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Poverty Dynamics in Peru, 1997-1999

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RESUME

Comment la pauvreté a-t-elle évolué pendant les années 1997-1999, période durant laquelle les performances de l'économie péruvienne se sont sérieusement détériorées sous l'effet négatif de la crise financière internationale ? La réponse à cette question se base traditionnellement sur des comparaisons en coupe instantanée des indicateurs de pauvreté. Dans ce rapport, nous élargissons l'analyse en examinant tout d'abord la fiabilité de ce type de comparaisons à travers la prise en compte des erreurs d'échantillonnage, et ensuite en analysant les transitions de pauvreté des ménages présents durant les trois années de notre panel. En plus des matrices de mobilité de transitions, nous avons calculé un indice de mobilité plus récent proposé par Fields et Ok et estimé un modèle logit multinomial de transition de pauvreté, comprenant non seulement les caractéristiques des individus et des ménages, mais aussi les variables géographiques locales concernant principalement la fourniture des biens publics. Enfin, les programmes de lutte contre la pauvreté ont été évalués sur la base d'approches statiques et dynamiques de la pauvreté.

ABSTRACT

How has poverty changed during the 1997-99 period, when the Peruvian economic performance deteriorated seriously under the negative impact of the international financial crisis? The answer to this question has traditionally relied on cross-section comparisons of poverty indicators. In this paper we extend the analysis first by examining the robustness of these kind of comparisons by considering sampling errors and stochastic dominance and second, by analyzing poverty transitions for households present in the three years of our panel data. Besides transition mobility matrices, we calculated the newer economic mobility index proposed by Fields and Ok and estimated a multinomial logit model of poverty transitions including not only individual and household characteristics but also local geographical variables concerning mainly the provision of public goods. Finally, anti-poverty programs were then evaluated on the basis of static and dynamic poverty approaches.

Theme: Welfare, income distribution and poverty

Keywords: poverty dynamics, inequality, Peru, multinomial logit

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INTRODUCTION

The Peruvian economy experienced a period of rapid expansion from 1993-1997 (exceeding 6% per year on average) but growth then slowed down significantly, similarly to the other countries in the sub-region hit by the Asian crisis. It is stagnating at 0.5% and per capita household spending fell by 8% from 1997 to 1999. There have been far-reaching macroeconomic disruptions in Peru since 1991, marking radical changes in its economic policy: most State enterprises were privatized; subsidies and price control were abolished; the labor market was liberalized whilst social spending was multiplied by three from 1993 to 1998 (from \$63 to \$174 per capita). In this new unfavorable macroeconomic environment, the insistent problems of poverty that concern nearly four out of ten Peruvians (six out of ten in rural areas) and the continuing extremely high levels of inequality (Gini coefficient: 0.48) have come back onto the agenda in academic and political circles. In Peru, certain people maintain that the fact that the indicators have not improved challenges the effectiveness of policies aimed at fighting poverty and the capacity of economic growth to reduce inequality and poverty.

However, the disappointing results obtained in terms of living standards and inequalities are judged from a static standpoint, by comparing indicators in a given year with those of previous years. Net balances of poverty are taken into consideration and not the households' trajectories over a period of time. Thus, important questions remain unanswered. What share of the population is in a state of permanent poverty and what percentage of the poor in a given year are « transient poor »? Do the permanently poor have any particular characteristics that differ from those of the transient poor? In what way does this dynamic approach to poverty lead to rethinking on policies to combat poverty? Few developing countries are equipped to answer these questions as this implies being able to monitor the same households on a large scale over a period of time, and the necessary surveys are quite rare in these countries.

However, Peru has recently set up a panel of households with national coverage (see box). Taking advantage of this new database, a joint study covering all the above questions was carried out by the Peruvian National Institute of Statistics and Information Technology (INEI) and DIAL, on poverty dynamics for the period 1997-1999. The main results are presented in the following pages.

Data from ENAHO panel

As of 1996 INEI, with support from the IDB in the framework of the MECOVI program for the improvement of household surveys on living standards, has a new database at its disposal on recent trends in poverty in Peru. The national household surveys (ENAHO) that we use were designed from the outset to include a significant panel base, with national coverage. Conclusions can be drawn with respect to seven geographical zones, and to urban and rural areas. The survey concerned 3,100 households and nearly 15,000 individuals over the complete period 1997-1999. The panel base represents a little over 50% of the total sample. Apart from information on housing and demographical data concerning the individuals, the surveys included a section on education, health, expenditure, income, employment, etc. The surveys analyzed were carried out in the last quarter of 1997, 1998 and 1999.

Data from these surveys was completed with data from local administration censuses (“municipalidades”) carried out in 1994 and 1997. It was thus possible to include not only the characteristics of the households and the individuals but also local variables, such as provision of public services (health and education), distance, quantity and quality of roads and economic density.

1. CROSS-SECTION EVOLUTION OF POVERTY AND INEQUALITY

The question whether poverty has increased or diminished over the last years has raised great concern among Peruvian politicians and researchers. We will first examine this issue in the usual way, which is to say by comparing poverty incidence using a cross-section approach. According to this approach, poverty headcount increased slightly between 1997 and 1998 (from 36.2% to 37.7%). In spite of a 6% decline in average household per capita real expenditure, neither the depth of poverty (average distance from the poverty line) nor poverty severity changed during these years (see table below). A major upsurge in national poverty rates occurred in 1999 when the incidence of poverty jumped to 42.2% without, once again, implying significant changes in poverty severity or inequality among the poor. This may suggest that there were important redistributive effects.

Table n° 1-1: Foster-Greer-Thorbecke poverty measures, Peru 1997-1999

	Poverty			Extreme poverty		
	FGT(0)	FGT(1)	FGT(2)	FGT(0)	FGT(1)	FGT(2)
<i>National</i>						
1997	36.2	12.4	5.7	15.6	4.2	1.7
	[33.1-39.3]	[10.8-13.9]	[4.8-6.7]	[13.1-18.1]	[3.3-5.2]	[1.2-2.2]
1998	37.7	12.4	5.7	16.3	5.0	2.2
	[34.5-40.8]	[10.9-13.9]	[4.8-6.6]	[13.6-18.9]	[3.9-6.1]	[1.6-2.7]
1999	42.2	13.1	5.5	13.2	3.1	1.1
	[39.1-45.3]	[11.8-14.4]	[4.8-6.2]	[11.2-15.3]	[2.5-3.7]	[0.8-1.4]
<i>Urban</i>						
1997	23.7	6.4	2.5	4.3	0.7	0.2
	[20.3-27.1]	[5.1-7.7]	[1.9-3.2]	[2.8-5.8]	[0.3-1.1]	[0.1-0.3]
1998	26.0	7.0	2.7	4.2	1.0	0.3
	[22.6-29.4]	[5.9-8.2]	[2.1-3.3]	[2.9-5.6]	[0.6-1.5]	[0.2-0.5]
1999	31.9	8.5	3.3	3.9	0.8	0.2
	[28.3-35.5]	[7.2-9.8]	[2.6-3.9]	[2.5-5.3]	[0.4-1.1]	[0.1-0.4]
<i>Rural</i>						
1997	59.9	23.6	11.8	37.1	10.9	4.6
	[54.5-65.3]	[20.3-26.9]	[9.6-14.0]	[31.3-42.9]	[8.5-13.4]	[3.3-5.9]
1998	59.8	22.6	11.3	39.1	12.5	5.6
	[54.2-65.3]	[19.3-25.9]	[9.2-13.5]	[33.1-45.2]	[9.9-15.1]	[4.1-7.1]
1999	61.6	21.9	9.8	30.9	7.5	2.8
	[56.2-67.0]	[19.3-24.5]	[8.3-11.3]	[26.3-35.5]	[6.0-9.0]	[2.0-3.5]

Source: Our estimation from ENAHO 1997-IV, 1998-IV and 1999-IV.

FGT(0): headcount ratio

FGT(1): average normalized poverty gap

FGT(2): average squared normalized poverty gap

95% confidence intervals in parentheses

Sample size: 3100 panel households, weighted at the individual level

A more contrasted picture appears when poverty rates are broken down by rural/urban areas and by regions. First we find that there are very significant differences in poverty levels between rural and urban areas. Six out of ten Peruvians living in rural areas are poor, while this situation concerns “only” around three in ten urban individuals. However, it appears that poverty increase over the 1997-1999 period was an almost exclusively urban phenomena, somewhat concentrated in the Costa regions. Poverty incidence increased by around 7 percentage points in the capital Lima and in the urban coast (representing 52% and 39% change, respectively). Rural areas and Sierra and Selva regions recorded relatively small poverty changes during the examined period. Of the approximately one and half million increase in the number of poor between 1997 and 1999, 43% came from Lima and 30% from the urban coast. Thus, increase in poverty was essentially an urban phenomenon affecting the population living in large cities. This has led to a moderate deconcentration of poverty in rural compared to urban areas. The share of rural poor fell from 57% to 50% so that poverty is no longer “a rural problem” as it was in the past. Gaps remained at the same levels in terms of severity or intensity of poverty (FGT1 and FGT2 poverty measures) (see graph and table below). Urban poverty appears to be highly cyclical (a World Bank study showed that during the 1994-1997 high growth period urban poverty declined by 13% while rural poverty diminished by only 4% (World Bank, 1999:12).

Contrasting with the rise in overall poverty, the extreme poverty rate (household expenditure below basic food consumption equivalent to the 3,318 kcal. requirement), after rising slightly in 1998 declined by almost 3 percentage points in 1999 (from 16.3% to 13.2%). Extreme poverty in Peru is very much a rural phenomenon: eight out of 10 extreme poor are in households living in rural areas (which only account for 35% of total population); the remaining 20% are in urban dwellings, mostly outside the capital. The rural Sierra alone accounts for around 60% of the extreme poor in Peru (its population share is 22%). It was also the rural Sierra, by far the poorest region in Peru, that most benefited from the reduction in extreme poverty: around 80% of the decline concerned this region where the share of extreme poor diminished from 64% to 59% between 1998 and 1999, and the poverty incidence plummeted from 43.4% to 35.3%.

However, since household expenditures come from statistical surveys, differences in poverty rates must be evaluated taking into account sampling design. First, we estimated confidence intervals for each of the FGT poverty measures, then we performed t-tests for the null hypothesis that poverty incidence had not changed. Our results show (see appendix) that poverty headcount in 1999 was significantly higher than in 1997 and 1998 (t-test for difference in poverty headcount between 1997 and 1998 was statistically different from zero only at a 24% level of confidence). These results apply at national and urban levels. No significant changes in poverty rates in the 1997-99 period were found in rural areas (poverty rate was 1.7 percentage points higher in 1999 than in 1998 but, because of sampling size and design, standard errors are also important, almost twice those prevalent for urban areas (see table in the appendix). This means that poverty increases need to be greater than 2.4, 3.2 or 4.3 percentage points at the national, urban and rural levels respectively, in order to be considered as statistically significant. It should be noted that the range of confidence intervals is not necessarily the same for all regions. Such sampling errors are very often ignored in cross section poverty comparisons and in this sense their conclusions are not necessarily firmly established on statistical grounds.

2. CROSS-SECTION INEQUALITY COMPARISONS

How did inequality fare during this period, particularly in 1999 when poverty increased significantly? Table 2-1 below and other regional disaggregated figures shown in the appendix suggest a reduction in inequality for household expenditure both in 1998 and 1999 but an increase in income inequality. Nonetheless, changes in Gini coefficients are relatively small, making it difficult to establish a general downward tendency; it can be observed that 95% confidence intervals for Gini coefficients overlap in all cases. Similarly, no clear-cut tendency can be discerned in any of the regional breakdowns reported in the appendix (Sierra and rural Gini coefficients were reduced by 10% and 6% but, again, confidence intervals overlap). A more robust cross section inequality analysis is carried out in the next section.

Table n° 2-1: Gini coefficients

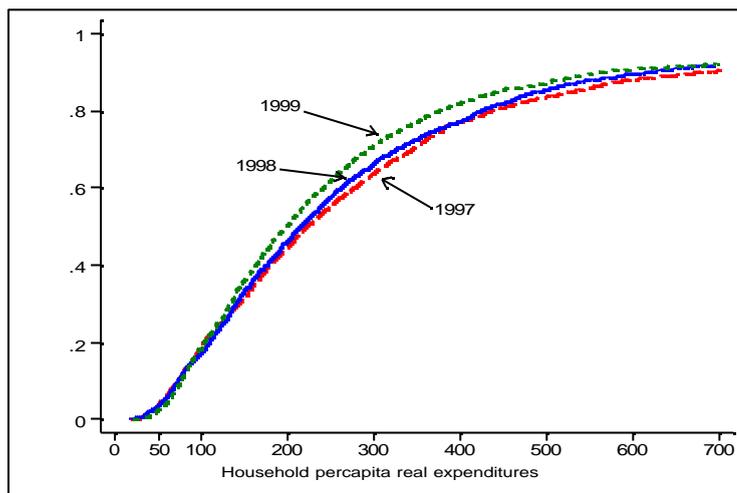
	<i>1997</i>	<i>1998</i>	<i>1999</i>
<i>Total expenditure</i>	0.482 [0.448-0.515]	0.475 [0.446-0.504]	0.467 [0.436-0.499]
		0.557	
<i>Income</i>	0.545 [0.504-0.587]	[0.525 – 0.590]	0.553 [0.514-0.592]
<i>Food expenditure</i>	0.357 [0.351-0.370]	0.348 [0.331-0.364]	0.328 [0.299-0.333]

Source: Our estimation from ENAHO 1997-IV, 1998-IV and 1999-IV. Weighted estimates for panel households at the individual level. 95% confidence intervals are bootstrap estimates.

3. STOCHASTIC POVERTY DOMINANCE

Since there is no single way to determine poverty lines and, more fundamentally considering that poverty is not a discrete phenomenon, cross-section comparisons of poverty rates must be completed by an examination of the whole distribution using the theory of stochastic dominance. This serves to evaluate the robustness of the conclusions made in the preceding analysis. In the graphics below, we show the cumulative density functions of real household per capita expenditure (at 1999 prices) for the overall population and separately for urban and rural populations. As before, only panel households are considered.

