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POVERTY TRANSITIONS: EVIDENCE FOR INCOME AND MULTIDIMENSIONAL INDICATORS

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Poverty Transitions: Evidence for Income and Multidimensional Indicators

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Abstract

This paper presents empirical results of transitions of poverty measures for Chile, using the 1996 – 2001 – 2006 National Socioeconomic Panel Survey data. We compare the differences between poverty dynamics using the income method and the multidimensional approach. Also, we identify determinants associated with changes in the state of poverty. Over this period, Chile experienced significant reductions in both income and multidimensional poverty. We found that the percentage of people moving out of poverty using the income measure is higher than the percentage of people out of poverty when measured multi-dimensionally. The paper suggests that there are differences *between* the measures of multidimensional poverty and multidimensional poverty transitions variy considerably according to this. Transition matrices show that the percentage of people moving out of poverty using the income measure is higher than the percentage of people out of poverty when measured multi-dimensionally. The importance of education as a determinant of exiting poverty is clear in all measures, while the number of persons working at home is important only when considering the income measure only.

Keywords: Poverty measurement, multidimensional poverty, poverty dynamics, deprivations, transition matrix.

JEL Classification: D31, I32

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1. Introduction

Understanding the dynamics of poverty is essential for the creation of public policies oriented to this segment of the population. This is especially true when studying the factors determining movement between socioeconomic levels, because these are the determining factors on which we must build programs and policies in a way to better target resources. This paper seeks to provide evidence about transitions and factors influencing exiting or entering poverty in order to contribute to the development of social programs aimed at overcoming poverty in Chile.

Moreover, studying transitions and determinants of poverty also arises from the importance of undertstanding the part of the population that is not living in poverty but is nevertheless in a vulnerable position. Poverty reduction does not necessarily implies a reduced vulnerability of falling into poverty. Households that are subject to variability in their incomes, or that suffer from a negative external shock, may at one point be above the poverty line but quickly fall beneath the poverty line. Evidence about poverty transitions is relevant because in addition to poverty reduction measures, it is important to introduce long-term policies aimed at reducing vulnerability. The concept of vulnerability allows accounting for a dynamic notion of poverty as a present or potential condition while at the same time providing a better characterization of chronic poverty

Public policies aimed at overcoming or reducing poverty should differentiate between these two types of poverty. In the case of chronic poverty, measures should be directed towards increasing the capital of households, while in the case of transitory poverty, programs should be targeted towards promoting strong social networks, providing social security.

In Chile, poverty has traditionally been measured using the Income Method, also known as the Basic Needs Cost Method. According to this method, a person is considered poor if his or her income is below a minimum level that satisfies basic needs. This approach measures poverty in absolute terms and has been used in Chile since 1987. Due to this, indicators have been kept comparable over time.

According to the income measures, Chile has experienced a significant reduction in poverty. According to the *Encuesta Nacional Caracterización Socioeconómica* (CASEN), in 1990 the proportion of poor people was 38.6% and decreased to 13.7% in 2006 (latest data available to date). This can mainly be attributed to economic growth in the country during this period (Contreras, D. et al. 2007), and public policy efforts to create a better quality of life through a broad network of social protection and greater opportunities in social and economic fields.

Among the assumptions made when measuring poverty through income is that people make decisions based on their preferences and needs, and that income is the primary way for people to fill those needs. However, it has become extremely relevant to measure poverty through methods incorporating other dimensions that complement income. These are multidimensional poverty measures. This new approaches stems from the assumptions that the measures based exclusively on income as an approximation of market consumption capacity does not directly capture access to goods that cannot be purchased with personal income and that are mainly provided by the state (Larrañaga 2007).

Another reason justifying the use of multidimensional poverty measures is that the income indicator is an incomplete characterization of household welfare, but many public programs and social policies are designed using this information. Finally, the information used to construct income poverty indicators are derived from household surveys, and segments of the population tend to under-report their income. While

there are attempts to correct this through adjustments and imputation methods, there is evidence that self-reported income is flawed as a measure to calculate poverty rates.

Thus, from a perspective of looking at poverty as a multidimensional phenomenon, the measurement of poverty should consider non-monetary aspects to account for these flaws and to complement the self-reported approach.

However, a multidimensional approach also entails certain complexities. The research on the subject is relatively recent and there is no consensus on some definitions and measures. This paper aims to identify differences in the analysis of the dynamics of poverty in Chile using two measures of multidimensional poverty and to identify determinants associated with changes in the state of poverty in Chile.

Therefore, the main objective of the study is to compare the differences between dynamics of poverty using the income method versus the multidimensional approach, over the years 1996 - 2001 - 2006. The specific objectives are to measure income poverty and multidimensional poverty, generate transition matrices, and estimate determinates of poverty and entrance and exit for the years 1996, 2001 and 2006. This study will add important information regarding poverty transitions with both measures and will contribute to the analysis of the dynamics of poverty in Chile.

To achieve these objectives, we develop a calculation of income poverty and multidimensional poverty. From this calculation, transition matrices are generated to observe the dynamics of poverty measured by income and by multidimensional measures. We then estimate discrete choice models to determine the probability of moving into and out of the state of poverty. Finally, the results of both methods of poverty measurement are compared.

The paper is structured as follows: in the second section, we will analyze the existing evidence on poverty using multidimensional factors. In the third and fourth section we describe the study methodology and data used. The fifth section contains the main results and the final chapter presents the main conclusions.

2. Theoretical Framework

This section will address two topics: first, a brief review of vulnerability as a social phenomenon. Then we describe different methodologies for estimating multidimensional poverty, identifying some criteria for choosing dimensions and some important factors when considering indicators.

2.1 Social Vulnerability

There is a very broad conceptualization of social vulnerability, which reviews specific aspects of their definition, both theoretical and operational. In the case of this paper, we are only interested in a conceptual definition as a contribution to the understanding of vulnerability as a broader concept of poverty.

The concept of social vulnerability arises from a need to expand the concept of poverty. Poverty as a social issue has become more complex in terms of its dimensions and definitionand requires the inclusion of elements of risk and safety. Thus arises the concept of vulnerability, which is dynamic and is broader than the concept of poverty.

The concept of social vulnerability can be understood as "a multidimensional process that converges into the risk or probability of the individual, household or community to be hurt injured or harmed to changes or permanence to external or internal situations. The social vulnerability of individuals and groups is expressed in several ways, either as fragility and helplessness to changes caused in the environment, as the institutional neglect from the state, which does not contribute to strengthening or systematic care of its citizens, as for internal weakness to address the changes of the individual or household to take advantage of opportunities presented to them, as permanent insecurity that paralyzes, disabled and discourages the possibility and act on future strategies for better standards of living" (Busso, 2001).

On the other hand, the concept of vulnerability of households, recognizes that "a household is considered vulnerable to future loss of welfare when the level is below the threshold set by any standard (or standards) socially accepted to have been caused by risk. The degree of vulnerability depends on the characteristics of risk and the ability of households to face it. This ability depends on the particular characteristics of the household and, above all, of its assets. The end result expected is defined in relation to a specific indicator of welfare-level minimally socially acceptable for example a poverty line" (Heitzmann, K., Canagarajah, R. Siegel, P. 2002).

From the above, we can conclude that the phenomenon of social vulnerability draws heavily on the combination of internal factors –the ability to respond to changes- and environmental or external factors -determinants that cause insecurity. Consequently, alternatives to reduce vulnerability will depend on the relationship between existing assets and opportunities that the State, market and society offer the individual or household.

In Chile, the Ministry of Planning (MIDEPLAN) has used the Ficha CAS as a tool to assign different social benefits to the neediest families. However, this instrument does not account for the social reality of poverty or social risks to vulnerable groups. For this, the previous administration created a new instrument, the Social Protection Sheet (FPS). This allows to capture the changes experienced by poors, identifying the different dimensions that shaped poverty, detecting those living in vulnerable conditions and collectinginformation needed for the application on social programs.

To MIDEPLAN, vulnerability is understood as the risk of being below thepoverty line and includes both households who are currently in that state and those who may be in the future. It is a dynamic and comprehensive concept, designed to identify not only poor households but those who are not considered poor but are vulnerable to falling into poverty. It also takes into special account those family members who are at the highest risk, such as children, the elderly, persons with disabilities, teenage mothers, and female heads of household.

People in poverty are more vulnerable risks, as they have fewer resources to deal with their situation. In this sense, MIDEPLAN proposes that the essence of the approach to vulnerability lies in the ability to look at risk management as a safety net for individuals and households, enabling the elimination of poverty (by reducing vulnerability). In other words, risk management provides a way out of poverty or prevents the movement of other individuals or families into poverty.

