour productivity activities, either in self-employment or in wage employment. Therefore, their participation in the labour market is restricted to farming, construction, transport, street trading, and domestic service. Consequently, the relationship between education and non-farm income may be weaker than in other cases described in the international literature based on national surveys, because we are dealing with a sample of peasant households engaged mainly in self-employment activities (both farm and non-farm) located in a backward region with high levels of rural poverty.

The age of the household head is a positive and highly significant variable in explaining non-farm income in Cajamarca, in line with the findings reported in empirical studies carried out in other developing countries (Canagarajah et al., 2001; Lanjouw et al., 2001; Abdulai and CroleRees, 2001; Lanjouw, 2001).

The dependency ratio is associated with higher non-farm income in Cajamarca. This is mainly due to the labour-intensive hat making activity, in which both children and adult household members are actively engaged.

Household participation in communal work was positive and statistically significant in explaining non-farm income in Ayacucho. This result implies that a better environment for non-farm activity is created when farmers engage on a rotating basis in road building, the upkeep of irrigation channels, bridge repairs and village security.

Food market integration has a remarkably positive impact on non-farm income in Ayacucho. This finding suggests a complementary relationship between farm and non-farm activities.

A general assessment of the variables defining non-farm income shows that human assets, social assets and food market integration variables are positive determinants of non-farm incomes in the rural Andes. Furthermore, physical assets related to farm activity, such as livestock, fertilizer use, access to irrigation and pest control, have negative effects on non-farm income, as expected. However, access to natural capital such as land has a positive and significant effect on non-farm incomes in Ayacucho. This may be due to a household diversification strategy between farm and non-farm activities where access to land is consistent with participation in other activities undertaken to supplement or raise household incomes.

## 7. CONCLUSIONS

There is a consensus among academics and international institutions that the promotion of non-farm rural activities is one of the key ways to address poverty and accelerate development. Moreover, available empirical evidence suggests the growing importance of both employment and income related to the non-farm rural sector in developing countries.

This chapter has examined both theoretical and empirical issues related to income diversification in the context of a peasant economy located in a backward region of the Peruvian *Sierra*. The main question addressed in this chapter, in line with the theoretical framework presented, was the role played by access to assets in explaining farm and non-farm incomes in the context of the Andean peasant economy.

The empirical analysis relied on primary data collected in the late 1990s in the north and central Peruvian Andes, in the Departments of Cajamarca and Ayacucho. The fieldwork was conducted in four villages of Cajamarca. The sample selected consisted of two villages with marginal non-farm rural activities and two villages with significant non-farm rural activities (hat making). In Ayacucho, a department that was seriously affected by political violence, the population surveyed included the members of the *comunidad de retorno* and the *comunidad resistente*.

A separable household model was used as the theoretical basis for the estimation of farm and non-farm income function. Assets were classified as natural, human, physical and social. Although all households in the sample recorded some level of farm income, almost a third of them did not report any non-farm income in the survey year. As a result, Ordinary Least Square and Tobit models were used for the empirical analysis. The findings were compared to those of some major studies on the importance of assets in explaining income diversification in the context of a peasant economy.

In general, the estimation of farm and non-farm incomes has demonstrated the importance of natural, physical, human and social assets as key determinants of rural incomes in the research sites. Meanwhile, the Peruvian Andes are characterized by high levels of land dispersion and fragmentation, as well as strong demographic pressure on the available arable land. Despite its scarcity as a factor of production, findings suggest that access to land is fundamental to the livelihood of peasant households in the Andean region.

An important body of economic research carried out in Peru since the 1960s has revealed the articulation and integration of peasants in different markets for goods, services, labour, land, money, credit, and capital. This finding is confirmed in the research districts and by the income diversification strategy followed by peasant households in the Peruvian *Sierra*. Therefore, both farm and non-farm activities are significant income sources for the households surveyed.

For both study areas the nearest city, Bambamarca in the case of Cajamarca, or Huanta in the case of Ayacucho, appeared as the main urban centres for economic transactions such as the purchase of goods and services for household consumption, processed foodstuffs, agricultural products, industrial goods, supplies for agriculture, livestock and crafts, as well as access to a range of services including education and health. In contrast, the participation of families in the (agricultural and non-agricultural) labour market encourages them to travel to wider regional

markets, especially the coastal Departments in the case of households from Cajamarca, and the Amazon, in the case of Ayacucho.

From a dynamic perspective, we may note some important changes in the economic role of the peasant economy in the Peruvian context. Since the early twentieth century, most food for the domestic market was produced by traditional farmers sector in the Highlands. However, as the urban coastal population grew, commercial farmers from the Coast began to specialise in basic food crops. Production conditions were not favourable on the Highlands, and as Thorp and Bertram (1978: 274) conclude "historically the traditional sector has grown slowly, being deprived of resources, discriminated against in policy measures and obliged to operate on the country's less-productive land resources". Hopkins (1981) estimated that agricultural output produced in the peasant economy contributed about 48.5 per cent to Gross Agricultural Value in the period 1948-1952, but this share had fallen to 27 per cent by 1976. In view of this downward trend, it would appear that peasants are losing ground as food suppliers to urban markets (Figuroa, 1989).

This is the case of the potato, the main cash crop in a traditional peasant economy, which is mainly traded in village fairs and local towns. Evidence on the research districts seems to suggest that the main role of a late twentieth century peasant economy in a backward region and with high incidence of rural poverty, is to provide a pool of unskilled labour to local and regional economies. Given the stagnation in the output and productivity of the main cash crop and land fragmentation, small farmers require additional incomes, and so temporary and seasonal participation in (farm and non-farm) labour markets has become part of a household income diversification strategy which provides a source of cash earnings.

In the particular case of the area studied, where households consist mainly of small peasant holdings in a poor region with a low level of economic development, we may safely assume that push factors have a decisive influence in defining participation in rural diversification activities. Thus, non-farm rural activities are fundamentally of "refuge" activities which allow households to gain access to an immediate and relatively secure source of income that is less risky than agriculture. However, these are generally low-skilled, low-productivity activities<sup>7</sup>.

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<sup>7</sup> Lanjouw (2001) and Isgut (2004) noted that self-employed work jobs may offer only a 'last resort' income source in the context of El Salvador and Honduras respectively.



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