Figure n° 3-1: Cumulative distributions of household per capita expenditure 1997, 1998 and 1999

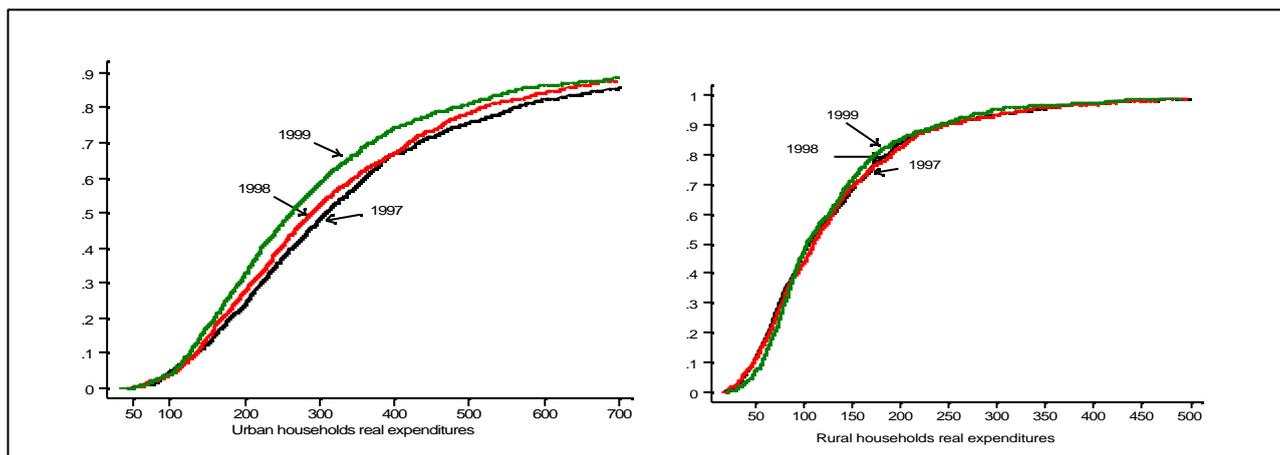


At first sight, it seemed that the 1997 distribution dominated slightly the 1998 distribution and very clearly the 1999 distribution. The crossings of the cdf occurs either at the lower or at the upper segments of the distribution, outside the interval containing all range of plausible poverty lines. However, a Kolmogorov test for the similarity between each couple of distributions do not allow for the rejection of the null hypothesis in any of each comparison (1997/1998, 1998/1999, and 1997/1999) at the 1% or at the 5% confidence level¹. However, things were not so

clear-cut for extreme poverty. Up to a real per capita household expenditure of around S/90 the 1999 distribution dominated the preceding years distributions². This was reflected in the reduction of extreme poverty rates in 1999 compared with the other two year in our period. In other words, this result is robust regardless of the way in which this extreme poverty line is determined.

With respect to urban households, the three cumulative distributions were almost the same up to S/100 soles. Over this amount the 1999 distribution was dominated by the 1997 and 1998 distributions. Poverty in urban areas undoubtedly increased steadily in 1998 and especially in 1999. The very significant decline in real expenditure for the segments near half of the distribution should also be noted. Concerning rural areas, the figure below shows that no robust conclusions can be put forward since all three distributions were extremely close to each other.

Figure n° 3-2: Cumulative distributions of rural and urban household per capita expenditure 1997, 1998 and 1999

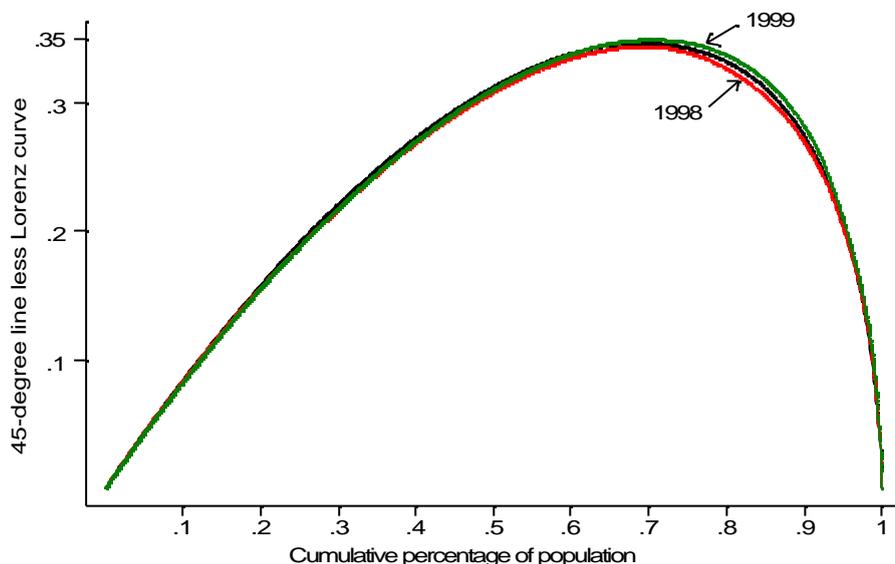


1. Maximum absolute distances between distributions were 0.0332, 0.0247 and 0.162 for the 99/97, 99/98 and 97/98 cdf respectively. Critical values for Kolmogorov distribution (defined by $c\sqrt{(n1+n2)/(n1*n2)}$, where c is 1.36 or 1.63 according to 5% or 1% confidence level) at 1% confidence level is 0.04142 and 0.03456 for the 5% level.
2. In determining the critical poverty lines (crossing points in the cdf distributions) we use the DAD software, developed by CREFA.

4. STOCHASTIC INEQUALITY DOMINANCE

As can be appreciated in the graphic below, Lorenz curves for household expenditures for each year over the 1997-99 period are not only very near each other but they cross in several points. We cannot therefore conclude that there was an increase in inequality in Peru during the 1997-1999 period.

Figure n° 4-1: Vertical distance of the Lorenz curves from diagonal



5. KERNEL EXPENDITURES DISTRIBUTION IN PERU 1997, 1999

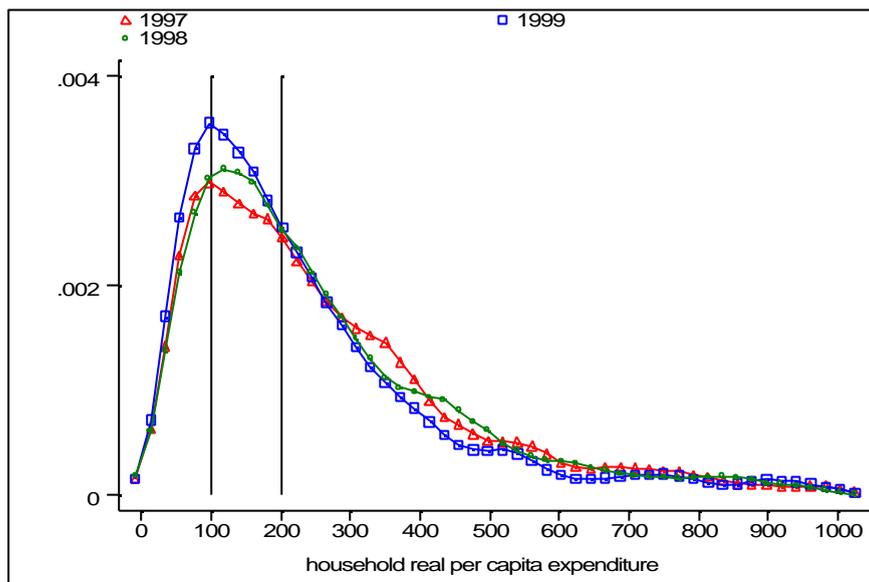
So far we have seen that inequality at the national level, as measured by the Gini coefficient, slightly diminished between 1997 and 1999 whilst poverty incidence significantly increased. Contrasted pictures appeared when we distinguished urban from rural areas. Inequality was constant in urban areas whereas it diminished in rural areas. Inversely, poverty increases revealed to be an almost entirely urban phenomenon while it remained fairly unchanged in rural areas.

However, one single parameter (i.e. Gini, P_0) can hardly describe the whole distribution of households' expenditures. More comprehensive indicators or devices are needed if we want to know which segment of the distribution experienced greatest changes and in what direction they moved. This may enable to answer relevant questions like whether or not the middle class is vanishing, making the 1999 distribution more polarized. Lorenz curves and household expenditure cumulative density functions were used as a first approach in examining stochastic dominance. Though (separately) more informative (spread and level), they give no clue at once about the tendency towards bimodality, nor they reveal changes in levels and the direction of shifts. Using kernel density estimation that provides a picture of the whole distribution can do this³. For each expenditure level, its associated frequency is shown graphically so we can simultaneously examine changes in the level, tendency towards modality and spread of the expenditure distribution.

3. Burkhauser, R et al (1996).

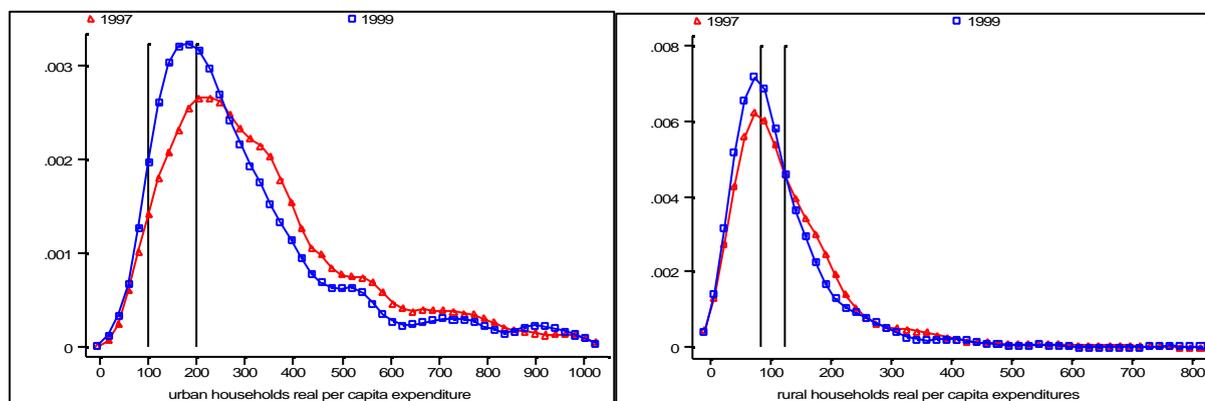
In figure below we have drawn kernel densities for 1997, 1998 and 1999 household expenditures with vertical lines representing grossly poverty lines (the lower one is extreme poverty). We can clearly see that the distribution has flattened over the 300-500 soles range, which corresponds approximatively to the richest 6th to 9th deciles. The increase in the density below the poverty lines that we observe particularly between 1998 and 1999 comes essentially from this segment of the distribution. Of course, since we are dealing with cross section data, this deformation of the distribution does not implies that there was income mobility of households from this deciles to the poorest ones. Does this pattern hold also for both rural and urban areas? The answer is no as is shown below.

Figure n° 5-1: National Kernel densities for household per capita real expenditures



In urban areas there is a leftward shift of most segments of the distribution, with the exception of the poorest households. The proportion of households around the poverty line increased significantly, particularly that of already poor households whereas it diminished for higher income households. In rural areas there was an increase in the extreme poor category coming both from poor and non-poor households. Note that the rural distribution seems far more unequal than the urban distribution of household's consumption expenditures⁴.

Figure n° 5-2: Urban and rural Kernel densities for household per capita real expenditures

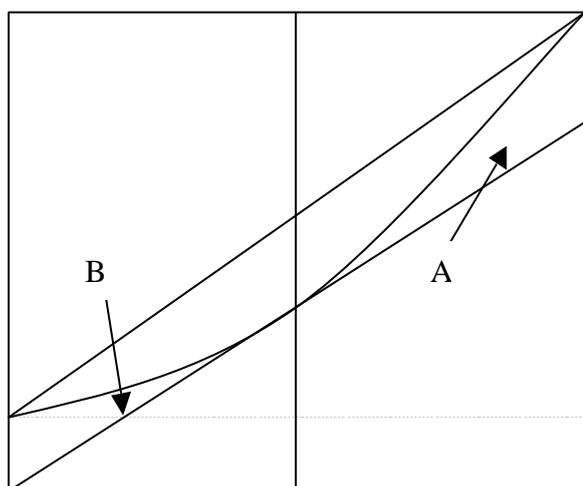


4. Epanechnikov kernel and bandwidth 0,25 were applied.

6. ANOTHER LOOK TO THE SHRINKING MIDDLE CLASS: POLARIZATION OF THE INCOME DISTRIBUTION

Does the decline in mean household incomes and expenditures had implied a tendency towards polarization putting the middle class under stress? One can wonder if the evolution of inequality in Peru was concomitant with a reduction of the degree of polarization of the distribution. An additional, though different question is whether there is a tendency towards bipolarization of the distribution, which is what is expected if the middle class is disappearing⁵. Wolfson showed that the standard inequality indicator (the Gini coefficient) is not able to account for the polarization phenomenon, which implies a tendency toward the bi-modality of the distribution (Wolfson, 1997). One can have a curve of Lorenz more close to the diagonal in a bi-modal distribution than in the case of a Lorenz curve characterized by a more uniform distribution. The concepts of inequality and polarization are therefore two different concepts⁶. The quoted author proposes an indicator of polarization that relies on a transformation of the Gini coefficient. He adds a tangent curve to the curve of Lorenz to the median while prolonging coordinates downwards. The surface given by A+B indicates the degree of polarization.

Figure n° 6-1: Inequality and polarization: a graphical representation



The formula for the evaluation of this surface is:

$$P = \frac{2(T - \text{Gini})}{\text{mtan}}$$

Mtan = median tangent = median/mean

T= "the area of the trapezoid defined by the 45 degree line and the median tangent = the vertical distance between the Lorenz curve and the 45 degree line at the 50th percentile = $0.5 - L(5)$ = the difference between 50% and the income share of the bottom half of the population ". (Wolfson 1997: 15).