According to what was said earlier in this study we define a home to be vulnerable when their level is or was under the poverty line (poverty line considering income poverty or multidimensional poverty). That is, the social vulnerability is defined as "the risk that has a home to fall into poverty." We use this definition in order to simplify the analysis and contribute to the study of the dynamics of poverty.

2.2 Multidimensional Poverty

There are two steps in measuring poverty (Sen, 1976): identification and aggregation. In the case of poverty measured conventionally (considering income as the sole indicator of poverty), identification of people in poverty corresponds to defining a poverty line (z). This poverty line presents the income needed to purchase a basic basket of goods and services. Thus poor people are those who have a per capita income less than the poverty line. The poverty level is measured as follows:

$$g_i = \frac{(z - x_i)}{z} \quad for\ x_i < z$$
$$g_i = 0 \quad for\ x_i \geq z$$

In the stage of aggregation, using the function proposed by Foster, Greer and Thorbecke (1984), the FGT measure is defined as follows:

$$FGT_{\alpha} = \frac{1}{n}\sum_{i=1}^{n} g_i^{\alpha}$$

where α is a measure of aversion to poverty. When α is zero ($\alpha = 0$), FGT corresponds to the incidence of poverty (Headcount Measure), where all people living in poverty are counted equally. When α equals 1 ($\alpha = 1$), FGT represents the poverty gap, where the level of poverty for each individual will depend on how far that person is from the poverty line. When α is equal to 2 ($\alpha = 2$), it is the squared poverty gap, where individuals receive higher weight the larger their poverty gaps are. Therefore, when α is greater than 0 ($\alpha > 0$) the measure is sensitive to the degree of poverty, whereas when α is greater than one ($\alpha > 1$) the measure is sensitive to the distribution of the poor (Alkire and Foster 2008).

When poverty is measured considering other dimensions besides income, it also must meet these two stages (Battiston, D. et al. 2009). In this case, identifying the poor starts with defining the dimensions to be considered (j) and the indicators to be used in each of these dimensions. Finally, we must define the threshold for each

dimension indicating the cut-off where an individual would be deprived of that dimension. This builds a vector of the poverty line in which each vector element corresponds to the chosen thresholds for each dimension z = (z1, z2, z3 ..., zd).

The next step is to define how many dimensions (k) an individual must lack to be considered multi-dimensionally poor. There are different approaches to answering this question. The Union Approach, which presents all dimensions included in the measurement (d) where the deprivation of one dimension is sufficient that the person is considered to be poor multi-dimensionally, i.e k=1. The second approach is the Intersection Approach, which defines poor multi-dimensionally a person who is deprived in all dimensions k=d. The third alternative is to consider individuals to be poor at an intermediate level of dimensions between the minimum and maximum level.

Therefore, if c_i is the number of poverty dimensions for the individual i, he will be considered multi-dimensionally poor if c_i = k:

$$g_{ij} = \frac{(z_j - x_{ij})}{z_j} \quad for\ x_{ij} < z_j \ \ y \ \ c_i \geq k$$
$$g_{ij} = 0 \quad otherwise$$

For aggregation stage, Alkire and Foster (2008) use the following indicators:

• Headcount Ratio: incidence or the proportion of poor people. This is analogous to the headcount ratio used for the income poverty measure. It has the advantage of being easy to calculate and interpret, but the disadvantage of not satisfying the multidimensional monotonicity property, i.e. when increasing the range of deprivation experienced by a poor person is not reflected in the level of aggregate poverty.

$$H(X;z) = \frac{1}{n}\sum_{i=1}^{n}\left[\sum_{j=1}^{d} g_{ij}(k)\right] = \frac{q}{n}$$

• Adjusted Headcount Ratio: measures the total number of deprivation dimensions experienced by the poor in relation to the total number of dimensions that can be deprived. It is a measure that combines information of the incidence of poverty with the average deprivation of the poor. This indicator is sensitive to the frequency and extent of multidimensional poverty (Alkire and Foster 2008) and satisfies the monotonicity property, i.e. if the number of dimensions that are deprived increases, the poverty rate also increases.

• Adjusted Poverty Gap: the poverty gap measures the depth of poverty, i.e. how far below the threshold of poverty is the average impoverished person. This indicator is calculated based on the product of the Adjusted Headcount Ratio and the average poverty gap. The index also satisfies the monotonicity property and considers the severity of poverty.

• Adjusted P_2 Measure: is calculated based on the product of the Adjusted Ratio Headcount and the average severity index. It is the sum of the squared poverty gap divided by the maximum value that the squared gap can take. This measures the severity of poverty and is sensitive to the inequality of distribution of deprivation among the poor. The indicator allows nonlinearities for the calculation of the poverty gap.

The following formula describes the measures mentioned above, when $\alpha = 0$ corresponds to the Headcount Adjusted Ratio. When $\alpha = 1$, the Adjusted Poverty Gap and when $\alpha = 2$, is the Adjusted P_2 Measure.

$$M_{\alpha}(X;z) = \frac{1}{nd}\sum_{i=1}^{n}\left[\sum_{j=1}^{d} w_j\left(g_{ij}(k)\right)\right]^{\alpha} \quad with \ \alpha \geq 0$$

2.3 Dimensions, Indicators and Thresholds

For the calculation of the multidimensional poverty measure, the selection of the dimensions indicators and thresholds for each indicator is complex, and incorporates methodological decisions and political considerations.

There is a wide discussion of which dimensions should be considered in measuring multidimensional poverty, what are indicators to be considered on a selected dimension, how to measure each dimension, and finally how the threshold criterion for poverty is chosen.

Alkire (2008) suggests that there are different options for selecting the dimensions: 1) use existing data2) make assumptions based on theoretical foundations 3) create a list according to consensus 4) use a process of participatory public deliberationand 5) choose dimensions according to empirical studies of values or behavior of individuals.

When considering the selection of indicators, the author suggests the need to have an index for each dimensionby combining existing indicators.Furthermore, he suggests that the indicators of each dimension should not be highly correlated. Finally, he recommends that sensitivity should be exercised, using more than a poverty line to analyze the robustness of the data.

Additionally, following Larrañaga (2007), the choice of other dimensions besides income must satisfy two conditions: 1) be a basic determinant of welfare, so that being deprived in that dimension is a threat to the quality of life, and 2) income alone would not fix these deprivations. This would avoid duplication of the variables considered. In relation to the indicators for each dimension, Larrañaga suggests that the important decision is to choose between resources and outcomes as they relate directly to welfare. Additionally, these indicators must meet requirements for identification, aggregation and comparison.

In summary, there are several recommendations of dimensions, indicators and thresholds. There are certain conditions or properties that are more desirable, but there is no consensus on which dimensions define poverty and therefore there are no standard indicators or thresholds.

3. Methodology

For the analysis of the dynamics of multidimensional poverty we must measure poverty using the income definition as well as by considering other dimensions. Once the poverty rate considering both measures was estimated, we analyzed the dynamics of poverty by observing the movements into and out of poverty using a transition matrix.

We also consider the determinants of change between poverty states between 1996 and 2001 and again between 2001 and 2006. In other words, the determinants of transition from a state of poverty to one not of poverty. For the latter, we used two types of estimations: Probit and Multinomial Probit. We follow the proceeding steps.

3.1 Income Poverty and Multidimensional Poverty Measures

As noted above, there are various measures of aggregation that can be used. The method used for this study was the Headcount Ratio. It was chosen because it estimated poverty directly. The main advantage of this measure is that it provides easily interpretable and disaggregated information, facilitating the analysis of poverty transitions.

The model is as follows: there is a matrix of $n \times d$, where x_{ij} element corresponds to the result of the individual i in dimension j, where i = 1, ..., n and j = 1, ..., d.

To carry out identification of poor households it is necessary to define thresholds for each dimension that separates deprivation from non-deprivation. The set of thresholds for each dimension considered is summarized in a vector *z = (z1, z2, z3…, zd)*. Thus, if the individual is under the threshold on a dimension, he is defined as deprived in that dimension.

It is then necessary to define the number of dimensions *k* in which an individual must be deprived to be considered multi-dimensionally poor. we consider two approaches: the Union Approach *(k=1)* and an intermediate measure, where an individual is considered poor multi-dimensionally if a person is deprived in two dimensions *(k=2)*. Two approaches were used to compare the results and verify whether there were differences. Therefore, if c_i is the number of private dimensions for the individual *i*, he will be considered poor if multi-dimensionally $c_i = k$.

Once identified as multidimensionally poor households we proceed to the aggregation stage:

$$H(X;z) = \frac{1}{n}\sum_{i=1}^{n}\left[\sum_{j=1}^{d} g_{ij}(k)\right] = \frac{q}{n}$$

Where g_{ij} is the poverty gap of the individual *i* in the dimension *j* $g_{ij} = \frac{z_j - x_{ij}}{z_j}$ $for\ x_{ij} < z_j\ y\ c_i \geq k$ or $g_{ij} = 0$ $otherwise$. This is the same as the number of individuals private in *k* or more dimensions (*q*) over the total population (*n*).