-
5. Birdsall, Graham, and Pettinato (2000) has proposed to compare the median income of the population that generates the top 50 percent of total income to the median income for the total population as an indicator of stress in the middle strata.
 6. Esteban, J., C. Gradin, D. Ray (1999): « Extensions of a measure of polarization with an application to the income distribution of five OECD countries », Syracuse University, WP n°218.

Tableau n° 6-1 : Polarisation coefficients

	National			Urban			Rural		
	1997	1998	1999	1997	1998	1999	1997	1998	1999
Household expenditures	.4334	.4261	.4243	.3449	.3540	.3661	.3342	.3086	.3733
Household incomes	.5032	.5275	.5025	.4176	.4331	.4491	.3984	.4408	.5021

Source: Our estimation from ENAHO 1997-IV, 1998-IV and 1999-IV. Weighted estimates for panel households at the individual level.

At the national level there is no tendency in the polarization index but there was a 12% increase in rural areas and 6% in urban areas. Notice that the degree of polarization is very similar in both areas. The increase in polarization was more pronounced in rural areas when considering household income instead of expenditures.

7. POVERTY AND INCOME TRANSITIONS

The incidence of poverty rose from 37.3% in 1997 to 39.2% in 1998 for the households in the panel and again to 42.7% in 1999. These increases may seem very moderate considering that per capita spending fell by about 6% in the panel for two consecutive years. Monitoring the trajectories of the same households over a period of time, hence distinguishing between people going into and out of poverty, revealed a more complex picture and qualifies the relative immobility of the static indicators of the net balance of poverty.

Panel surveys allow us to follow the same household across different time periods. A synthetic means of assessing flows between poverty and non-poverty is to build transition matrices in which the lines refer to the situation of the individuals in the first year, whereas the columns refer to the situation of the same individuals at a later date. This serves to extend the cross-section analyses concerned exclusively with net flows of poverty by separately examining flows into and out of poverty, as well as those that had no change in poverty status.

In the table 3 below and in the appendix, we can observe that despite the fact that the poverty headcount was practically unchanged between 1997 and 1998 (it registered only a 2 percentage point change), 28.3% of individuals in poor households in 1997 were no longer in poverty in 1998. On the other hand, one non-poor out of five moved into poverty during these two years. Between the initial year (1997) of our sample and the final year (1999), the probability of moving out of poverty was slightly lower than the probability of entering poverty, a result that has been found in other studies on poverty transitions.

Tableau n° 7-1: Poverty transitions 1997-1999

<i>Poverty status in 1997</i>	<i>Poverty status in 1999</i>		
	Non poor	Poor	Total
<i>Non poor</i>	76.2	23.8	100 (63.8)
<i>Poor</i>	25.5	74.5	100 (36.2)
<i>Total</i>	57.8	42.2	100

Source: Our estimation from ENAHO 1998-IV and 1999-IV. Weighted estimates

It is interesting to note that in 1998/99 the proportion of non-poor entering into poverty increased from 12% to 14.1% of individuals, while the proportion of those leaving poverty diminished from 10.6% to

9.6%. It was therefore more difficult to avoid poverty when recession gained momentum in 1999 (probability of entering and staying in poverty both increased) (table 4).

Table n° 7-1: Poverty transitions 1997-1999

	1997-1998	1998-1999	1997-1999
<i>Poor-poor</i>	25.6	28.1	27.0
<i>Poor-non poor</i>	10.6	9.6	9.2
<i>Non poor-poor</i>	12.0	14.1	15.2
<i>Non poor-non poor</i>	51.7	48.3	48.6
Total	100	100	100

Source: Our estimation from ENAHO 1997-IV, 1998-IV and 1999-IV.
Weighted estimates

This gives a more mixed picture of poverty than static measures, and an optimistic one in the sense that a significant proportion escape poverty with only a fraction of poor staying poor year after year (out of 36.2% of poor in 1998, 25.6% remained poor and the remaining 10.6 escaped poverty). However, a less optimistic view emerges if we consider that, over the 1997-1999 period, poverty touched almost six Peruvians out of ten, that is to say more than 14 million Peruvians (table n°5).

Table n° 7-2: Poverty transitions 1997/1999

	Population	%	Cumulated %
<i>One time poor</i>	4'920,976	19.0	19.0
<i>Two times poor</i>	4'208,584	16.3	35.3
<i>Always poor</i>	5'545,600	21.5	56.8
<i>Never poor</i>	11'169,483	43.2	100.0
Total	25'844,643	100.0	

Source: Our estimation from ENAHO 1997-IV, 1998-IV and 1999-IV.
Weighted estimates

Since we know that poverty incidence increased significantly in 1999 and that it differs greatly in urban and rural areas, it is interesting to consider whether higher net poverty rates are also associated with higher transition probabilities. It is hard to say *a priori* whether the severely poor or the poor experience higher mobility rates. We can postulate that the extreme poor have to devote some of their resources to attenuating their higher vulnerability and, by the same token, are unable to take advantage of opportunities for upward mobility. Direct government transfers targeted may reverse this fact mostly to the extreme poor in rural areas.

A little over 40% of people in extreme poverty (who spend less than the cost of a basic food basket equivalent to the consumption of 2,318 kcal.) managed to increase their spending sufficiently to no longer suffer from extreme poverty, without being completely free from poverty nonetheless. However, nearly six « extremely poor » people out of ten remained in the same condition. As for poor who were not in extreme poverty, nearly 40% escaped from poverty whereas 20% plunged into extreme poverty. Out of the 20% of non-poor who moved into poverty, four fifths managed to maintain an overall level of spending above the cost of the basic food basket and the remaining fifth fell into extreme poverty. These results are of vital importance in assessing poverty reduction policies that attempt to give priority to targeting the « extremely poor ».

Regional-specific poverty lines

We constructed poverty lines specific to each one of the 7 geographical regions. In this way we were able to take into account absolute and relative price differences across regions and differences in consumption patterns and thus get regional comparable as well a national poverty figure. Concerning inter-temporal comparisons, we used price indexes broken down into eight sub-groups for the 24 departmental capitals in order to deflated expenditures.

It can also be observed that twice as many people fall into poverty in rural areas than in urban areas, and also that there are approximately 40% more cases of being freed of poverty in urban areas. Asset diversification strategies and targeted social expenditures are thus insufficient to reduce vulnerability in rural areas largely dependent on non-irrigated agricultural production. It should be noted that, despite lower population figures, extreme poverty is concentrated in rural areas.

8. THE STEADY STATE POVERTY RATE

The transition matrices can be used to calculate a poverty equilibrium rate (reached when flows into and out of poverty are equal). In the present case, the rate stands at 41.3%, relatively close to the rate observed in 1999⁷. However, as Stevens, Bane, and Burgess and Popper in the United States and Jenkins in the United Kingdom have remarked, the probabilities of transition are not stable over time and remain highly dependent on the households' initial situation despite the observed mobility. Hence, examination of the transitions between 1998 and 1999 shows that the probabilities of escaping from poverty fell from 28% to 25%, whereas the probabilities of becoming poor rose from 20% to 22% (the equilibrium rate reaches 46.8%). Hence, the percentage of people escaping from poverty was slightly higher when seen from the angle of annual transitions (1997/98 and 1998/99) rather than from the period 1997/99. It therefore emerges that these two-year transition matrices cannot be extrapolated to obtain a single long-term poverty equilibrium rate.

The following diagram gives an idea of the complexity of poverty transition during the three years in question. In particular, it shows that approximately half the poor people who escaped from poverty in 1997 and 1998, returned to it in 1999. Conversely, among the 13% of individual who fell into poverty in 1998, half escaped it in 1999. This reflects the vulnerability of a category of households, which is unable to escape poverty on a permanent basis, and suggests the need to reconsider the interpretation of annual transitions in poverty.

Figure n° 8-1: Flows into and out of poverty, 1997-1999

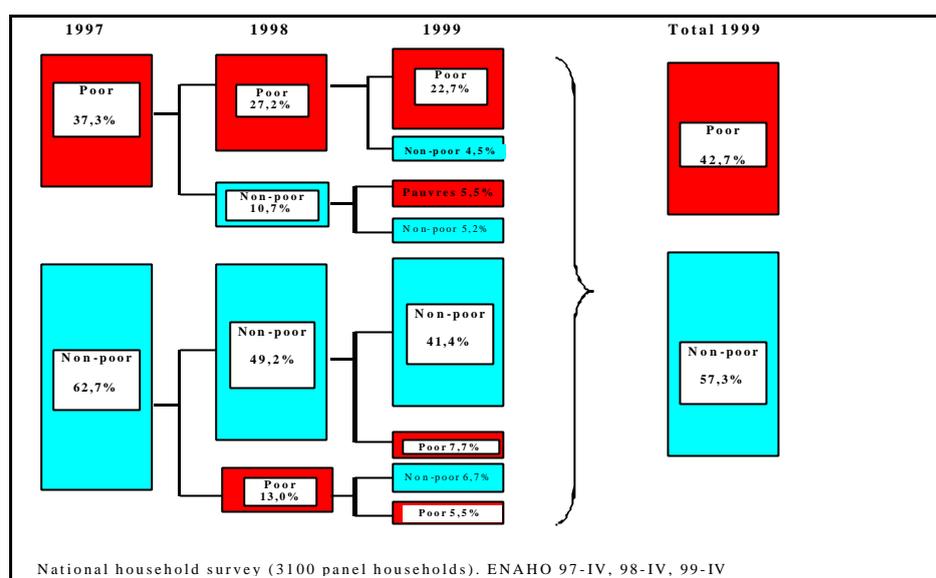
7. The steady state poverty rate can be calculate as follows:

$$H^* = \frac{Anp}{(Apn + Anp)} = \frac{1}{((Anp/Apn) + 1)} \text{ where}$$

Anp= poverty exit rate between t y t+1

Apn= poverty entry rate between t y t+1

H*= steady state headcount poverty rate (Baulch, B. et N. McCulloch, 1998:5-6)



9. PERMANENT AND TRANSIENT POVERTY IN PERU

The diagram above shows that nearly 23% of households experienced poverty in each of the years of the observed period. These households, that can be referred to as the hard core of «permanent poor», represent over half of the total poor observed each year, the other half being comprised of «transient poor»⁸. Over the whole period, 41% of households had never experienced poverty, whereas 36% went between poverty and non-poverty. This means that poverty is a far wider-reaching phenomenon, given that six out of ten Peruvians were touched by poverty at least once during the period 1997-1999.

This mobility between poverty and non-poverty is not specific to the Peruvian population. In its latest report on poverty, the World Bank gives comparable figures for other developing countries. Transient poverty represented a share ranging from 47% of the total poor in the Ivory Coast to 85% in Zimbabwe (see table below).

Table n° 9-1: Permanent and transient poverty

Country	Period	Permanent poor	Transient poor	Never poor
<i>Peru</i>	1997-99	21.5	35.3	43.2
<i>China</i>	1985-90	6.2	47.8	46.0
<i>Ivory Coast</i>	1987-88	25.0	22.0	53.0
<i>Ethiopia</i>	1994-97	24.8	30.1	45.1
<i>Pakistan</i>	1986-91	3.0	55.3	41.7
<i>Russian Federation</i>	1992-93	12.6	30.2	57.2
<i>South Africa</i>	1993-98	22.7	31.5	45.8
<i>Zimbabwe</i>	1992/93-1995/96	10.6	59.6	29.8

Source: Attacking Poverty, World Bank 2000 (draft), p.21 and our estimates for Peru.

8. The transient poor represent respectively 39%, 42% and 47% of the total poor in 1997, 1998 and 1999.

Jalan and Ravallion (1998) have recently proposed a new indicator distinguishing between chronic and temporary poverty. The chronically poor are defined as people whose long term per capita consumption (or permanent income, according to the life cycle theory concept) is below the poverty line. The difference between observed poverty and permanent poverty provides us with the transient share of poverty, a breakdown that is immediately available for additively separable indicators such as those in the FGT family. The chronic share is therefore the value of the poverty indicator when spending does not fluctuate close to its average rate over a period of time⁹. Vulnerable populations suffer greater fluctuations in their income and, as they do not have sufficient savings, they pass on such shocks in their levels of spending. Hence, for example, a household may be deemed « permanently » poor over a period of 5 years although it was poor for one year only, if spending for that year was well below the poverty line and thus pulled the average spending over five years down to below the poverty line. Formally:

G_{it} = per capita expenditure of household i in period t

G_{imy} = average per capita expenditure of household i over the whole period

P_{it} = a poverty indicator for household i in period t

Permanent poverty:

$C_i = P(G_{imy}, \dots, G_{nmy})$

Transient poverty:

$T_i = P(G_{it}, \dots, G_{nt}) - P(G_{imy}, \dots, G_{nmy})$

The aforementioned components can be gathered to obtain a national level indicator. For that it is necessary to have poverty indicators that can be additive decomposable, both in the individual and the temporal dimension (such as FGT).

A disadvantage of inter-temporal aggregation is that poverty in a future period may depend on present consumption (or poverty). This could be the case, for instance, of present consumption of durable consumer goods, which are work tools that generate income for households. This potential problem can be avoided by using an expenditure measure that takes into account the « use » value of such goods.

In their study of poverty dynamics in southern China, Jalan & Ravallion propose the poverty gap square as the poverty indicator, in order to take into account the distance below the poverty line and to give more weight to expenditure values that are more distant from the poverty line.

G_{it}^* is the per capita household expenditures normalized by the poverty line

$P(G_{it}) = (1 - G_{it}^*)^2$ if $G_{it}^* < 1$

$= 0$ if $G_{it}^* \geq 1$

From this decomposition several poor household categories can be defined:

- 1) Currently poor but not permanent poor.
- 2) Currently poor and permanent poor.
- 3) Not currently poor but permanent poor.

If we take average household spending for the period 1997-99, it can be seen that 35.8% of the population was below the poverty line, i.e. a higher percentage than the number of poor individuals in each

9. A similar approach was adopted by Fields (1999) to study the relation between economic mobility and long-term inequalities. As far as equity is concerned, a society with the same degree of inequality but with greater mobility can be considered as « fairer » than another with a lesser degree of mobility.

year. In other words, around 12% of vulnerable households suffered from a drop in their spending that were sufficiently large to bring their average spending for the period 1997-99 to below the poverty line.

The accent here is less on the volatility of income, as lean years can be compensated for by good years. From this angle, poverty appears to be partly a problem of uninsured or unanticipated risk. In certain cases this vulnerability can lead households into poverty traps, for instance when the children are taken out of school or when medical care is not given.

10. SENSIBILITY TO POVERTY LINE AND MEASUREMENT ERRORS

In order to test the sensitivity of our results to poverty line definitions and to expenditure measurement errors, first we considered a poverty range of 10% around the poverty line and second, took into account only transitions generated by changes in expenditure exceeding 10%. In this way it is possible to appreciate whether the observed poverty transitions are due to households very near the poverty line or to transitions implying small changes in per capita expenditure.

Table n° 10-1: Sensibility of poverty transitions to poverty line and measurement errors

	<i>Fall into poverty</i>	<i>Escape from poverty</i>	<i>Always poor</i>	<i>Never Poor</i>	<i>Total</i>
1997-98					
<i>Households which expenditure change was greater than +/- 10%</i>	14.1	12.2	24.2	49.5	100
<i>Transitions above/below 10% the poverty line</i>	9.3	7.3	26.4	57.0	100
<i>Overall panel</i>	12.0	10.6	25.6	51.8	100
1998-99					
<i>Households which expenditure change was greater than +/- 10%</i>	16.5	11.6	26.0	45.9	100
<i>Transitions above/below 10% the poverty line</i>	9.2	7.3	28.6	54.8	100
<i>Overall panel</i>	14.1	9.6	28.1	48.3	100

Source: Our estimation from ENAHO 1997-IV, 1998-IV and 1999-IV. Weighted estimates

The conclusions were practically the same, indicating the fact that flows to and from poverty were relatively clear-cut. This is partly due to the fact that nearly 85% of households experienced a percentage variation in expenditure greater than 10% from one year to another, and partly that the observed variations in living standards mainly resulted from changes in the size or make-up of households, the rate of participation of their members, the dependency ratio, etc., rather than variations in the rates of remuneration on the labor market. Higher sensitivity of transitions is related to the definition of poverty lines, which results from the fact that cdf for household per capita expenditures are very steepest over the poverty line range so defined.

It may be interesting to examine relative economic mobility through a quintile mobility matrix. Tables 8 and 9 show that there is an important degree of mobility among Peruvian households: no more than 50% of individuals remain in the same quintile in two consecutive years. Moreover, around 20% of the population experienced upward mobility of one-quintile in 1997/98 while those who moved downward represented 21%. Simultaneously to the increase in the poverty rate between 1998/99, less individuals (16%) moved upwards by one quintile. It can be noted from these transition matrices that most economic mobility is

relatively short-ranged. Only around 5% of individuals moved farther, either upward or downward, than one quintile in the expenditure distribution during the 1997-1999 period.

Table n° 10-2 / Table n° 10-3: Quintile transition matrix

<i>1998 quintile</i>						<i>1999 quintile</i>					
<i>1997 quintile</i>	I	II	III	IV	V	<i>1998 quintile</i>	I	II	III	IV	V
I	13.15	5.22	1.22	0.32	0.11	I	13.68	5.04	0.85	0.39	0.05
II	5.18	8.26	4.41	1.85	0.30	II	4.97	7.54	5.19	2.10	0.21
III	1.38	4.74	6.95	5.15	1.77	III	0.92	5.40	7.32	5.11	1.24
IV	0.32	1.40	5.96	7.51	4.79	IV	0.41	1.59	5.04	8.10	4.84
V	0.07	0.44	1.40	5.15	12.94	V	0.04	0.41	1.61	4.28	13.65

Table n° 10-4: Transition matrix mobility indicators

	<i>1997/98</i>	<i>1998/99</i>
<i>Percentage on diagonal</i>	48.8	50.3
<i>Percentage that moved up by one quintile</i>	19.6	16.0
<i>Percentage that moved up by two or more quintiles</i>	5.6	4.8
<i>Percentage that moved down by one quintile</i>	21.0	19.7
<i>Percentage that moved down by two or more quintiles</i>	5.0	5.0

Source: Our estimation from ENAHO 1997-IV and 1998-IV. Weighted estimates

11. PROFILE OF POVERTY TRANSITIONS

In the same way, it is possible to compile static poverty profiles, showing the incidence of poverty according to households' demographical and economic characteristics and also to build a profile of the vulnerable population (i.e. people who fall into or escape poverty), the chronically poor and those that are never in a state of poverty. Of course, this exercise particularly serves to characterize these different populations and not to establish relations of causality between the population's characteristics and the different poverty transitions (these are, to a certain extent, unconditional risks). The concomitant effects of the different variables will be examined later, in the presentation of the main results of the econometric estimates.

These profiles provide an outline of typical households. For instance, the profile of households in a state of permanent poverty corresponds to a relatively large household with a low number of working members and hence a quite high dependency level. The head of household lives in the sierra, is of average age, cohabits and has not received an education (on a national level, only 8% of heads of households have not been to school whereas the figure reaches 20% amongst the chronically poor). Vulnerable households are

characterized by the young age of their head, by living in a rural area and by only having reached a primary level of education. The benefit of a secondary education prevents people from becoming chronically poor but is not sufficient to allow them to avoid episodes of poverty. A particularly significant fact is that there does not seem to be any relationship between the risk of poverty and the fact that the head of household is a woman. On the contrary, a higher percentage of such households manage to escape from poverty than for households where the head is a man. Households that are sheltered from poverty are households residing in the large coastal cities, with a less than average size, a high rate of participation in the labor market and whose heads are employers or salaried executives with a higher level of education (see table in appendix).

12. POVERTY AND INEQUALITY DECOMPOSITIONS

In the past three years Peruvian growth performance has been very poor. Household per capita expenditures declined by 12,2% between 1997 and 1999 and the poverty rate increased, as we have seen, from 36.2% to 42.1%. In this section we address the question of the extent to which this change in poverty rates is due to pure growth effects or to changes in inequality, or to put it other way, to what extent the recent growth performance has been pro-poor? In answering these questions we will limit our decomposition to poverty incidence (Po) following recent work by Mahmoudi who provides an exact decomposition, contrarily to pioneering work by Datt and Ravallion. We will only consider households in the panel in order to avoid de effects of varying sample size and to ensure comparability with the decomposition proposed by Fields and presented in the next section.

According to the approach developed by Datt and Ravallion, poverty changes can be decomposed into one part due to growth, another due to changes in inequality and a third component identified as a residual. Of course, there is no reason for the growth and inequality components to vary in the same direction.

To carry out the decomposition, Datt and Ravallion focus on poverty indicators that can be represented in terms of poverty line (z), mean expenditures (μ_t) and the Lorenz curve (L_t), (which indicates inequality among individuals):

$$P_t = P(z/\mu_t, L_t)$$

The general principle upon which Datt and Ravallion bases their decomposition consist in considering the growth component as the poverty change that result of a change in mean expenditure (μ), holding constant the Lorenz curve (L_r) and given the poverty line. The redistribution component is equal to the poverty change due to changes in the Lorenz curve, holding constant average expenditure.

$$P_{t+n} - P_t = [P(z/\mu_{t+n}, L_t) - P(z/\mu_t, L_t)] + [P(z/\mu_t, L_{t+n}) - P(z/\mu_t, L_t)] + \text{residual}$$



According to Datt and Ravallion, the residual appears «whenever the poverty measure is not additively separable between (μ) and L, i.e. whenever the marginal effects on the poverty index of changes in the mean (Lorenz curve) depend on the precise Lorenz curve (mean) » (Ravallion, Datt 1991:4).

The method proposed by Datt and Ravallion implies the econometric estimation of a Lorenz curve. The form of the function estimated by the authors is «elliptical » (or a general quadratic function). This regression is estimated by OLS with the variables expressed in logarithms. Chen, Datt and Ravallion provide software (POVCAL) designed to estimate the parameters of the Lorenz function when expenditure data is grouped.

According to McCulloch y Baulch (1998:4), the residual appears as a result of the choice of the reference period and is equal to the difference between the growth components measured at the final and initial distributions. They note that this residual is neither an econometric residual nor is it related to the quality of the data.

Mahmoudi for whom the existence of a residual is an undesirable characteristic of the method due to misspecification has criticized this interpretation of the residual. “The residual in Datt-Ravallion’s method show the inability of the method to separate pure growth and redistribution components completely and ignore all possibility of decomposition in a unique formula, which makes it sensitive to the choice of distribution as the reference” (Mahmoudi, 1998:3).

The alternative method suggested by Mahmoudi relies on the relationship between the cumulative density function (cdf) of expenditure and the Lorenz curve. Mahmoudi underlines that the cdf function can be used to highlight the redistribution effect since the Lorenz curve is non other than the integral (normalized by the mean) of the distribution function. It allows for an exact decomposition of poverty changes in a pure growth effect and a redistribution effect and has the advantage of not requiring a parametric estimation of Lorenz curves.

$$L(p) = 1/\mu \int_0^r \text{cdf}^{-1}(\pi) d\pi$$

Since it is postulated that cdf1 and cdf2 have, by construction, the same mean value, then Mahmoudi shows that:

$$\mu [L_2(p) - L_1(p)] = \int_0^r [\text{cdf}_2^{-1}(\pi) - \text{cdf}_1^{-1}(\pi)] d\pi$$

The change in the headcount poverty ratio that can be attributed to growth can be expressed as:

$$P_{t+n} - P_t = [P(\text{cdf}_2, z) - P(\text{cdf}_1, z)] = \text{cdf}_1(z\mu_t / \mu_{t+n}) - \text{cdf}_1(z)$$

Thus, the method consists in constructing a new distribution-scaling up (by average change in expenditure) the reference distribution so it is homothetically shifted. We then compare this distribution in which all expenditures has been increased by the average growth with the observed distribution in the final period. The differences in poverty rates are naturally due to the redistribution effect whereas the difference between the reference distribution and the simulated distribution yields the growth contribution to poverty changes.

There is no residual from this decomposition but, naturally, the growth and redistribution components will vary according to which distribution is taken as the reference distribution. Mahmoudi proposes simply to take the average of each component obtained by considering the first and then the second distribution as

the reference (in the first case the distribution is scaled up, whereas in the second it is scaled down, if growth is positive between the two periods).

If we wish to compare the growth contribution (or the redistribution effect) considering two periods of different lengths (for instance 1980-85 and 1985-2000), it is convenient to normalize the redistribution component using the absolute value of the growth component as denominator, as was suggested by McCulloch y Baulch.

$$\text{Anti-poor bias of growth} = -\Delta P_{\psi} / |\Delta P_{\mu}|$$

The table below shows the results obtained by applying this methodology to the Peruvian case. Only headcount poverty change decomposition is reported. First, it should be recalled that inequality, measured in terms of real expenditure (at 1999 prices, deflated by disaggregated price index for 8 subgroups for each of the 24 *departamentos*' capital and weighted at the individual level), diminished during the period considered (1997-1999). It passed from 0.482 in 1997 to 0.475 in 1998 and diminished further to 0.467 in 1999, although a contrasted evolution was observed in urban and rural areas. While inequality diminished steadily, though by small proportions, in urban areas it first increased and then decreased by 6% between 1998 and 1999 in rural areas. It can also be observed that poverty headcount increased most in urban areas (almost 6% points) whereas in rural areas the increase in poverty rates was moderate (less than 2% points). We can therefore expect a bigger growth effect in urban areas than in rural areas and inversely with respect to the redistribution effect.

Table n° 12-1: Decomposition of poverty changes into growth and inequality effects

Peru 1997-1999

Average of reference periods to and T1

	<i>National</i>		<i>Urban</i>	<i>Rural</i>	
	<i>97/98</i>	<i>98/99</i>	<i>97/99</i>	<i>97/99</i>	
<i>Growth effect</i>	3.12	4.53	7.74	9.23	-0.02
<i>Redistribution effect</i>	-1.68	-0.03	-1.80	-1.03	1.72
<i>Total poverty change</i>	1.44	4.5	5.94	8.2	1.70
<i>Pro poor growth bias</i>	0.54	0.01	0.23	0.11	86.0

Source: our estimation from ENAHO 1997, 1998 and 1999 surveys. Panel households

Note: Poverty incidence (Po) at the (weighted) individual level.

It is interesting to note that, at that national level over the period 1997-99, the decrease in mean household expenditure accounts for all the increase in poverty incidence; the redistribution effect moved in the opposite direction, contributing to diminish the poverty rate that would otherwise have been even higher. Redistribution effects reduced the poverty headcount by 2 percentage points, whereas falling mean household expenditure raised poverty incidence by almost 8 percentage points between 1997 and 1999. However, quite different pictures appear when we consider the sub periods 1997/98 and 1998/99 and when we distinguish between rural and urban areas. Huge adverse growth effects were partly mitigated by redistribution effects in urban areas, while small positive growth effects were overridden by negative distributive effects in rural areas (see table above). The first recession year (1997/98) was characterized by an important redistribution of household expenditure that halved poverty increase due to poor growth performance. The second recession year (1998/99), although it implied a reduction in mean household expenditures similar to that recorded in 1997/98, had lower favorable distributional changes. The normalized pro poor bias was significant in 1997/1998; decline in growth was not biased against the poor since the actual increase in poverty was less than what would occur with distributionally neutral growth (the headcount is more than 50% lower than it would otherwise have been). In 1998/99 the pro poor bias practically disappeared. It would be tempting to interpret this neutrality of recession as reflecting the failure of public policy in favor of the poor. However, a more rigorous analysis based on panel data is needed before drawing such conclusions (see below). It is worth noting that in rural areas growth was biased against the poor, accounting for almost all the poverty increase, while in urban areas it was biased in favor of the poor, though in a modest proportion (11%).