3.1.2 Dimensions, Indicators and Thresholds

Based on the literature and available data, the dimensions considered in this study are: income, education, health, housing and overcrowding. The dimensions, indicators and thresholds used are described below.

Income

For the income dimension, the threshold is the yearly official poverty line provided by the *Ministerio de Planificación* (MIDEPLAN). This is represented by per-capita income. Therefore, if the individual is below the poverty line then the person is counted as deprivate in the income dimension.

The income dimension will be one of the five dimensions included in the multidimensional measure but it is also the indicator for the income poverty measure. Note that when in the next section we show the results of the income poverty measure it is simply the official poverty line provided by MIDEPLAN.

Education

In the case of the educational dimension, the indicator was the proportion of people in the household over 14 years old with eight years of schooling, i.e. those who have completed primary education. In this case the threshold was 50%, thus if less than 50% of people over 14 years old in the household have completed primary education, the household is considered deprived in the education dimension.

This indicator was used because years of schooling are a good proxy of educational access and educational outcomes. The measure used was 8 years of schooling because it is the required level of schooling in 1996.

Health

For the health dimension, the indicator is the percentage of people in the household who declare that they do not have health insurance or belong to Group A (Indigent) of the National Health Fund (FONASA). The threshold selected is 50% of household members lacking health insurance or belonging to Group A.[2]

Housing

The measure of poverty in housing is an index created by the *Ministerio Vivienda y Urbanismo* (MINVU) from three indicators. Those indicators are:

1) Housing Material Index: the predominant materials used in exterior walls, roofs and floors of houses, which are classified as acceptable, recoverable or unrecoverable, according to the following categories:

[2] In Chile all individuals have health insurance, we are using as threshold the group that cannot choose were to go when hacing a health problem and most of the time use public health providers of low quality.

Clasification	Exterior Walls	Roof	Floor
Acceptable	Steel or reinforced concrete, masonry brick, concrete or stone partition lined both sides (wood or other).	Tejas; concrete slab with inner sky, zinc or slaty-sky interior: zinc, slaty, tile, tiled or wood interior with no sky.	Radier coated (parquet or ceramic table, linoleum, FLEXIT, tile, carpet, etc.), wooden table or on bearers or joists.
Recoverable	Adobe, unlined interior partition (wood or other) Barro, thatch, drywall or other traditional craft.	Phonolite; straw coiron, reeds or cane.	Radier uncoated, wood, plastic or pies directly on land.
Unrecoverable	Waste material and / or recycling (cardboard, cans, sacks, plastic) and other materials.	Waste material and / or recycling (plastics, cans, etc).	Dirt floor.

Housing can be analyzed by:

- Acceptable material: households whose houses have walls, ceilings and floors that are classified as acceptable.
- Recoverable material: Households whose homes have walls, floor or ceiling of acceptable or recoverable material or households whose homes have more than one indicator recovered but none unrecovered.
- Unrecoverable material: households whose houses have at least one unrecoverable material.

2) Sanitation: consists in availability of water within housing and the mechanism of wastewater disposal. For this, the following categories are considered:

Clasification	Water Availability	Excreta Disposal
Acceptable Sanitation	With faucet un the house	Toilet conected to sewer Toilet conected to septic tank
Sanititation Deficit	With tap water in the site but outside the home. Do not have the system, leads	Sanitary latrine is connected to the black well Box on black hole Drawer on ditches or canals Drawer connected to another system No toilet (WC)

3) Type of housing: classified into two types, acceptable housing: houses, townhouses, apartments and rooms in old houses or tenements and unrecoverable housing: consists of shacks, improvements, huts or similar buildings.

The *overall quality of housing index* consists of these three conditions, materials, sanitation and housing type, and sorts them into three categories, "Acceptable", "Recoverable" and "Unrecoverable," according to the following criteria:

Quality of Housing Index			
Categories	**Type of Dwelling**	**Sanitation Index**	**Materiality Index**
Acceptable Housing	Acceptable	Acceptable	Acceptable Recoverable (only if the wall is recoverable, other acceptable)
Recoverable Housing		Acceptable or deficit	Acceptable Recoverable
Unrecoverable Housing	Unrecoverable	Acceptable	Accepable Recoverable Unrecoverable
		Deficit	Accepable Recoverable Unrecoverable

The threshold chosen for this dimension was the level of "unrecoverable housing", i.e. if the household lives in a home classified as unrecoverable, then the home is considered deficient in this dimension. If the housing is acceptable or able to be made so, it is not considered deficient.

Overcrowding

Finally, overcrowding was defined by *Ministerio Vivienda y Urbanismo* (MINVU) as the space available per resident and consists of:

- No overcrowding defined as those households with 2.4 or fewer people per bedroom.
- Mediumvercrowding defined as those households with more than 2.5 but less than 5 people per bedroom.
- Critical overcrowding defined as those households with five or more people per bedroom.

Both medium and critical overcrowding are considered to be deficient in this category

Considering these five dimensions, income, education, health, housing and overcrowding, each with their own indicators and thresholds for poverty, we use the Headcount Ratio method to determine multidimensional poverty.

3.2 Vulnerability: Transition Matrix

Once we estimated the rates of income poverty and multidimensional poverty, we analyzed the dynamics of poverty and the vulnerability by observing the trajectory of households over time.

A household is classified as poor or not poor by income and poor or not poor multi-dimensionally. This was done for each respective year: 1996, 2001, and 2006. With this information and through transition matrices, we observed changes in the different states of households over time. Then we have four possible states, those households who were poor in the two periods, those who came out of poverty, those who entered poverty and finally those households which remained always non-poor. Making this analysis we can identify those households that are in a chronic state of poverty and those that are transient and vulnerable to falling into poverty.

Chronic poverty is a result of low household productive capital, while in the transient poverty is associated with negative shocks that the household is unable to absorb(Contreras, D. et al.). It is this second group that is called "vulnerable" because they do not necessarily fall under the poverty line in every moment of time, but rather are households that are more likely to fall into this situation, since it was previously below the poverty line

3.3 Probit and Multinomial Probit Estimations

We estimated discrete choice models for the determinants of the probability of entering and exiting poverty for both income poverty and multidimensional poverty. In the latter case, we considered two measures: multidimensional poverty using the Union Approach *(k=1)* and intermediate approach of multidimensional poverty using two dimensions *(k=2)*.

At first we estimated Probit models for the determinants of the probability of entering poverty and the probability of escaping poverty. The dependent variables are as follows:

$$Yentered_{t1,t2}\begin{cases} 1\ if\ household\ is\ Non\ Poor\ in\ t_1\ and\ Poor\ in\ t_2\ (NP-P) \\ 0\ if\ household\ is\ Non\ Poor\ in\ t_1\ and\ Non\ Poor\ in\ t_2\ (NP \quad NP) \end{cases}$$

$$Yexited_{t1,t2}\begin{cases} 1\ if\ household\ is\ Poor\ in\ t_1\ and\ Non\ Poor\ in\ t_2\ (P-NP) \\ 0\ if\ household\ is\ Poor\ in\ t_1\ and\ Poor\ in\ t_2\ (P-P) \end{cases}$$

This was done for changes in the state of poverty between 1996 and 2001 and for changes in state of poverty between 2001 and 2006. In a second stage we estimated multinomial Probit model, considering four possible categories. Here we estimate the determinants of being in each of these alternatives.

$$Y_{ti,t1}\begin{cases} Non\ Poor\ in\ t_1 and\ Non\ Poor\ in\ t_2\ (NP-NP) \\ Non\ Poor\ in\ t_1 and\ Poor\ in\ t_2\ (NP-P) \\ Poor\ in\ t_1 and\ Non\ Poor\ in\ t_2\ (P-NP) \\ Non\ Poor\ in\ t_1 and\ Non\ Poor\ in\ t_2\ (NP-NP) \end{cases}$$

3.3.1 Variables

The explanatory variables used for both estimates, Probit and Multinomial Probit, are divided into categories geographic, demographic, human capital, labor, health, and physical capital.

The geographic variables are Capital Region and Urban – Rural Area.

The demographic variables are Household Head Age (HH_Age), Household Head Sex (HH_Sex), number of people over 65 years at home (Age>65), and Household Head Couple (HH_Partner), which takes the value of 1 if the household head has a spouse and 0 if the household head has no partner.

The educational variables are education level of the household head or spouse (Parents_Education) and Maximum Education at Home (Max_Education) which is the level of education achieved by the most educated person in the household.

The labor variables are Occupation of Head of Household (HH_Working) with value 1 for employed and value 0 for unemployed or retired. It also includes a Dependency Ratio (Dependency_ratio), which is calculated by dividing the number of people working by the total number of people in the household.
The health variables considered are: Disability, in which the variable takes value 1 if someone in the household has a disability and takes value 0 otherwise and Health Shock which considers any household major illness during the period.

Finally, we use home ownership as a proxy for physical capital assets of the person.

4. Data

The database used in this investigation is from the CASEN Panel Survey for 1996, 2001 and 2006.

From the 1996 CASEN survey the *Ministerio Planificación* (MIDEPLAN) took a representative sub sample of households living in regions III, VII, VIII as well as the Metropolitan Region, which was surveyed in 2001 and then 2006. This sub-sample consisted of 5209 households. The survey over-represents the poorest households in the four regions.

Table 4.1 shows the number of households and people surveyed in each wave of the Casen Panel Survey.

Table 4.1: Panel Casen 1996 – 2001 – 2006

	Households	Individuals
1996	5209	20942
2001	4648	18587
2006	3769	14568
1996 - 2001	3795	15038
2001 - 2006	3126	12100
1996 - 2001 - 2006	2648	10287

In the first wave, 5,209 households were interviewed totaling 20,942 people. By 2001 there were only 4,648 households totaling18,587 people. Finally in 2006 the number of households was reduced to 3,769 totaling 14,568 people.

Because it is a panel survey, it is necessary to determine the level of attrition sample over time. Attrition can present several problems for analysis of the data, principally if the characteristics of the households that are lost, i.e. non-respondents, differ systematically from the characteristics of those that are not. This means that attrition is selective and any estimates made from this data may be biased.

The rate of attrition for the sample is 28% after five years and 50% after 10 years. This is comparable to similar surveys. According to a study on the nature of this sample's attrition (Bendezú, 2007) it consistently lost people between 20 and 29 years, people who rented their homes, and persons of higher income deciles. Although this may lead to bias in the estimates, longitudinal survey weights compensate for this attrition.

This multi-topic survey includes several useful topics for identifying poverty, both income and multidimensional, and determinants that could contribute to transitions between states of poverty or remaining in states (poor, non-poor). The main topics covered by the survey are household composition, education, employment and income.

For measuring poverty including other dimensions besides income, it would be ideal to have a survey that has information about many other topics (that are not included in Panel Casen), so that we could choose appropriate indicators for the dimensions. Ideally, we would need information about other dimensions such as, among others, security andhappiness,. At the moment, there is no such survey in Chile.

5. Results

5.1 Deprivation by Dimensions

Table 5.1 shows the percentage of households that are under the threshold for each of the five dimensions: income, education, health, housing and overcrowding. An important observation is that for the income dimension defined by the poverty line, the percentage of people below the threshold decreases over time. The reduction is almost the same for the period between 1996 to 2001 as the one for 2001 to 2006.

For the dimension of education, in which the threshold is that 50% of household members over 14 years of age have at least 8 years of education, the percentage increased slightly between 1996 and 2001 and decreased slightly between 2001 and 2006. The health dimension has similar movement; the percentage held between 1996 and 2001 and then there was a small decrease of about 1.4 percentage points between 2001 and 2006. In the housing dimension, there is a decrease in the percentage of households below the threshold during 1996 and 2001, but then stops declining. The overcrowding dimension shows a clear decline over the period. The reduction in the initial period is over 8 percentage points and then 5 percentage points between 2001 and 2006.

Table 5.1: Deprivation by Dimensions (%)

Dimensions	1996	2001	2006
Income	19,3	14,9	8,0
Education	14,3	15,4	14,5
Health	25,9	25,8	24,4
Housing	3,9	1,7	1,5
Overcrowding	23,1	15,4	10,0

In relation to the level of deprivation of the population, Table 5.2 shows that the percentage of households above the threshold for all dimensions has grown over the years, reaching over 61% in 2006. On the other hand, people who are below the threshold in four or five dimensions is 2% or less for any given year.

Table 5.2: Households by number of deprived dimensions (%)

Number Deprivations	Percentage		
	1996	2001	2006
0	46,1	53,8	61,5
1	32,4	26,3	25,8
2	12,9	14,1	8,1
3	6,6	4,8	3,6
4	2,0	0,9	0,9
5	0,1	0,1	0,1

5.2 Headcount Ratio (H) and Adjusted Headcount Ratio (M0)

When measuring poverty in a multidimensional way, using the Headcount Ratio and considering the Union Approach, poverty rates are 51.4% in 1996, 44.3% in 2001, and 36.8% in 2006. If we define poverty intermediately, as being poor if household have two or more dimensions under a corresponding threshold *(k=2,)* the percentages of households in poverty decreases to 18.5% in 1996, 16.8% in 2001 and 11.7% in 2006. Consistently, the more dimensions are included in the "cut off", the lower the poverty rate for all years.

Table No. 5.3 shows these results and reports the percentages at each value of "cut off" as possible (k = 1, ..., 5).

Table 5.3: Multidimensional Poverty: Headcount Ratio (%)

	Headcount Ratio (H)		
	1996	2001	2006
Union Approach (k>=1)	51,4	44,3	36,8
2 dimensions (k>=2)	18,5	16,8	11,7
3 dimensions (k>=3)	6,8	4,3	3,6
4 dimensions (k>=4)	0,9	0,5	0,2
Intersection Approach (k=5)	0,1	0,0	0,1

It is important to keep in mind that the Headcount Ratio is a multidimensional poverty measure that does not satisfy the monotonicity property since the measure does not change if a poor person increases the number of deprivationsTherefore, we calculate the Adjusted Headcount Ratio, which takes into account the number of deprivations per person. The following tables show the average deprivation of the poor in each "cut off" and poverty rates using this new measure.

Table 5.4: Average Deprivations of the Poor (%)

	Average Deprivations of the Poors (A)		
	1996	2001	2006
Union Approach (k>=1)	1,9	1,8	1,7
2 dimensions (k>=2)	2,6	2,5	2,5
3 dimensions (k>=3)	3,3	3,2	3,3
4 dimensions (k>=4)	4,1	4,1	4,2
Intersection Approach (k=5)	5,0	5,0	5,0

Table 5.5: Multidimensional Poverty: Adjusted Headcount Ratio (%)

	Adjusted Headcount Ratio (M0)		
	1996	2001	2006
Union Approach (k>=1)	19,0	15,9	12,5
2 dimensions (k>=2)	9,5	8,4	6,0
3 dimensions (k>=3)	4,5	2,8	2,4
4 dimensions (k>=4)	0,7	0,4	0,1
Intersection Approach (k=5)	0,1	0,0	0,1

We can find significant differences in terms of magnitude of poverty between the two measures. But poverty in both measures decreases oveofr time and always decreases dramatically when defining poverty with a cut off = 3 or more dimensions. This shows that few people have deficiencies in more than two dimensions.

For the transition matrix and the estimates shown in the following sections, the Headcount Ratio measured is used for simplicity.

5.3 Transition Matrix

Transition matrices are given below for each period and for each of the three measures of poverty: poverty measured by income, multidimensional poverty *k=1* and multidimensional poverty *k=2*.

The data shows that in 1996-2001 the percentage of households who move out of income poverty was 59.7% while the percentage of household who enter poverty only reaches 8.8%. On the other hand, 40.3% of households are below poverty line the two years. For the following period, 2001 - 2006, those leaving poverty are above 74% and those who become poor are only 5.0%.

Chronic poverty was reduced by 15 percentage points over the two periods. Considering the definition of transient poverty as those households that exit and enter poverty in the period studied, it can be said that 18.6% of the hosuseholds between 1996 and 2001 are in this situation, therefore are in a vulnerable contidion. In the case of the next period, 2001 – 2006, the transient poverty is reduced to 15.4%.

Matrix 1: Income Poverty (%) 1996 - 2001

	2001		
1996	Poor	Non Poor	Total
Poor	40,3	59,7	19,3
Non Poor	8,8	91,2	80,8
Total	14,9	85,2	100,0

Matrix 2: Income Poverty (%) 2001 - 2006

	2006		
2001	Poor	Non Poor	Total
Poor	25,2	74,8	14,9
Non Poor	5,0	95,0	85,2
Total	8,0	92,0	100,0

Looking at the results for the period 1996 - 2001, for multidimensional poverty k=1, we see that those moving out of poverty are only 32.0% and those entering poverty are 19.2%. The households that can be classified in chronic poverty reach 68.0% ando those in a transient poverty status are 25.7%. In the following period, the percentage of movement out of poverty increases to 38.3% while movement into poverty decreased slightly (17.0%). The households that can be considered vulnerable in this period increased to 26.3%. This can be explained because there are more households leaving poverty between 2001 – 2006 than in the first period.