13. INEQUALITY DECOMPOSITION BETWEEN AND WITHIN GROUPS

Next, we examined the sources of economic heterogeneity by decomposing the (Theil) inequality index between groups and within groups for both 1997 and 1998 household per capita expenditures.

The Theil inequality index can be additively decomposed between groups and within groups in the following way:

$$T = \underbrace{\sum Y_i/Y \ln(Y_i)/(Y/N)}_{\text{Within groups}} + \underbrace{\sum Y_j/Y \ln(Y_j/N_j)/(Y/N)}_{\text{between groups}}$$

We considered geographical domains and characteristics for household heads in order to shed some light on the nature of inequality and its evolution. Despite the huge gap in living standards between rural and urban areas, only about 25% of total inequality was accounted for by differences in their average expenditures. There is no sign either that it is increasing (it actually fell slightly). Considering inter-regional differences (for INEI's seven geographical regions) indicated that they accounted for around one third of total inequality and that the gap was reduced as urban regions were more heavily exposed to deteriorating living conditions than rural regions. Interestingly enough, the sex of household heads did not contribute in any significant way to total inequality, similarly to household age group or its civil status. In contrast to this, the level of education of household heads is by and large the major single household characteristic contributing to overall inequality (36% in 1997). It can be noted that its relative (as well absolute) contribution fell by around 10 percentage points between 1997 and 1998, suggesting an important reduction in the economic benefits to education. Finally and not surprisingly, workers' activity had a small impact since unemployment and inactivity concern a very small number of household heads.

Table n° 13-1: Theil inequality between groups, level and % of total inequality

	1997	1998	1997	1998
	Level		<i>Between group as % of total</i>	
<i>Geographical domain</i>	0.16505	0.13766	36.4%	32.7%
<i>Rural/ urban area</i>	0.11436	0.10146	25.2%	24.1%
<i>Sex</i>	0.00023	0.00269	0.1%	0.6%
<i>Age group</i>	0.0122	0.00684	2.7%	1.6%
<i>Education level</i>	0.1639	0.11291	36.1%	26.7%
<i>Activity</i>	0.01881	0.01677	4.1%	4.0%
<i>Civil status</i>	0.02296	0.02065	5.1%	4.9%

Source: our estimation from ENAHO 1997, 1998 and 1999 surveys. Panel households

14. DECOMPOSING INCOME MOBILITY IN PANEL DATA: FIELDS/OK'S GROWTH AND "EXCHANGE" MOBILITY

A new generation of mobility indicators has been proposed by Fields & Ok, based on an axiomatic approach inspired by Shorrocks' work (1978) and the Markandya mobility indicator (1984). The proposed indicators have the particularity of allowing a distinction to be made between the two aspects of mobility (structural and exchange mobility) and of not requiring the independence hypothesis of a first order Markovian process.

The symmetric economic mobility indicator proposed by Fields (1998) and Fields & Ok (1996, 1999) serves to measure the importance of flows implied by expenditure mobility. The indicator is based on changes in expenditure level. In order to take into account the fact that a transferred amount does not have the same significance for low and high incomes, the authors propose that the logarithm of income should be considered. In this way, an equal transfer of expenditure will have a greater importance for poor households than for wealthier households.

Being:

x_i household (i) per capita expenditure in the initial year

y_i household (i) per capita expenditure in the final year

$$dn(x, y) = \sum |x_i - y_i|$$

$dn(x, y)$ measures the total amount of change in expenditure between the initial and the final observation period and is equal to total mobility. Fields & Ok proposes that this flow be expressed in per capita terms and as percentages of the average of base-year income. In this way, mobility can be referred to an order of magnitude relevant for the analysis.

$$mn(x, y) = 1/n \sum |x_i - y_i|$$

$$pn(x, y) = \sum |x_i - y_i| / \sum x_i$$

$mn(x, y)$ is the average total mobility per household and $pn(x, y)$ is the total mobility in percentage of total expenditure in the initial year. All variables are expressed in logarithms.

An important feature of the Fields & Ok index is that it can be decomposed into two parts: the first measures the mobility due to growth (or decrease in growth) and the second measures the mobility due to the changes in position in the expenditure scale, with constant average expenditure. Thus, when the economy grows, the decomposition of dn in the two components is given by:

$$dn(x, y) = Gn(x, y) + Tn(x, y)$$

The mobility due to growth is the mobility that will have occur if all household expenditures had grown in the same proportions and it is equal to:

$$Gn(x, y) = \sum y_i - \sum x_i$$

While the mobility due to transfers between households is the mobility that would have occurred if the households had changed their position in the distribution, maintaining constant aggregate expenditure. It is given by:

$$Tn(x, y) = 2 \left(\sum_{i \in L_n(xy)} \ln(x_i/y_i) \sum (x_i - y_i) \right)$$

$L_n(xy)$ Is the group of households that suffered a diminution in their spending.

To summarize, total mobility in the growth phase is decomposed as follows:

$$dn(x, y) = \sum |x_i - y_i| = \sum y_i - \sum x_i + 2 \left(\sum_{i \in L_n(xy)} \ln(x_i/y_i) \sum (x_i - y_i) \right)$$

and in a recession phase the index is as follow:

$$dn(x, y) = \sum |x_i - y_i| = \sum x_i - \sum y_i + 2 \left(\sum_{i \in W_n(xy)} \ln(x_i/y_i) \sum (x_i - y_i) \right)$$

$W_n(xy)$ is the group of households that had an increase in their expenditures.

The non-directional or symmetric index of expenditure mobility is interesting insofar as it informs us about the degree of instability that exists in income distribution or household spending. A difficulty that could appear is the sensitivity of this index to extreme values, which renders average values representative of changes in the distribution of household expenditures. This can be overcome, as proposed by Fields (1998), by examining the whole cumulative distribution of expenditure changes and performing a first order dominance test.

15. DIRECTIONAL MOBILITY INDEX

The directional mobility index consists in examining the stochastic dominance of the distribution of changes in household expenditure levels between two different years. This approach allows for inter-temporary comparisons of welfare (Fields, Leary, Ok, 1998:2).

It is important to insist on the fact that the Fields & Ok index does not depend on the first order Markovian process hypothesis, implicit in annual transition matrixes, which is rejected in most empirical mobility studies. They are also the only ones to register mobility when the spending of all households grows homothetically (Fields, 1998:6).

Economic mobility can be measured without introducing the discontinuities that occur when populations are divided into categories of poor and non-poor, or accepting the independence hypothesis of first order Markovian processes. This is the case for the economic mobility indicator proposed by Fields and Ok (Fields, 1998 and Fields & Ok, 1996). It enables a distinction to be made between growth-related

structural mobility and so-called « exchange » mobility, and measures the importance of transfers of mobility-related flows of expenditure. Growth mobility is the mobility that would have occurred if all household expenditure had varied in the same proportions, whereas exchange mobility is the mobility that occurs when households change their position in the distribution.

The calculations made for Peru show that total mobility was quite considerable during the period from 1997-1999, as it represented approximately 40% of average per capita expenditure. More interestingly, exchange mobility accounted for over two-thirds of total mobility, and also fell (from 90% to 86% of total mobility in the sub periods 97/98 and 98/99) together with total mobility when the average expenditure level fell.

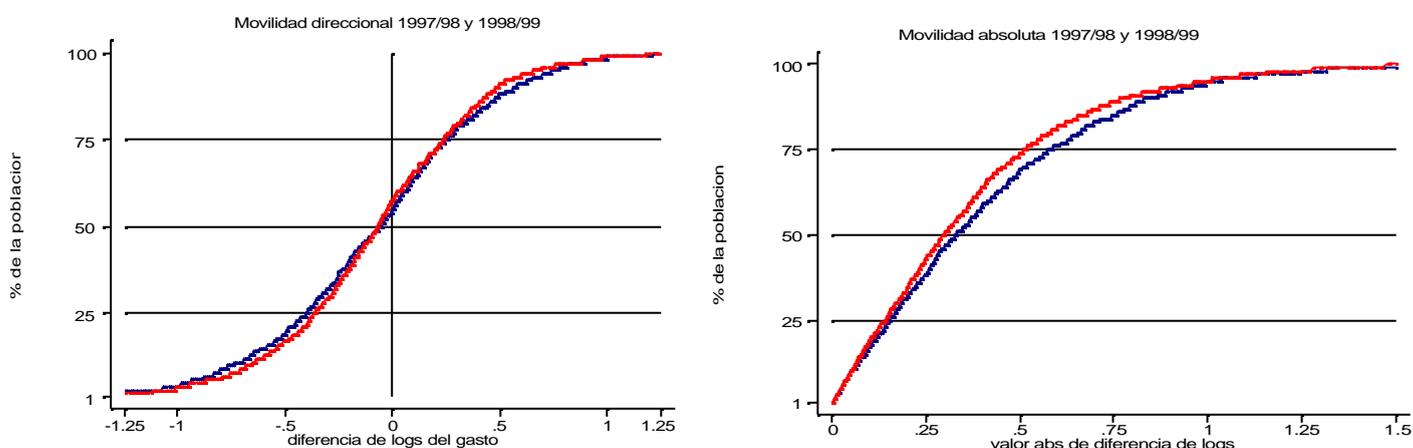
Table n° 15-1: Fields/Ok income mobility index

(En % household per capita expenditure)

	<i>Total</i>	<i>Growth</i>	<i>Exchange</i>
97/98	42.48	4.06	38.42
	100%	10%	90%
98/99	37.38	5.26	32.12
	100%	14%	86%
97/99	45.12	9.16	35.96
	100%	20%	80%

Source: our estimation from ENAHO 1997, 1998 and 1999 surveys.

Figure n° 15-1: Directional and absolute mobility



16. MODELLING POVERTY TRANSITIONS

In commenting the poverty transition profile, we have so far examined the unconditional risk that households of given characteristics may experience any of the poverty transition states. This has allowed identifying some variables that may be relevant for policy making. For more analytical purposes though we need to consider the relative risks conditional on the other factors that determines poverty transitions. We will particularly focus on the factors that enable households to escape poverty since this may give some clues for improving anti-poverty policies.

As is well known, static, cross-section econometric models allows us only to identify the correlates of poverty, that is to say characteristics linked to poverty but in no case can be inferred causality patterns from this kind of analysis. This can only be done in the context of panel data by modeling the factors associated with poverty transitions. This is the first step in understanding poverty causality (or better triggering factors). However, we must be very cautious in deducing from our results policy oriented recommendations for this is essentially a partial equilibrium approach and we need to understand also the indirect effects. For instance, it is not because we may find a strong positive relationship between the probability of escaping poverty and labor market participation of secondary household members that it follows that a nation-wide increase in labor force participation rates will reduce poverty. This will also depend on how the labor market will react to the increase in the labor supply and it is by no means guaranteed that all workers will be better off. We must not ignore either that it may be very difficult to consider only exogenous variables among the explanatory variables. Most variables used in regressions have a two-way causality, including household demographic characteristics. More educated urban households, which are also richer than less educated rural households, may decide not to have as many children as do rural households. Each child adds to the denominator of income per capita but not to the numerator, so it is- at least in the short run- an automatic decline in welfare. We can argue that household and individual characteristics are fixed in the short run but are endogenous in the medium and the long run. Our three years (1997-1999) panel allows us to consider events or shocks that are not contemporaneous to the poverty transitions, limiting somewhat the problem of simultaneity and of endogenous variables.

We attempted to estimate the determining factors of the different forms of poverty transition between 1998 and 1999 using a multinomial logit model since our dependent variable is a categorical variable with four values corresponding to each of the poverty transitions in our matrix (chronic poverty, falling into poverty, escaping from poverty and never in poverty). We can postulate that there is a latent unobserved variable y^* related to the “capacity of households to protect themselves against poverty or escape it”. If this is the case (an hypothesis that is known as the parallel regression hypothesis which can be tested¹⁰) the appropriated model is the ordered multinomial logit. If this hypothesis is not granted, then we need to estimate an unordered multinomial model. The choice of the logit function is justified by the simplicity in interpreting the results in terms of odds ratio or relative risk ratios. In the ordered model we have only one set of parameters estimated whereas in the unordered model each poverty transition state has its own parameters (with one state as base case). From this framework we will attempt to answer to various questions. Do the factors explaining chronic poverty equally important in explaining entries in poverty? Are there specific events linked to escaping poverty, different from those explaining the probability of being never poor? What role is played by geographical variables in poverty transitions?

10. The parallel regression or the proportional-odds hypothesis can be tested ruining an unconstrained and a constrained regression in which it is imposed the restriction that the coefficients are equal across categories and then performing an approximate likelihood-ratio test (see STATA manual). If we estimate an unordered multinomial model when the dependent variable is ordered, then there is efficiency loss since we are not using all the information available. Inversely, if the dependent variable is not ordered and we estimate an ordered model, then our estimates will be biased or even nonsensical. A significant p-value is evidence to reject the null hypothesis that the coefficients are equal across categories (Scott, 1997:149)

17. THE EXPLANATORY VARIABLES

Three kinds of variables will be considered: household, individual and geographic variables. These variable are measured in two ways: as given initial characteristics and as events (changes from one period to another). At the household level, we considered besides household demographics (type of household, household size, dependency rates, percentage of income recipients, age structure) and housing characteristics, physical and human capital. We split physical capital into working capital and luxury goods. Human capital was measure by the education level of the household head and its spouse and by the maximum education level of any member in the household and by labor experience of the head (approached by his age and age squared). Life-cycle effects were also measured by including age class of household head. At the individual level, we considered also labor status of the head (occupied, unemployed, out of the labor force), institutional sector (informal, private or public sector), production sector (primary, manufacturing or service), whether it has or not a secondary employment, labor hours in primary and secondary employment, socio-professional category (blue collar, white collar), etc. We also considered the impact of spatial variables related to the provision of public infrastructures (number of schools, health centers, quantity and quality of road infrastructures) and economic density (number of markets, shops, etc.) taken from the municipalities' censuses. A set of regional dummy variables was included as well as an urban/rural dummy variable. Among the events we will consider changes in marital status, changes in occupational status, changes in the number (and proportion) of income receivers and changes in the household head.