Matrix 1: Multidimensional Poverty (k=1) (%) 1996 - 2001

	2001		
1996	Poor	Non Poor	Total
Poor	68,0	32,0	51,4
Non Poor	19,2	80,8	48,6
Total	44,3	55,7	100,0

Matrix 2: Multidimensional Poverty (k=1) (%) 2001 - 2006

	2006		
2001	Poor	Non Poor	Total
Poor	61,7	38,3	44,3
Non Poor	17,0	83,0	55,7
Total	36,8	63,2	100,0

In the case of multidimensional poverty k=2, between 1996 and 2001 movement out of poverty was 51.7% while movement into poverty was 9.7%. This contrasts with the following period, in which poverty exit levels are 60% and poverty entrance was 5.9%. The households that remain poor between 1996 and 2001 are 48.3%, while in the second period studied the percentage decreases to 40.5%.

Looking at the transient poverty, in the first period the percentage reaches 17.4%, while in the second period studied the rate decreased to 14.9%.

Matrix 1: Multidimensional Poverty (k=2) (%) 1996 - 2001

	2001		
1996	Poor	Non Poor	Total
Poor	48,3	51,7	18,5
Non Poor	9,7	90,3	81,5
Total	16,8	83,2	100,0

Matrix 2: Multidimensional Poverty (k=2) (%) 2001 - 2006

	2006		
2001	Poor	Non Poor	Total
Poor	40,5	59,6	16,8
Non Poor	5,9	94,1	83,2
Total	11,7	88,3	100,0

From these matrices it follows that, when measuring poverty by income, the percentage of individuals moving out of poverty in each period is greater than when considering multidimensional poverty by either of the two definitions used here. This could be due to the fact that multidimensional measures of poverty consider dimensions that are more persistent over time. For example, there is a lot of similarity in the educational dimension over time compared to the income dimension. The appendix includes transition matrices for each dimension showing the low rate of change in the education and health dimensions.

Moreover, the percentage of people who fall into poverty, i.e. those that became poor during the time period is considerably lower when comparing income poverty with multidimensional measure via Union Approach. However, it is very similar when compared with the multidimensional poverty measure (k = 2).

Therefore, we can conclude that, in terms of dynamics of poverty, income poverty measures behave similarly to the multidimensional poverty measure when counting deprivation in two or more dimensions. This may be due to correlation in deprivate dimensions with lack of income.

5.4 Probit Estimations

To understand what is correlated with household transitions into and out of poverty over time, it is necessary to look at the determinants that explain the change in status. For this we estimate Probit and Multinomial Probit models for each measurement of poverty utilized. This is done for both the period 1996 - 2001 and for the period 2001-2006.

5.4.1 Probit

The estimation results shown below are for Probit models to determine the probability of entering or exiting poverty (considering the three poverty measurements) for both time periods. As explained in Section 3, when estimating the probability of entering poverty, the dependent variable takes the value 1 if the household was "not poor" in period 1 and changes to "poor" in period 2. Consequently, for the estimation of the probability of escaping poverty, the dependent variable takes the value 1 if the household was "poor" in period 1 and "not poor" in period 2.

5.4.1.1 Probability of Entering Poverty

In the estimation for the probability of entering poverty, either the first period or the second (Table 5.6: Log Likelihood Estimate in Poverty 1996-2001 and 2001-2006), the educational indicators are the most important explanatory variables. The higher the education level of the household, the less likely it is to enter poverty. This is similar to the evidence of Contreras, D. et al. 2007.

If we look at what happens in the first period, we can conclude that for all poverty measures considered, increased age of the household head decreases the probability of entering poverty.

Comparing the income poverty measure to the multidimensional measures, living in the capital region is a determinant of entering poverty for the first, but not the second.

In the second period, there are certain differences between the income poverty measure and multidimensional measures; we observe that the dependency ratio negatively affects the probability of entering income poverty and seems not to be a relevant variable for multidimensional poverty. The variable "head household working" is similar.

5.4.1.2 Probability of Exit Poverty

If we observe only the first period, (Table 5.7: Probability Estimation Poverty Exit 1996-2001 and 2001-2006), the higher the dependency ratio, the more likely the household is to exit poverty in an income measure but not in a multidimensional measure. Meanwhile, a health shock is the reverse situation; having had an illness during this period negatively affects the chance to escape income poverty but is not significant in explaining multidimensional poverty.

When considering the period 2001 - 2006, we can conclude that the higher the educational level of the most educated person in the household, the more likely the household is to exit poverty since it occurs in all three poverty measures considered

On the other hand, having a person with a disability in the household negatively affects the probability of exiting poverty for income poverty and multidimensional poverty with k=1.

Table 5.6: "Estimation of the Probability of Entering 1996 – 2001 y 2001 - 2006" (mfx)

	Entered_96_01	Entered_96_01_1d	Entered_96_01_2d
Capital_Region_96	-0.038	-0.047	-0.038
	(0.0626)	(0.2514)	(0.0852)
Area_96	0.029	0.113	0.010
	(0.1426)	(0.0408)*	(0.7318)
HH_Age_96	-0.005	-0.008	-0.004
	(0.0000)**	(0.0018)**	(0.0110)*
HH_Sex_96	-0.020	0.058	-0.049
	(0.6355)	(0.5418)	(0.3922)
HH_Partner_96	0.034	-0.189	0.048
	(0.3976)	(0.1047)	(0.2466)
Dependancy_Ratio_96	-0.085	-0.359	0.071
	(0.2569)	(0.0324)*	(0.2877)
Age > 65_ 96	0.199	-0.030	0.121
	(0.0045)**	(0.6898)	(0.0461)*
Disability_96	-0.010	-0.051	0.077
	(0.6868)	(0.6044)	(0.1152)
HH_Working_96	0.027	0.081	-0.014
	(0.4453)	(0.3329)	(0.7522)
Max_Education_96	-0.008	-0.025	-0.012
	(0.0395)*	(0.0028)**	(0.0002)**
Parents_Education_96	-0.007	0.004	-0.006
	(0.1426)	(0.6004)	(0.2426)
Home Owner_96	-0.054	-0.019	-0.070
	(0.1139)	(0.7430)	(0.0638)
Health_Shock_96	0.023	-0.012	0.041
	(0.4031)	(0.8219)	(0.1102)
Observations	1265	593	1065

Robust p values in parentheses
* significant at 5%; ** significant at 1%

	Entered_01_06	Entered_01_06_1d	Entered_01_06_2d
Capital_Region_01	0.001	-0.092	-0.016
	(0.9542)	(0.0280)*	(0.1991)
Area_01	0.005	0.027	-0.052
	(0.7011)	(0.6274)	(0.0560)
HH_Age_01	-0.000	-0.001	-0.000
	(0.6197)	(0.6186)	(0.8508)
HH_Sex_01	0.014	-0.112	-0.039
	(0.4139)	(0.3460)	(0.2790)
HH_Partner_01	-0.027	0.065	0.039
	(0.1885)	(0.5210)	(0.1058)
Dependancy_Ratio_01	-0.139	-0.133	0.026
	(0.0029)**	(0.3988)	(0.6369)
Age > 65_ 01	-0.020	-0.074	-0.010
	(0.2565)	(0.2610)	(0.6762)
Disability_01	0.030	0.100	0.032
	(0.1927)	(0.2100)	(0.1527)
HH_Working_01	0.058	0.057	-0.030
	(0.0013)**	(0.4104)	(0.2889)
Max_Education_01	-0.006	-0.018	-0.008
	(0.0007)**	(0.0007)**	(0.0007)**
Parents_Education_01	0.003	0.000	0.000
	(0.2491)	(0.9566)	(0.9065)
Home Owner_01	-0.022	-0.054	-0.001
	(0.2007)	(0.3800)	(0.9517)
Health_Shock_01	0.026	0.108	0.006
	(0.0311)*	(0.0053)**	(0.6320)
Observations	1405	667	1088

Robust z-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Table 5.7: "Estimation of the Probability of Exit Poverty 1996 – 2001 y 2001 – 2006" (mfx)

	Exited_96_01	Exited_96_01_1d	Exited_96_01_2d		Exited_01_06	Exited_01_06_1d	Exited_01_06_2d
Capital_Region_96	0.079	0.051	0.024	Capital_Region_01	0.058	0.121	0.024
	(0.3541)	(0.3519)	(0.7668)		(0.3547)	(0.0363)*	(0.7676)
Area_96	-0.073	0.033	0.116	Area_01	-0.063	0.095	0.110
	(0.4294)	(0.5984)	(0.1651)		(0.3974)	(0.2349)	(0.2472)
HH_Age_96	0.001	0.001	0.003	HH_Age_01	0.009	0.005	0.004
	(0.7586)	(0.7120)	(0.5353)		(0.0090)**	(0.2283)	(0.4411)
HH_Sex_96	0.249	-0.078	0.125	HH_Sex_01	0.383	0.204	0.307
	(0.0709)	(0.4805)	(0.5078)		(0.0638)	(0.1262)	(0.0872)
HH_Partner_96	-0.275	-0.053	0.083	HH_Partner_01	-0.079	-0.179	-0.115
	(0.0103)*	(0.6410)	(0.6584)		(0.5802)	(0.1832)	(0.4569)
Dependancy_Ratio_96	1.518	-0.180	0.286	Dependancy_Ratio_01	0.538	0.394	-0.283
	(0.0209)*	(0.3495)	(0.3843)		(0.2465)	(0.0925)	(0.3136)
Age > 65_ 96	0.194	-0.158	0.345	Age > 65_ 01	0.103	-0.156	0.143
	(0.2363)	(0.1108)	(0.0179)*		(0.3578)	(0.2066)	(0.3269)
Disability_96	0.188	-0.094	-0.323	Disability_01	-0.321	-0.287	0.103
	(0.0965)	(0.2855)	(0.0218)*		(0.0078)**	(0.0160)*	(0.4930)
HH_Working_96	-0.265	0.065	-0.159	HH_Working_01	-0.198	-0.169	0.046
	(0.0753)	(0.4445)	(0.2176)		(0.0692)	(0.1416)	(0.7637)
Max_Education_96	0.007	0.040	0.044	Max_Education_01	0.040	0.050	0.052
	(0.6769)	(0.0006)**	(0.0594)		(0.0046)**	(0.0001)**	(0.0305)*
Parents_Education_96	0.017	0.028	0.042	Parents_Education_01	0.001	-0.004	-0.025
	(0.5386)	(0.1516)	(0.1397)		(0.9437)	(0.8062)	(0.3820)
Home Owner_96	0.078	0.044	0.037	Home Owner_01	-0.073	-0.029	0.027
	(0.3839)	(0.5566)	(0.6879)		(0.2524)	(0.7538)	(0.7759)
Health_Shock_96	-0.241	0.078	0.001	Health_Shock_01	-0.074	-0.112	-0.097
	(0.0280)*	(0.4257)	(0.9921)		(0.2907)	(0.1251)	(0.2933)
Observations	524	951	479	Observations	375	770	349
Robust z-statistics in parentheses				Robust z-statistics in parentheses			
* significant at 5% level; ** significant at 1% level				* significant at 5% level; ** significant at 1% level			

5.4.2 Multinomial Probit

Multinomial Probit models explain the determinants of transition from one state to another, i.e. entering or exiting poverty between two periods of time.

We estimated six Multinomial Probit models, one for each time period and each measure of poverty used (income, multi-dimensional k=1 and multidimensional k=2). The dependent variable in each estimate considered four states:

1. Non Poor in t1 and Non Poor in t2 (NP – NP)
2. Poor in t1 and Non Poor in t2 (P – NP)
3. Non Poor in t1 and Poor in t2 (NP – P)
4. Poor in t1 and Poor in t2 (P – P).

The estimation results are shown in Tables 5.8, 5.9 and 5.10. The following describes the main results by states and periods.

5.4.2.1 Non Poor – Non Poor (NP – NP)

For the period 1996 - 2001 and all poverty measures, the age of the head of household, educational level of the most educated person in the household and home ownership all increase the likelihood of staying out of poverty.

Living in urban areas and the dependency ratio are variables that affect the probability of being poor in poverty income measure but not in the multidimensional measure.

There are certain similarities between the estimates of income poverty and multidimensional poverty with k=2. For example, living in the capital positively affects the probability of remaining out of poverty using income poverty and multidimensional with k=2 measures, but not for multidimensional poverty k=1.

For the period 2001 – 2006 and all poverty measures, the age of head of household, educational level of the most educated person in the household and home ownership all increase the likelihood of remaining out of poverty. This is the same as in the first period.

As in the previous case, living in the capital improves the probability of remaining out of poverty both for income poverty and multidimensional poverty.

5.4.2.1 Poor – Poor (P - P)

For the first period and using the income poverty measure, the dependency ratio negatively affects the probability of remaining in poverty for both periods. The labor status determines the probability of being poor in both 1996 and 2001.

Using the multidimensional poverty measure, the variable age of household head has a negative effect, i.e. the higher the age of the household head, the less likely

Analyzing the measures separately, the higher dependency ratio makes it less likely to stay poor in both periods. In the case of households in the metropolitan area, and analyzing poverty multidimensionally, the educational level of the most educated person at home and age of household head are variables that negatively affect the probability of being poor.

5.4.2.3 Poor– Non Poor (P – NP)

In the first period, 1996 - 2001, the older the household head, the lower the probability of leaving poverty between 1996 and 2001. This is true for any measure of poverty used.

In this period there are some similarities between income poverty and multidimensional poverty when considering k=2. Living in the metropolitan area negatively affects leaving poverty for both. The same relationship exists when you look at the education variables. Higher education levels for the person in the household with the most education, lowers the probability of being poor for both periods.

Looking at the results for the period 2001 to 2006, there are also some similarities between the estimates of income poverty and multidimensional poverty k=2, specifically the effects of household age, educational level of most educated person in the household and household ownership. The latter two have a negative impact on the probability of exiting poverty.

5.4.2.4 Non Poor – Poor (NP – P)

The last condition is to have fallen into poverty.

In the first period, considering income poverty, living in an urban area positively affects the probability of falling into poverty, while the higher the age of the household head and the higher the dependency ratio, the less likelihood there is of falling into poverty.

In the case of multidimensional poverty, there are important differences between the measures k=1 and k=2. For k=1, living in urban areas positively affects the probability of entering poverty while the dependency ratio and age of adults in the household decreases the probability. In the case of k=2, age of head of household negatively affects the level of education thus making the household more likely to fall into poverty.

For the second period, 2001 - 2006, the significant variables in income poverty are the dependency ratio and level of education of most educated person household, both of which negatively affect the chances of entering poverty. Having a health shock, however, increases the likelihood of falling into poverty for this measure.

In the case of multidimensional poverty k=1, health shock increases the likelihood

Table 5.8: "Multinomial Probit Estimation: Income Poverty"

	Income Poverty							
	Estimation 1996 - 2001				Estimation 2001 - 2006			
Variable	NP - NP	P - NP	NP - P	P - P	NP - NP	P - NP	NP - P	P - P
Capital_Region	0.1055483	-0.0642107	-0.0272207	-0.014117	0.0489983	-0.0406147	-0.0051386	-0.0032451
	(0.000)**	(0.006)*	(0.139)	(0.059)	(0.028)*	(0.015)*	(0.676)	(0.177)
Area	-0.0578237	0.0240605	0.0308941	0.0028692	-0.0303223	0.0262227	0.0029524	0.0011472
	(0.012)*	(0.093)	(0.049)*	(0.109)	(0.141)	(0.017)*	(0.860)	(0.130)
HH_Age	0.0104007	-0.00447	-0.0054568	-0.0004739	0.0039267	-0.0032522	-0.0004121	-0.0002625
	(0.000)**	(0.000)**	(0.000)**	(0.063)	(0.004)*	(0.001)*	(0.645)	(0.051)
HH_Sex	0.0206087	-0.021478	0.0057548	-0.0048855	-0.0294394	0.024794	0.0087302	-0.0040848
	(0.732)	(0.612)	(0.878)	(0.370)	(0.321)	(0.136)	(0.728)	(0.402)
HH_Partner	-0.0045977	0.0023912	-0.0016505	0.003857	0.0051228	0.0057638	-0.0124984	0.0016117
	(0.934)	(0.947)	(0.965)	(0.176)	(0.885)	(0.762)	(0.690)	(0.222)
Dependancy_Ratio	0.5147801	-0.2876699	-0.1384098	-0.0887004	0.5203303	-0.3665955	-0.1154592	-0.0382756
	(0.000)**	(0.003)*	(0.039)*	(0.022)*	(0.000)**	(0.000)**	(0.020)*	(0.036)*
Age > 65	-0.1087622	0.0145312	0.0992407	-0.0050097	0.0151288	0.002642	-0.0182128	0.000442
	(0.121)	(0.663)	(0.151)	(0.148)	(0.638)	(0.908)	(0.384)	(0.801)
Disability	-0.0827943	0.0840066	0.0008286	-0.0020409	-0.036254	-0.0056659	0.0322643	0.0096557
	(0.199)	(0.167)	(0.975)	(0.215)	(0.351)	(0.735)	(0.305)	(0.263)
HH_Working	-0.0529071	0.036547	0.0087538	0.0076062	-0.0866683	0.0257163	0.0549613	0.0059907
	(0.172)	(0.106)	(0.776)	(0.022)*	(0.002)*	(0.211)	(0.001)*	(0.042)*
Max_Education	0.025409	-0.0170078	-0.007029	-0.0013722	0.0152017	-0.0071521	-0.0072805	-0.000769
	(0.000)**	(0.000)**	(0.051)	(0.074)	(0.000)**	(0.005)*	(0.000)**	(0.075)
Parents_Education	0.0062578	-0.0006212	-0.0052985	-0.0003381	0.0011897	-0.004061	0.0028917	-0.0000204
	(0.327)	(0.900)	(0.265)	(0.404)	(0.790)	(0.205)	(0.345)	(0.917)
Home Owner	0.1458462	-0.0846824	-0.045362	-0.0158019	0.2006813	-0.1703613	-0.0261808	-0.0041392
	(0.002)*	(0.023)*	(0.178)	(0.070)	(0.000)**	(0.001)*	(0.217)	(0.213)
Health_Shock	-0.031043	-0.0149033	0.0443817	0.0015646	-0.0416552	0.0055695	0.0349848	0.0011009
	(0.370)	(0.342)	(0.136)	(0.661)	(0.067)	(0.723)	(0.033)*	(0.381)
Observations	1545	1545	1545	1545	1437	1437	1437	1437