We also attempted to consider the impact of social capital in poverty transitions. Following work by Grannovetter, households may develop two kinds of social ties: weak and strong ties. Weak ties are those relaying on relationships within the closer parental or neighborhood circle. It will be proxy by intra-household or intra-family transfers (“propinas a miembros del hogar, “remesas, donaciones o regalos a familiares fuera del hogar” and funerals & marriages expenditures). These weak ties are most effective in helping households to avoid extreme poverty, mostly by mean of in-kind transfers (“olla común” in shantytowns for example). But at the same time, they can act as a sort of poverty trap preventing for instance female labor participation. Weak ties refer to social capital developed outside the restricted family/community circles. They help individual o develop more business-oriented relationships. We will proxy this variable by the amount paid to clubs and associations (this includes participation to Lion’s Club), gifts/donations to charity associations and transfers to non-family members outside the household.

Table n° 17-1: Poverty transitions 98-99 (weighted)

	<i>Always poor</i>	<i>Fall into poverty</i>	<i>Escape from poverty</i>	<i>Never Poor</i>	<i>Total</i>
<i>Weak ties 1998</i>					
No	86.4	75.2	87.5	64.8	74.5
Yes	13.6	24.8	12.5	35.2	25.5
<i>Strong ties 1998</i>					
No	54.0	45.3	62.4	44.1	48.8
Yes	46.1	54.7	37.6	55.9	51.2
<i>Total</i>	100.0	100.0	100.0	100.0	100.0

Source: our estimations from the 1997-1999 household panel.

Households with weak ties are defined as those that declare having an expenditure in tips to non family persons not belonging to the household or those having made donations to social institutions (church, charity institutions, etc.) or having paid their membership quota to clubs and associations. Strong ties

households are those that have given tips and gifts to family member inside or outside the household and those having made some expenditures related to marriages and funerals.

There is some evidence showing that households with weak ties are over represented among households never poor while those not having weak ties represent a higher proportion in the always poor and in those escaping poverty than in the whole population (see table above). Inversely, strong ties seem to have a positive impact on the risk of becoming poor (there are 55% of new poor that had strong ties expenditure against 51% in the whole population) and a negative impact on the risk of escaping poverty. As in the case of weak ties, they are also over represented in the group of never poor (a more detailed data is presented in the appendix).

18. THE MULTINOMIAL UNORDERED REGRESSION MODEL

This model is designed to estimate the impact of the different explicative variables on each of the forms of poverty transition. The model will predict the probability that a given household with given characteristics will experience any of the four poverty transition states. In order to identify the model one of the poverty transitions must be taken as the base case. Different sets of coefficients will be obtained for each state. We will first comment the statistical significance of the regression coefficients on the logits. Besides, following Long graphical presentation, we will show jointly the impact of discrete changes in explanatory variables over the probability of being in each poverty state and, given that we are most interested on poverty dynamics, their impact in terms of odds ratio or relative risk ratios (rrr). In other words, we are interest in knowing how each variable affects the odds of a person being always poor, falling into or escaping poverty relative to being never poor (the base case). The multinomial logit model is given by:

$$Pr_{ij} (y_i = 1 | x_i) = 1 / \sum_{j=2}^4 e^{\beta(j)X_i}$$

$$Pr_{ij} (y_i = m | x_i) = e^{\beta(j)X_i} / \sum_{j=2}^4 1 + e^{\beta(j)X_i} \quad \text{for } m > 1$$

Pr_{ij} is the probability that household i is in poverty state j

The relative probability of $y=2$ (new poor) relative to the base case ($y=4$, never poor) (rrr) for a one unit change in X_i is given by:

$$\frac{Pr_{ij} (y_i = 1 | x_i)}{Pr_{ij} (y_i = 4 | x_i)} = e^{\beta_i(2)}$$

Since the coefficients of the benchmark are set equal to 0, the impact of an explanatory variable on the rrr of ie. becoming poor relative to being never poor is simply the $\beta(j)X_i$ regression coefficient exponentiated. The interpretation is simple since as Long recalls, the value of the factor change in the odds does not depend on the value of the level of the variable considered nor on the levels of the other variables, as in the case of the marginal impact (Long 1997:169).

19. REGRESSION RESULTS

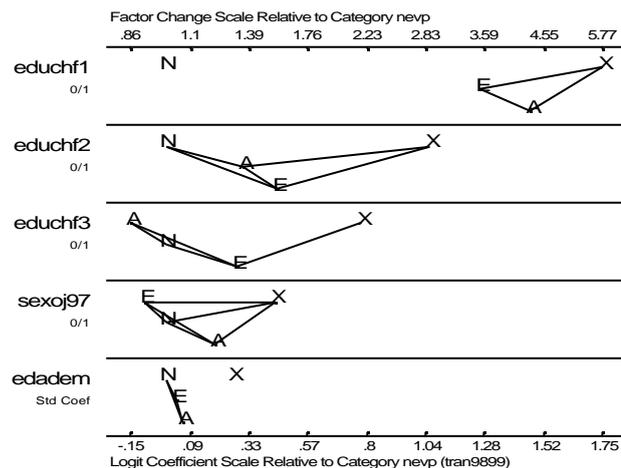
By and large the most sizeable impact is that of the level and changes of household size after controlling for its composition. One standard deviation increase in size multiplies by three the risk of chronic poverty

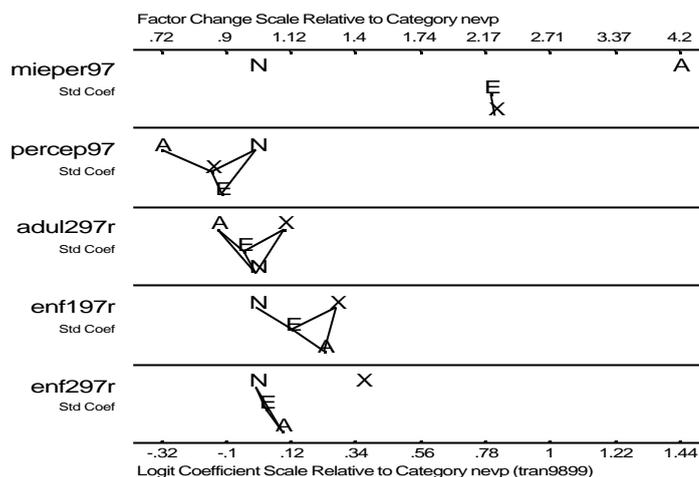
relative to being never poor and by two that of being transient poor. No differentiated impact of household size was found on entering or escaping poverty. The number of income earners also plays a role but only in chronic poverty with respect to the three other poverty transitions over which it makes no difference. Household composition has also an independent impact. A higher proportion of children aged less than five year will increase by five and by two the chances of chronic poverty and entering poverty, respectively. Though, this variable had no significant impact for escaping poverty. It is interesting to notice that the proportion of children aged over six has a reverse strong positive effect in escaping poverty relative to staying in poverty. This may be related to increased participation in the labor market of female household members.

We obtain, as Gleewe did, no significant impact of gender of household head on any of the poverty transitions. Though male headed households has better odds of escaping poverty or never being touched by poverty as well as lower chance of falling in poverty, this effect was not statistically significant nor it implied a noticeable change in probabilities of each poverty transition state. The effect of marital status was insignificant once we controlled for personal and household characteristics and geographical variables.

Concerning education variables, if the household head has no formal education level the household chances of being always poor multiplies by a factor of 15 relative to never being poor (reference was superior education). Primary or secondary education level do not differentiate transient or chronic poverty but only never poor and the other three groups.

Adding spouse education level increases the probability of being always poor (only when spouse has no formal education) but was not significant for other transition states. It seems that for individuals without any level of formal education there is a high matching between the head and spouse. For this reason considering these variables together makes hard to distinguish its impact on poverty transitions, we dropped thus the spouse education level variables. We considered also the maximum level of education for the household as a whole together with the household head education level (Wald tests rejected the null for each group and for both considered together). Household headship is not necessarily an attribute of the best-educated member and likely of the member that brings more income to the household. This may reflect a high degree of intergenerational educational mobility.





Note:

X= exits poverty

N= never poor

A= always poor

E= enters poverty

The positive impact of public goods (health, roads, education), economic density and of geographical variables on poverty transitions faded away once the urban/rural divide was taken into account¹¹. There is no intrinsic unfavorable impact linked to the Sierra or Selva climatic conditions. Rural areas concentrate lack of public goods.

The possession of "luxury" assets divides the population in three poor categories; transient, chronic and never poor. Households, which did not possess assets, appeared to have a greater probability of living in poverty than those that did. However, the possession of productive assets (sewing machine, transport vehicle) was related in a negative manner to the probability of being chronically poor (though significant at 11%), but did not prevent (or favor) movements into or out of poverty relative to never being poor.

We found no significant effect of household head age nor of experience (age squared). Wald tests conducted for age class variables gave no significant results either (chi2= 11.51 significant at the 25% level so we could not reject the null Ho that coefficients are equal to zero).

20. POVERTY TRANSITIONS AND POVERTY REDUCTION POLICIES

A large number of developing countries have introduced various programs to fight against poverty, either through direct transfers to bring short term relief for the social cost of reforms or through longer term programs designed to improve poor people's human capital. However, pro-poor policies, particularly those targeting the chronically poor, require a dynamic view of poverty.

An approach in terms of the dynamics of poverty transition has a dual impact, first on the diagnosis of who the poor people are and second, in terms of the design of suitable programs to fight against the different

11. A joint wald test for geographical variables linked to public goods (escpub, escpriv, para97, feria97) cannot reject the null (chi2=17.4 with p-value= 0.136) at the 10% level. In our final estimated equation drop all these variable (except the number of public schools).

forms of poverty. Static analyses identify the poor at a particular point in time and introduce sustainable aid measures, usually defined in terms of transfers towards the poor people identified in this way. Given the high percentage of movements in and out of poverty, these programs contain a relatively high error rate if the aim of the actions is to target the permanently poor.

Table n° 20-1: Targeting indicators for policies to fight poverty

1998	<i>Non-poor in 1998</i>	<i>Poor in 1998</i>	<i>Total</i>
Did the household benefit from one of the social programmes (food aid, health, education)?			
No	28.7	6.6	35.3
Yes	32.6	32.1	64.7
Total	61.3	38.7	100.0

Source: Our estimation from ENAHO 1997, 1998 and 1999 surveys. Panel households.

In the case of Peru, the poverty reduction programs appear to target the poor relatively well, given that less than one out of every five poor persons is excluded from one of the three types of programs in question (food programs, health, education). The massive nature of these programs (65% of the population benefits from them in one form or another) also explains why there is a high percentage of «leakage », as over half of the non-poor population (53%) has benefited from one of the programs. As many non-poor households have benefited from the social programs as poor ones. If it is assumed that the amounts of aid were equivalent, it would therefore have been possible to double the aids given to the poor if the programs had been better targeted. The proportion of people in extreme poverty covered by the social programs was maintained at 18% in 1998 and 1999, but different trends can be noted depending on the degree of poverty. The rate of exclusion of those in extreme poverty fell from 12% to 8%, whereas it rose from 17% to 25% for poor who were not in extreme poverty. This diverse deterioration was due to a reduction in the general cover of health programs, accompanied by a loss of effective targeting in health and education programs (from 42% in 1998 to 31% in 1999 for health programs and from 53% to 47% for education). It should be noted that targeting errors are more significant for the health and education programs than for those designed for food programs, which give priority to people in extreme poverty.

The targeting of programs designed to fight poverty in Peru is also relatively effective, given that almost nine out of ten permanent poor are able to benefit from them. The means of targeting (poverty maps identifying underprivileged areas) and the concentration of the permanently poor in rural areas explain these good results. The programs to fight poverty touch three-quarters of the vulnerable populations. There is therefore very little exclusion even if poverty transitions are taken into account. However, people who are never poor no doubt absorb a substantial share of aid, given that they represent 40% of total beneficiaries. This opens the possibility of a redistribution of the resources of the social programs in a view to increasing aid to vulnerable households and permanently poor people.

Table n° 20-2: Targeting indicators and poverty transitions

<i>Transitions 1998-99</i>					
Did the household benefit from one of the social programs in 1998 (food aid, health, education)?	Fall into poverty	Escape from poverty	Always poor	Never poor	Total
<i>No</i>	2.3	2.2	3.6	24.9	33
<i>Yes</i>	7.5	7.7	25.2	26.7	67
Total	9.8	9.8	28.8	51.6	100

Source: Our estimates using the ENAHO surveys 1998-IV and 1999-IV.

An examination of the characteristics and determining factors of transitions between poverty and non-poverty also provides a new type of policy to fight against poverty. By focusing attention on the static indicators, the public authorities were encouraged to implement a policy based on transfers of resources to the poor. However, by examining the characteristics of the chronically poor and transient poor, a new type of policy associating transfers with the determining factors for movements in and out of poverty could have more lasting effects in reducing poverty. This would be quite apart from the reduction of targeting errors (« filtering » and « exclusion ») due to a high degree of mobility between poverty and non-poverty.

We now know that the factors associated with permanent poverty and transient poverty are not always the same, as we have demonstrated in the case of Peru¹². This implies that when designing programs to fight against poverty, it is possible to distinguish not only between the short-term aspects (food programs, direct transfers) and those that concern the medium and long term, but that it is now possible to decide more precisely which factors should be emphasized. The recent trend is to bring into play the positive effects of interactions between the different poverty programs¹³.

12. Non nation-wide studies in Pakistan come to the same conclusions, whereas one concerning southern China does not show any specific factors to explain permanent or transient poverty. See works by Jalan and Ravallan, plus Baulch and McCulloch.

13. See Kanbur and Squire (1999).

CONCLUSION

Encompassing the decline in real per capita household expenditure during the 1997-1999 period, poverty incidence and inequality rose in Peru, particularly in 1999. The recession did not affect all households in the same way. Poverty increases affected urban areas far more than rural ones, the capital Lima being the hardest hit. Extreme poverty declined, especially in rural areas where it was traditionally concentrated. Anti-poverty government programs and the rebound in agricultural production after the Niño climatic disturbance, combined to produce this favorable result. The cross section analysis was completed (and critically compared) to two other approaches.