Robust p values in parentheses
* significant at 5%; ** significant at 1%

Table 5.9: "Multinomial Probit Estimation: Multidimensional Poverty k=1"

	Multidimensional Poverty K=1							
	Estimation 1996 - 2001				Estimation 2001 - 2006			
Variable	NP - NP	P - NP	NP - P	P - P	NP - NP	P - NP	NP - P	P - P
Capital_Region	0.0594303	0.0106736	-0.0067743	-0.0633296	0.0851224	0.0450015	-0.0558427	-0.0742811
	(0.181)	(0.772)	(0.760)	(0.104)	(0.076)	(0.177)	(0.073)	(0.041)*
Area	0.0406454	-0.0151709	0.0603336	-0.0858081	0.0390898	0.0229459	0.0267441	-0.0887798
	(0.559)	(0.754)	(0.002)*	(0.168)	(0.572)	(0.602)	(0.376)	(0.116)
HH_Age	0.0149318	-0.0044489	-0.0010378	-0.0094451	0.0101442	-0.0034482	0.0009484	-0.0076444
	(0.000)**	(0.046)*	(0.442)	(0.000)**	(0.001)*	(0.098)	(0.600)	(0.001)*
HH_Sex	-0.1170892	-0.0050694	0.0074565	0.1147022	-0.0711337	0.1481539	-0.1073747	0.0303545
	(0.375)	(0.945)	(0.877)	(0.194)	(0.507)	(0.004)*	(0.261)	(0.692)
HH_Partner	0.0984876	-0.0104544	-0.0964569	0.0084237	0.0555186	-0.1335432	0.0587301	0.0192944
	(0.433)	(0.891)	(0.164)	(0.932)	(0.566)	(0.092)	(0.319)	(0.802)
Dependancy_Ratio	0.307992	-0.2283614	-0.1534533	0.0738227	0.1355524	0.1106991	-0.1123585	-0.133893
	(0.096)	(0.103)	(0.042)*	(0.640)	(0.457)	(0.436)	(0.191)	(0.392)
Age > 65	-0.1331655	-0.0494105	-0.0664808	0.2490568	-0.0677817	-0.0111288	-0.0665347	0.1454452
	(0.086)	(0.421)	(0.011)*	(0.003)*	(0.394)	(0.865)	(0.066)	(0.069)
Disability	-0.1095433	-0.0134186	-0.0449674	0.1679293	-0.0732741	-0.1270111	0.0693673	0.130918
	(0.209)	(0.827)	(0.168)	(0.049)*	(0.399)	(0.001)*	(0.269)	(0.112)
HH_Working	-0.0373783	0.0232078	0.0421845	-0.028014	0.0066767	-0.0785146	0.062351	0.0094868
	(0.684)	(0.705)	(0.299)	(0.710)	(0.937)	(0.263)	(0.076)	(0.890)
Max_Education	0.05886	0.0055289	-0.0038959	-0.060493	0.0625587	-0.0055935	-0.0022421	-0.0547231
	(0.000)**	(0.495)	(0.399)	(0.000)**	(0.000)**	(0.410)	(0.566)	(0.000)**
Parents_Education	0.0245467	-0.0006197	0.0076945	-0.0316215	0.0167669	-0.010024	0.0047932	-0.0115361
	(0.013)*	(0.943)	(0.085)	(0.007)*	(0.089)	(0.181)	(0.350)	(0.165)
Home Owner	0.2412947	-0.0556712	0.0547761	-0.2403997	0.1873673	-0.0922464	-0.0019281	-0.0931928
	(0.000)**	(0.323)	(0.013)*	(0.000)**	(0.006)*	(0.141)	(0.957)	(0.147)
Health_Shock	-0.0207162	0.0371777	-0.0062544	-0.0102071	-0.0932947	-0.0327691	0.0639292	0.0621346
	(0.752)	(0.569)	(0.815)	(0.847)	(0.062)	(0.356)	(0.023)*	(0.150)
Observations	1545	1545	1545	1545	1437	1437	1437	1437

Robust p values in parentheses
* significant at 5%; ** significant at 1%

Table 5.10: "Multinomial Probit Estimation: Multidimensional Poverty k=2"

	Multidimensional Poverty K=2							
	Estimation 1996 - 2001				Estimation 2001 - 2006			
Variable	NP - NP	P - NP	NP - P	P - P	NP - NP	P - NP	NP - P	P - P
Capital_Region	0.1373429	-0.0720639	-0.0185881	-0.0466908	0.0750523	-0.0358294	-0.0114496	-0.0277733
	(0.000)**	(0.004)*	(0.351)	(0.000)**	(0.008)*	(0.066)	(0.353)	(0.030)*
Area	0.0581854	-0.0214667	0.0094723	-0.0461909	0.1060671	-0.0209756	-0.0385184	-0.0465731
	(0.216)	(0.409)	(0.704)	(0.044)*	(0.040)*	(0.443)	(0.191)	(0.081)
HH_Age	0.0104759	-0.0043113	-0.0032759	-0.0028888	0.0059317	-0.0038534	0.0000172	-0.0020955
	(0.000)**	(0.000)**	(0.033)*	(0.000)**	(0.000)**	(0.001)*	(0.982)	(0.006)*
HH_Sex	0.0822569	-0.0230201	-0.0420081	-0.0172286	0.0249151	0.0487117	-0.0303143	-0.0433125
	(0.380)	(0.621)	(0.535)	(0.555)	(0.740)	(0.044)*	(0.478)	(0.367)
HH_Partner	-0.0969535	0.0445713	0.0488929	0.0034893	-0.0494937	-0.0107788	0.035282	0.0249904
	(0.113)	(0.129)	(0.192)	(0.883)	(0.326)	(0.747)	(0.110)	(0.217)
Dependancy_Ratio	0.176892	-0.1328738	0.0896562	-0.1336743	0.0283059	-0.0532859	0.0155004	0.0094796
	(0.156)	(0.079)	(0.197)	(0.024)*	(0.824)	(0.527)	(0.767)	(0.847)
Age > 65	-0.2600944	0.1731978	0.0856217	0.0012749	-0.094934	0.0850932	-0.0142534	0.0240942
	(0.005)*	(0.027)*	(0.261)	(0.948)	(0.211)	(0.187)	(0.521)	(0.386)
Disability	-0.152755	-0.0126887	0.0792652	0.0861785	-0.1608921	0.1136432	0.0287068	0.0185421
	(0.083)	(0.611)	(0.204)	(0.140)	(0.049)*	(0.140)	(0.281)	(0.400)
HH_Working	-0.0210448	0.0025414	-0.0073832	0.0258865	0.0560856	-0.0224669	-0.0255381	-0.0080806
	(0.700)	(0.937)	(0.856)	(0.106)	(0.353)	(0.584)	(0.357)	(0.768)
Max_Education	0.0447614	-0.0187596	-0.0106493	-0.0153524	0.032402	-0.0131784	-0.0076985	-0.0115251
	(0.000)**	(0.000)**	(0.002)*	(0.000)**	(0.000)**	(0.000)**	(0.001)*	(0.000)**
Parents_Education	0.0095292	0.0021931	-0.0061326	-0.0055897	0.0167614	-0.0144437	0.0011379	-0.0034555
	(0.222)	(0.677)	(0.289)	(0.095)	(0.023)*	(0.034)*	(0.571)	(0.190)
Home Owner	0.146349	-0.0573337	-0.0375982	-0.0514171	0.1534375	-0.1069691	0.0023086	-0.0487771
	(0.007)*	(0.125)	(0.287)	(0.046)*	(0.011)*	(0.040)*	(0.871)	(0.027)*
Health_Shock	-0.0565281	0.0142009	0.0384301	0.0038972	-0.0191736	0.0025672	0.0072973	0.0093091
	(0.198)	(0.597)	(0.182)	(0.844)	(0.553)	(0.916)	(0.603)	(0.429)
Observations	1545	1545	1545	1545	1437	1437	1437	1437

Robust p values in parentheses
* significant at 5%; ** significant at 1%

6. Concluding Remarks

Poverty in Chile has declined over time in all three measures used: poverty levels based solely on income, or poverty viewed multidimensionality considering measures of health, education, housing reliability and other measures. It should be noted that the absolute poverty rates differ according to the measure used.