First, we examined the whole household expenditure distribution in order to test the robustness of poverty line definitions. We could not reject the null hypothesis of equality in the distributions of per capita household expenditure across the different years. Cross section approaches taking into account confidence intervals and stochastic dominance thus did not enable us to conclude that there were significant welfare changes in Peru during this period.

Second, we examined income mobility with special attention to poverty transitions, following the same households over time. We found that around one quarter of poor (and a similar proportion of non poor) left (or entered) poverty each year. Permanently poor individuals represented around $\frac{3}{4}$ of the total poor observed every year (23% of population or 5.5 million). Decomposing economic mobility into a “growth” and an “exchange” effect in our household panel, we found that overall mobility represented nearly 42% of average expenditure and that the negative growth effect was largely outweighed by the redistribution or exchange effect. This result contrasts with our cross section growth-inequality decomposition in which growth effects accounted for a much larger share than redistribution effects in poverty changes. Poverty transition profiles and Theil inequality decomposition highlighted the important role of geographical disparities and of household head and family demographic characteristics. Education levels are the single most important factor allowing households to escape permanent poverty though it does not protect against episodes of poverty. Location as well as the absence of public goods was also important factors explaining poverty transitions. Anti-poverty programs have been precisely centered on the increase of public investment in social goods (health and education) and geographically targeted to rural areas. Exclusion rates were relatively low (only 6.6% out of 39% of poor in 1998), especially for extremely poor individuals (only 8% were excluded). The anti-poverty programs also benefited the most vulnerable and permanent poor rather than never-poor households.

Our econometric results showed that household size and education level (for the head or at the household level) were important factors in explaining permanent poverty, whereas no significant impact was found for female-headed households, either on permanent or transient poverty. Public goods and the possession of productive physical assets were linked to permanent poverty but not to exits or entries. These preliminary results are certainly still too rough to allow for policy recommendations, but they strongly suggest that public policy should pursue its attention to education and public goods in the attempt to reduce permanent and extreme poverty in Peru.

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APPENDICES

Appendix n° 1 : Poverty incidence (FGT0) by region

<i>Mean Subpop.</i>	<i>Estimate</i>	<i>Std. Err.</i>	<i>[95% Conf. Interval]</i>	
1997				
<i>Costa_urban</i>	25.9	3.6	18.9	32.9
<i>Costa_rural</i>	43.3	5.1	33.3	53.2
<i>Sierra_urban</i>	31.8	3.8	24.3	39.2
<i>Sierra_rural</i>	65.3	3.7	58.0	72.5
<i>Selva_urban</i>	30.1	3.7	22.8	37.4
<i>Selva_rural</i>	55.2	3.8	47.7	62.7
<i>Lima_Metrop.</i>	17.4	2.6	12.2	22.5
1998				
<i>Costa_urban</i>	29.0	3.2	22.6	35.3
<i>Costa_rural</i>	42.1	6.6	29.2	55.0
<i>Sierra_urban</i>	32.9	3.8	25.5	40.2
<i>Sierra_rural</i>	64.7	3.6	57.7	71.7
<i>Selva_urban</i>	33.5	4.2	25.3	41.8
<i>Selva_rural</i>	57.0	4.8	47.6	66.3
<i>Lima_Metrop.</i>	19.5	2.7	14.2	24.9
1999				
<i>Costa_urban</i>	36.0	3.4	29.4	42.6
<i>Costa_rural</i>	50.8	5.1	40.8	60.9
<i>Sierra_urban</i>	35.0	3.8	27.6	42.4
<i>Sierra_rural</i>	67.1	3.6	60.0	74.2
<i>Selva_urban</i>	39.4	4.1	31.2	47.5
<i>Selva_rural</i>	52.4	4.8	43.1	61.7
<i>Lima_Metrop.</i>	26.4	3.1	20.4	32.4

Source: Our estimation from ENAHO 1997-IV, 1998-IV and 1999-IV.

Appendix n° 2 : Testing significance of poverty rates changes

<i>Mean</i>	<i>Estimate</i>	<i>Std. Err.</i>	<i>t</i>	<i>P>t</i>	<i>[95% Conf.Interval]</i>	
<i>National 97/98</i>	-1.45	1.22	-1.187	0.236	-3.84	0.95
<i>National 98/99</i>	-4.51	1.36	-3.326	0.001	-7.17	-1.85
<i>National 99/97</i>	-5.95	1.36	-4.391	0.000	-8.62	-3.29
<i>Urban 97/98</i>	-2.30	1.48	-1.556	0.120	-5.21	0.60
<i>Urban 98/99</i>	-5.90	1.64	-3.598	0.000	-9.11	-2.68
<i>Urban 99/97</i>	-8.20	1.65	-4.973	0.000	-11.43	-4.96
<i>Rural 97/98</i>	0.17	2.15	0.081	0.936	-4.07	4.42
<i>Rural 98/99</i>	-1.88	2.37	-0.792	0.430	-6.56	2.81
<i>Rural 99/97</i>	-1.70	2.34	-0.728	0.468	-6.33	2.92

Source: Our estimation from ENAHO 1997-IV, 1998-IV and 1999-IV.

Appendix n° 3 : Poverty transitions 1997-1998

Poverty status in 1997	Poverty status in 1998		
	Non poor	Poor	Total
<i>Non poor (63.8)</i>	81.1	18.9	100
<i>Poor (36.2)</i>	29.2	70.8	100
Total	62.3	37.7	100

Source: Our estimation from ENAHO 1997-IV and 1998-IV.

Appendix n° 3 : Poverty transitions 1997-1998 (Continued)

Poverty status in 1998	Poverty status in 1999		
	Non poor	Poor	Total
<i>Non poor (62.3)</i>	77.4	22.6	100
<i>Poor (37.7)</i>	25.4	74.6	100
<i>Total</i>	57.8	42.2	100

Source: Our estimation from ENAHO 1998-IV and 1999-IV.

Poverty status in 1997	Poor status in 1998				
	Extreme poor	Poor (non extreme)	Non poor	Total	Total
Extreme poor	61.5 [54.3-68.2]	23.4 [18.8-28.8]	15.0 [11.1-20.0]	100	16.5 [14.0-19.4]
Poor (non extreme)	20.3 [16.1-25.2]	41.2 [35.1-47.6]	38.5 [33.2-44.1]	100	20.8 [18.7-23.0]
Non poor	4.9 [3.8-6.4]	15.0 [12.7-17.6]	80.1 [77.2-82.7]	100	62.7 [59.4-65.9]
Total	17.5 [14.8-20.5]	21.9 [19.6-24.3]	60.6 [57.3-63.9]	100	100

Source: Our estimation from ENAHO 1997-IV and 1998-IV.

Poverty status in 1998	Poor status in 1999				
	Extreme poor	Poor (non extreme)	Non poor	Total	Total
Extreme poor	68.0 [62.7-72.9]	19.8 [15.9-24.4]	12.2 [8.9-16.4]	100	17.4 [14.8-20.4]
Poor (non extreme)	19.7 [15.6-24.4]	45.2 [39.5-51.0]	35.2 [29.9-40.8]	100	21.8 [19.5-24.2]
Non poor	4.8 [3.7-6.3]	17.0 [14.6-19.8]	78.1 [75.1-80.9]	100	60.8 [57.5-64.0]
Total	19.1 [16.6-21.8]	23.7 [21.3-26.2]	57.3 [54.0-60.5]	100	100

Source: Our estimation from ENAHO 1998-IV and 1999-IV.

Appendix n° 4: Exits from poverty according to the distance respect the poverty line

Not poor in 1998

Poor in 1997	+1-10%	+11-20%	+21-30%	+31-40%	+41-50%	+51% and more	Total	Total
- 1-10%	16.9	16.9	10.7	8.6	10.16	36.7	100	27.6
-11-20%	20.3	15.3	8.5	7.9	9.41	38.4	100	25.6
-21-30%	18.4	18.3	12.2	10.2	5.47	35.4	100	12.5
-31-40%	20.7	5.4	23.8	6.8	20.66	22.6	100	14.3
-41-50%	22.7	10.0	16.0	7.4	15.14	28.8	100	12.0
51% and less	20.4	29.8	13.1	2.9	7.13	26.8	100	8.1
Total	19.5	15.2	13.0	7.8	11.2	33.3	100	100.0

Not poor in 1999

Poor in 1998	+1-10%	+11-20%	+21-30%	+31-40%	+41-50%	+51% and more	Total	Total
- 1-10%	13.4	12.2	12.4	12.6	15.3	34.2	100	22.4
-11-20%	27.8	12.5	19.3	11.3	4.4	24.8	100	26.0
-21-30%	31.1	20.6	17.3	8.8	2.2	20.0	100	21.3
-31-40%	39.7	14.6	19.5	3.5	3.4	19.2	100	13.6
-41-50%	35.6	17.8	7.5	10.4	5.9	22.8	100	9.9
51% and less	51.0	10.6	30.5	0.7	2.7	4.5	100	6.8
Total	29.3	14.9	16.9	9.2	6.3	23.5	100	100.0

Appendix n° 5: Entries to poverty according to the distance respect the poverty line

Poor in 1998

Not Poor in 1997	-1-10%	-11-20%	-21-30%	-31-40%	-41-50%	51% and less	Total	Total
+1-10%	13.2	27.7	26.3	18.1	8.4	6.3	100	18.4
+11-20%	24.2	37.5	8.9	12.6	13.9	2.8	100	12.1
+21-30%	14.7	17.9	32.4	19.1	6.6	9.2	100	16.9
+31-40%	30.8	20.9	4.0	19.9	22.2	2.2	100	13.3
+41-50%	25.1	27.7	17.3	5.8	0.0	24.2	100	7.7
+51% and more	32.7	25.8	16.6	10.0	9.9	5.0	100	31.5
Total	24.2	25.7	18.5	14.3	10.4	6.8	100	100.0

Poor in 1999

Not Poor in 1998	-1-10%	-11-20%	-21-30%	-31-40%	-41-50%	51% and less	Total	Total
+1-10%	27.6	12.3	27.0	15.8	7.9	9.5	100	24.77
+11-20%	19.1	20.3	19.4	22.6	12.7	5.9	100	20.36
+21-30%	28.6	7.6	27.0	24.7	2.2	9.9	100	11.77
+31-40%	44.5	20.1	11.7	9.1	5.2	9.4	100	9.13
+41-50%	14.6	13.2	30.1	11.2	22.5	8.4	100	8.43
+51% and more	21.8	36.9	14.3	13.1	7.2	6.7	100	25.54
Total	25.0	20.4	21.1	16.5	9.0	8.0	100	100

Source: Elaborated by J. Herrera from ENAHO 1998 and 1999.

Note: A = level of individuals sample weighted by the 1999 expansion's factor.

Appendix n° 6: Gini coefficients with it confidence intervals

		<i>Estimate</i>	<i>Lower bound</i>	<i>Upper bound</i>
<i>National</i>				
	<i>1997</i>	0.482	0.448	0.515
	<i>1998</i>	0.475	0.446	0.504
	<i>1999</i>	0.467	0.436	0.499
<i>Urban</i>				
	<i>1997</i>	0.428	0.393	0.462
	<i>1998</i>	0.425	0.394	0.455
	<i>1999</i>	0.427	0.395	0.459
<i>Rural</i>				
	<i>1997</i>	0.358	0.332	0.384
	<i>1998</i>	0.363	0.339	0.388
	<i>1999</i>	0.341	0.299	0.382
<i>Costa</i>				
	<i>1997</i>	0.364	0.324	0.404
	<i>1998</i>	0.347	0.319	0.374
	<i>1999</i>	0.348	0.315	0.381
<i>Sierra</i>				
	<i>1997</i>	0.449	0.423	0.475
	<i>1998</i>	0.449	0.423	0.475
	<i>1998</i>	0.480	0.440	0.521
	<i>1999</i>	0.431	0.406	0.457
<i>Selva</i>				
	<i>1997</i>	0.402	0.379	0.425
	<i>1998</i>	0.420	0.385	0.456
	<i>1999</i>	0.359	0.332	0.386
<i>Lima Metrop.</i>				
	<i>1997</i>	0.433	0.374	0.473
	<i>1998</i>	0.417	0.371	0.463
	<i>1999</i>	0.434	0.397	0.471

Source: Our estimation from ENAHO 1997-IV, 1998-IV and 1999-IV.

Upper and lower bound confidence intervals were estimated by the bootstrap method using the STATA program provided by Dean Joliffe

Appendix n° 7: Poverty Transitions 1997-1998 & Characteristic in 1997 (%)

	Into in poverty	Out of poverty	Remain in poverty	Remain in non poverty	Total
<i>Area</i>					
Urban	57.4	53.2	36.9	82.4	64.7
Rural	42.6	46.8	63.1	17.6	35.3
<i>Natural Region</i>					
Costa	46.9	38.5	29.8	65.2	51.1
Sierra	37.5	46.4	55.2	23.5	35.7
Selva	15.6	15.1	15.0	11.3	13.2
<i>Town size</i>					
100000 & + Inhabitants	36.8	30.0	18.2	61.1	43.9
20000 to 10000 Inhabitants	10.4	9.4	6.5	10.9	9.6
2000 to 20000 Inhabitants	10.3	13.7	12.3	10.4	11.2
Semi rural (500 to 2000 h.)	5.1	6.3	6.2	4.7	5.3
Rural (less than 500 h)	37.5	40.5	56.9	12.9	30.0
<i>Households demographic characteristics</i>					
<i>Households size</i>					
Male head	5.8	6.3	6.9	5.1	5.8
Female head	5.8	5.1	5.6	4.5	5.0
Total	5.8	6.1	6.8	5.0	5.7
<i>Sex household head</i>					
Male	86.6	81.9	86.7	84.3	85.0
Female	13.4	18.1	13.3	15.7	15.0
<i>Household head age</i>					
Male	45.8	47.9	44.6	47.5	46.6
Female	52.3	47.4	48.5	51.4	50.3
Total	46.6	47.8	45.1	48.1	47.1
<i>Household head age group</i>					
Less than 26 years old	5.6	4.7	4.0	3.3	3.9
>25 y <36 years	20.1	16.4	21.0	17.1	18.4
>35 y <56 years	46.0	47.9	53.0	50.2	50.1
>55 years	28.4	31.0	22.0	29.4	27.6
<i>Household head civil status</i>					
In union	28.1	21.9	28.0	15.7	21.0
Married	52.0	57.2	56.9	62.8	59.4
Widow	8.4	10.6	8.1	9.7	9.3
Divorced	0.1	0.0	0.0	0.4	0.2

Appendix n° 7: Poverty Transitions 1997-1998 & Characteristic in 1997 (%) (Continued)

	Into in poverty	Out of poverty	Remain in poverty	Remain in non poverty	Total
Non in Union	6.3	7.5	5.2	5.3	5.6
Single	5.0	2.9	1.8	6.1	4.5
Household members by age groups					
Adults (>17 years old)					
Male head	3.0	3.3	2.8	3.2	3.1
Female head	3.1	2.7	2.4	2.8	2.7
Total	3.0	3.2	2.8	3.2	3.1
Number of children >5 to <18 years old					
Male head	1.9	2.1	2.8	1.3	1.9
Female head	1.8	1.8	2.3	1.3	1.6
Total	1.9	2.0	2.7	1.3	1.8
Number of children <5 years old					
Male head	0.9	1.0	1.3	0.5	0.8
Female head	0.9	0.5	0.9	0.4	0.6
Total	0.9	0.9	1.2	0.5	0.8
% Adults (>17 years)					
Male head	55.3	54.5	43.5	66.6	58.0
Female head	57.0	56.0	45.4	70.5	61.5
Total	55.5	54.7	43.7	67.2	58.5
% Children >5 to <18 years old					
Male head	29.8	30.9	38.2	23.3	28.7
Female head	29.6	33.4	39.2	21.6	27.9
Total	29.8	31.3	38.3	23.0	28.6
% Children <5 years old					
Male head	14.8	14.7	18.3	10.1	13.3%
Female head	13.4	10.5	15.3	7.9	10.5%
Total	14.7	13.9	17.9	9.8	12.9%
Number of income earners					
Male head	3.1	3.0	2.9	3.1	3.0
Female head	3.2	2.8	2.8	3.2	3.0
Total	3.1	3.0	2.9	3.1	3.0
% of income earners					
Male head	61.7	54.2	45.6	72.2	62.0
Female head	80.2	67.9	56.8	93.4	80.0
Total	63.9	56.7	47.1	75.4	64.7
Household head education level					
Without level	9.1	11.7	18.0	3.2	8.7

Primary	52.8	51.1	60.6	28.8	42.3
Secondary	33.1	31.7	19.3	39.4	32.6

Appendix n° 7: Poverty Transitions 1997-1998 & Characteristic in 1997 (%) (Continued)

Superior -non University.	2.6	1.5	0.8	8.3	5.0
Superior University	2.5	4.0	1.2	20.3	11.4
Household head activity condition					
Occupied	89.9	88.7	92.0	83.5	87.0
Open unemployment	2.1	3.1	1.3	2.5	2.2
Disguised unemployment	2.4	0.8	0.4	1.0	1.0
Out of labor force	5.6	6.6	6.0	12.3	9.3
Occupation Category					
Employer	13.8	10.1	8.1	13.8	11.9
Independent worker	48.7	57.2	67.1	38.4	49.5
White collar	8.0	7.8	2.1	27.0	15.7
Blue collar	26.0	22.8	21.2	18.0	20.4
Non remunerated family worker	2.8	1.2	1.1	2.5	2.0
Household worker	0.8	1.0	0.5	0.4	0.5
Secondary activity					
No	84.6	82.4	72.0	81.8	79.6
Yes	15.4	17.7	28.0	18.2	20.4
Employer of principal occupation					
Public Adm.	20.6	23.2	10.8	23.8	21.1
Public Enterprise	0.3	0.4	0.0	0.7	0.5
Army Force & National Policy.	3.7	0.0	0.0	3.4	2.5
Private Employer.	72.7	73.7	87.4	70.7	74.1
Specially service enterprise	2.7	2.6	1.8	1.5	1.8

Appendix n° 8: Variables in the regression

"Geographic" Characteristics 1997	
estrat01	Stratum
domini01	Domain
regnat	Natural Region
dominio2	Domain by geographic areas
depart	Departamentos
area	Urban Area (=1; 0 if rural)
Public Services Equipment	
distot	Distance to provincial capital in hours
kmvias	Km of public road 1997
asfaltp	Percentage of asphalt Km on total
salpub	# public health establishment 1997
salpriv	# private health establishment 1997
salud	# total health establishment 1997
salpubp	% public health establishment
escpub	# public education center
escpriv	# private education center
escuel97	# education center 1997
com97	# registered trade in 1997
merca97	# Common market in 1997
para97	# Street market in 1997
feria97	# village market in 1997
centrc97	Common market +street market + village market
Housing Characteristics 1997	
tothab97	total room
telefono97	Having telephone
propit97	Housing owner
tpviv97	Non precarious housing
pared97	Concrete wall
pis97	Tile, concrete materials floors
agua97	Housing having access to public net water
desag97	Housing with outlet
elect97	Housing with electricity
combu97	Cook with electricity or gas
Household characteristics 1997	
miemb97	total members 1997
adult197	>=18 in 1997
adult297	>=18 & <70 in 1997
enf197	=<5 years in 1997
enf297	>=6 and <= 17 years in 1997
lgpc97	log de gpcm97
lgpc97r	log de gpm97r2
adul297r	% de adults en 1997
enf197r	% de children under 5 years old
enf297r	% de children > 5 and under 17
pperc97	% of income receivers in 1997
totmie97	Total people 1997
mieper97	Number of members 1997
percep97	Number of income receivers 1997

Appendix n° 8: Variables in the regression (Continued)

Household equipment 1997	
eqlujo1	Luxury household equipment
eqtrab	Modest household equipment
Características del jefe del hogar 1997	
edadem	Household head age 1997
cledad97	Age groups 1997
sexoem	Household head sex 1997
estcivem	Conjugal status 1997, household head
ocupaem	PEA 1997 (INEI)
ocup2em	PEA 1997 (Work Ministry)
opcatg97	Main Occupation 1997
octrab97	Who worked for in main occupation 1997
ocpho97	Labored hours in main activity 1997
ocsec97	Had secondary employment 1997?
ocscat97	Secondary occupation 1997
ocsho97	Labored hours in secondary activity
neduc97	Household head level education
Household Social Capital 1997	
matri97	Spending in wedding, funeral and other ceremonies
proph97	Tips to household members with 14 years old under
transf97	Remittance, donation, gifts to family out of household
dona97	Donations to charitable institutions.
club97	Contribution at clubs and associations, etc.
Social expenditure Impact 1998	
benali98	Had to benefit food aid
benedu98	Had to benefit education aid
bensal98	Had to benefit health aid
Household head level education 1997	
educf97	Household members education 1997
edues97	Spouse level education 1997
edumx97	Household maximum level education 1997

Appendix n° 9: Poverty transitions 98-99 (weighted)

	<i>Out of poverty</i>	<i>Into in poverty</i>	<i>Remain in no poverty</i>	<i>Remain in poverty</i>	<i>Total</i>
<i>Funding for members of the household (less than 14 years old)</i>					
No Spending	68.0	51.1	63.7	57.9	60.7
Spending	32.1	49.0	36.3	42.1	39.4
<i>Remesas, donations or gifts for members of the family (out of the household)</i>					
No Spending	93.3	83.6	79.4	94.3	85.5
Spending	6.7	16.4	20.6	5.7	14.5
<i>Weddings & funerals</i>					
No Spending	94.2	84.7	81.5	93.8	86.6
Spending	5.8	15.3	18.5	6.2	13.4
<i>Cotisations for clubs & associations</i>					
No Spending	98.8	98.5	93.3	99.4	96.3
Spending	1.2	1.5	6.7	0.6	3.7
<i>Funding for other people</i>					
No Spending	96.1	91.2	86.5	98.2	91.4
Spending	3.9	8.9	13.5	1.8	8.6
<i>Donations for institutions: church, Caritas, etc.</i>					
No Spending	89.8	81.9	76.6	88.3	81.9
Spending	10.2	18.1	23.4	11.8	18.1
Total	9.5	14.1	48.1	28.3	100.0

Source: Our estimation from ENAHO 1997-IV, 1998-IV and 1999-IV.

Note: The table shows the sample of 3100 households weighted by a corrected individuals expansion.

How to read: 49% of the individuals who were in a situation of poverty in 1999 provided funding for members of the household whereas only 39.4 households did the same spending in 1998.

Appendix n° 10: Multinomial regression

Number of obs = 3071
Wald chi2(93)= 852.09
Prob > chi2 = 0.0000
Log likelihood = -2778.995
Pseudo R2 = 0.2329

tran9899	Always poor			Enters poverty			Escaping poverty		
	RRR	z	P>z	RRR	z	P>z	RRR	z	P>z
Urban area (rural area=0)	2,421	5,167	0,000	2,192	4,236	0,000	1,889	3,125	0 , 002
# of public schools	1,000	0,367	0,713	1,001	1,196	0,232	1,003	3,120	0 , 002
# of rooms	0,789	-4,770	0,000	0,913	-1,911	0,056	0,815	-3,805	0 , 000
Telephone (no telephone==0)	0,305	-3,288	0,001	0,444	-3,086	0,002	0,421	-2,752	0 , 006
Sewage within dwelling	0,600	-3,237	0,001	0,532	-3,787	0,000	0,478	-3,821	0 , 000
With electricity (without electricity=0)	0,491	-4,341	0,000	0,502	-3,791	0,000	0,628	-2,375	0 , 018
# of household members in 1997	1,868	11,382	0,000	1,415	5,902	0,000	1,424	5,711	0 , 000
Number of income earners in 1997	0,748	-3,413	0,001	0,902	-1,167	0,243	0,875	-1,330	0 , 183
% adults in 1997	0,576	-1,275	0,202	0,846	-0,342	0,733	1,461	0,826	0 , 409
% child less/= 5 years old in 97	4,320	2,060	0,039	2,155	1,025	0,306	5,665	2,238	0 , 025
% child 6 to 17 years old in 97	1,481	0,681	0,496	1,150	0,223	0,823	4,978	2,589	0 , 010
equipamieto hogar acomodado	0,311	-6,114	0,000	0,744	-1,789	0,074	0,692	-1,972	0 , 049
equipamiento hogar modesto	0,807	-1,620	0,105	0,964	-0,259	0,796	0,835	-1,197	0 , 231
Age of household head in 1997	1,004	0,652	0,514	1,003	0,384	0,701	1,018	2,495	0 , 013
Household head male in 1997 (female=0)	1,216	0,754	0,451	0,911	-0,321	0,748	1,541	1,508	0 , 131

Appendix n° 10: Multinomial regression (Continued)

tran9899	Always poor			Enters poverty			Escaping poverty		
	RRR	z	P>z	RRR	z	P>z	RRR	z	P>z
Marital status of household head in 1997 (not single97=0)	1,141	0,572	0,567	0,922	-0,306	0,760	0,985	-0,059	0 , 953
No formal education head 97	4,318	3,576	0,000	3,523	3,035	0,002	5,770	3,709	0 , 000
Primary head 97	1,358	0,867	0,386	1,562	1,306	0,191	2,874	2,618	0 , 009
Secondary head 97	0,865	-0,418	0,676	1,320	0,882	0,378	2,195	2,071	0 , 038
No formal education household 97	8,912	4,497	0,000	3,124	2,033	0,042	2,981	1,979	0 , 048
Primary household 97	7,418	6,323	0,000	3,266	3,679	0,000	2,508	2,772	0 , 006
Secondary household 97	3,867	4,739	0,000	2,492	3,439	0,001	1,960	2,410	0 , 016
Sup.no univ. household 97	2,424	2,813	0,005	1,895	2,281	0,023	1,711	1,661	0 , 097
Inactif 97	1,126	0,346	0,729	1,051	0,151	0,880	1,028	0,084	0 , 933
Independent 97	1,253	1,022	0,307	1,178	0,743	0,457	0,872	-0,608	0 , 543
Private sector 97	1,557	1,895	0,058	1,302	1,128	0,259	0,719	-1,297	0 , 195
Weak ties 1997	0,723	-2,099	0,036	0,892	-0,744	0,457	0,774	-1,445	0 , 148
Strong ties 1997	1,079	0,604	0,546	1,067	0,471	0,638	0,732	-2,036	0 , 042
Beneficiary of some social program	1,226	1,401	0,161	1,206	1,183	0,237	1,057	0,326	0 , 745
Household size change	1,641	9,053	0,000	1,330	5,035	0,000	1,637	8,212	0 , 000
Changes # income earners 97-98	0,740	-4,313	0,000	0,887	-1,691	0,091	0,758	-3,381	0 , 001

Appendix n° 11: Hausman tests of IIA assumption

Ho: Odds (Outcome-J vs. Outcome-K) are independent of other alternatives.

Reference: never poor

Omitted	chi2	df	P>chi2	Evidence
<i>Always poor</i>	8.508	63	1.000	for Ho
<i>Fall into poverty</i>	14.147	63	1.000	for Ho
<i>Exit poverty</i>	-7.700	64	---	for Ho

Note: If chi2<0, the estimated model does not Meet asymptotic assumptions of the test.

Appendix n° 12: Small-Hsiao tests of IIA assumption

Reference: never poor

Ho: Odds (Outcome-J vs. Outcome-K) are independent of other alternatives.

Omitted	lnL(full)	lnL(omit)	chi2	df	P>chi2	Evidence
<i>Always poor</i>	-791.127	-763.615	55.023	32	0.007	against Ho
<i>Fall into poverty</i>	-833.035	-803.076	59.917	32	0.002	against Ho
<i>Exit poverty</i>	-936.352	-907.303	58.099	32	0.003	against Ho

Appendix n° 13