Multidimensional poverty measures give different results when considering different methods of aggregation. Using a Headcount Ratio gives poverty rates higher than when considering the method Headcount Adjusted Ratio. Since the latter case is adjusted by the number of deprivations impoverished people experience, this is not unexpected.

According to the transition matrices, the percentage of people moving out of poverty using the income measure is higher than the percentage of people out of poverty when measured multi-dimensionally. This is because multidimensional measures consider dimensions far more persistent such as education. Increasing the level of income is faster than increasing the years of schooling. However, increased years of schooling can be a more sustainable contribution to staying out of an impoverished state in the long-run.

Additionally it is important to note that there are differences between the measures of multidimensional poverty. The behavior of multidimensional poverty transitions varies considerably for different values of k. We can conclude that the income poverty measure behaves very similarly in some ways to the multidimensional poverty measure k=2.

In determining the factors that are influencing the transition into or out of poverty or remaining in the state of poverty, it appears that there are differences between both multidimensional measures, and with the traditional measure of income. However, it is clear the importance of education as a determinant of exiting poverty in all measures. This result is consistent when considering estimates of both the Probit and Multinomial Probit models. In all cases, the highest educational level of the home is a strongest factor for moving out of poverty.

Additionally, when considering the income measure only, the dependency ratio is far more relevant than the other variables in explaining changes in the state of poverty. The household age also plays an important role in the probability of exiting and entering poverty: the older the household head, the greater probability of leaving poverty. This is true for the result set of most estimates.

Chronic income poverty measure, shows that the the dependency ratio negatively affects the probability of remaining in poverty for both periods. Using the multidimensional poverty measure, the variable age of household head has a negative effect. The educational level of the people in the household is also a important factor, higher education is key in determining the permanence in poverty. Finally, owning the house decreases the likelihood of being multidimensionality poor for both periods.

cut-offs or dimensions changes the poverty rates and the rates of movement into and out of poverty. Therefore, it is important to consider dimensions other than income when measuring poverty because the traditional measure of poverty used in Chile has certain deficiencies. However, it is also important that the process of multidimensional poverty measurement is conducted using criteria that have international validity or that arise from national consensus. This can include the decision of the dimensions, the number of dimensions and the aggregation method used among others.

7. References

Alkire, S. 2007. "The Missing Dimensions of Poverty Data: Introduction to the Special Issue", Oxford Development Studies, 35 (4): 347-359.

Alkire, S. 2008. "Choosing Dimensions: The capability approach and multidimensional poverty", MPRA Paper No. 8862, posted 26.

Alkire, S. and Foster, J. E. 2007. "Counting and Multidimensional Poverty Measurement" OPHI Working Paper Series No. 07, OPHI.

Battiston, D., Cruces, G., Lopez-Calva, L., Lugo, M. and Santos, E. 2009. "Income and Beyond: Multidimensional Poverty in six Latin American countries" OPHI Working Paper Series No. 17, OPHI.

Bendezú, L., A. Denis, J.R. Zubizarreta, 2007. "Análisis de la atrición de la muestra de la Encuesta Panel CASEN". Documento de Trabajo Nº 1, Observatorio Social, Universidad Alberto Hurtado.

Bendezú, L., A. Denis, C. Sánchez, P. Ugalde, J.R. Zubizarreta, 2007. "La Encuesta Panel CASEN: metodología y calidad de datos". En J.R. Zubizarreta, ed. Documento Metodológico Nº 1, Observatorio Social, Universidad Alberto Hurtado

Bourguignon, F. and Chakravarty, S. 2003. "The measurement of multidimensional poverty", Journal of Economic Inequality, 1 (1): 25-49.

Busso, G. "Vulnerabilidad social: nociones e implicancias de políticas para Latinoamérica inicios del siglo XX", en Seminario Internacional las diferentes expresiones de la vulnerabilidad social en América Latina y el Caribe, 2001.

Castro, R., F. Kast, 2004. "Movilidad de la pobreza en Chile. Análisis de la Encuesta Panel 1996/2001". Serie Informe Social Nº 85, Libertad y Desarrollo, Santiago.

Castro, R., 2008. "Pobreza y Movilidad de Ingresos en Chile". Serie Informe Social Nº 111, Libertad y Desarrollo, Santiago.

Consejo Nacional de Evaluación de la Política de Desarrollo Social (CONEVAL) 2009, "Metodología para la medición multidimensional de la pobreza en México".

Contreras, D., Hermann, J., Cooper R. y Nielson C. 2008. "The Dynamics of Poverty in Chile". Journal of Latin American Studies 40, 251-273.

Conteras, D., Cooper R. and Nielson C. 2007. "Crecimiento Pro Pobre en Chile". Documento de trabajo 239, Departamento de Economía, Universidad de Chile.

Denis, A., Prieto, J. and Zubizarreta, R. 2007. "Dinámica de la pobreza en Chile: evidencias en los años 1996, 2001 y 2006". Persona y Sociedad, Universidad

Foster, J. E., Greer, J. and Thorbecke, E. 1984. 2A class of decomposable poverty indices", Econometrica, 52 (3): 761-6.

Fundación para la Superación de la Pobreza, 2009. "Panorama general de la pobreza y su dinámica en Chile: Últimas mediciones". Dirección de Investigación y Propuestas Públicas.

Heitzmann, Karin – Canagarajah, R. Sudharshan – Siegel, Paul B. (2002) Criterios para evaluar las fuentes de riesgoy de la vulnerabilidad. Papales de Discusión sobre Protección Social Nº 0218, Unidad de Protección Social, Red de Desarrollo Humano del Banco Mundial, Junio.

Larrañaga O. "La medición de la pobreza en dimensiones distintas al ingreso" 2007. Series Estudios Estadísticos y Prospectivos, CEPAL Naciones Unidas.

López-Calva, L. F. and Ortiz-Juárez, E. 2009. "Medición multidimensional de la pobreza en México: significancia estadistica en la inclusión de dimensiones no monetarias", Estudios Económicos, Special Issue: 3-33.

MIDEPLAN Componentes centrales de un sistema de protección social sustentable: Nuevo Escenario Social en Chile [Borrador]. Santiago, Departamento de Estudios, División Social MIDEPLAN, Diciembre 2005.

MIDEPLAN Síntesis de los principales enfoques, métodos y estrategias para la superación de la pobreza [Borrador]. Santiago, Octubre 2002.

Paredes, R., J.R. Zubizarreta, 2005. "Focusing on the Extremely Poor: Income Dynamics and Policies in Chile". Documento de Trabajo Nº 183, Departamento de Ingeniería Industrial y de Sistemas, Universidad Católica de Chile.

Sen, A. 1976. "Poverty: An Ordinal Approach to Measurement", Econometrica, 44: 219-231.

8. Appendix

Matrix 1: Deprivation in Education (%) 1996 - 2001

	2001		
1996	Poor	Non Poor	Total
Poor	79,6	20,4	14,3
Non Poor	4,7	95,3	87,8
Total	15,4	84,7	100,0

Matrix 2: Deprivation in Education (%) 2001 - 2006

	2006		
2001	Poor	Non Poor	Total
Poor	71,0	29,0	15,4
Non Poor	4,2	95,8	84,7
Total	14,5	85,5	100,0

Matrix 1: Health Deprivation (%) 1996 - 2001

	2001		
1996	Poor	Non Poor	Total
Poor	64,0	36,0	25,9
Non Poor	12,4	87,6	74,1
Total	25,8	74,2	100,0

Matrix 2: Health Deprivation (%) 2001 - 2006

	2006		
2001	Poor	Non Poor	Total
Poor	58,1	41,9	25,8
Non Poor	12,7	87,3	74,2
Total	24,4	75,6	100,0

Matrix 1: Housing Deprivation (%) 1996 - 2001

	2001		
1996	Poor	Non Poor	Total
Poor	27,0	73,0	3,9
Non Poor	0,7	99,3	96,1
Total	1,7	98,3	100,0

Matrix 2: Housing Deprivation (%) 2001 - 2006

	2006		
2001	Poor	Non Poor	Total
Poor	39,9	60,1	1,7
Non Poor	0,9	99,1	98,3
Total	1,5	98,5	100,0

Matrix 1: Overcrowding Deprivation (%) 1996 - 2001

	2001		
1996	Poor	Non Poor	Total
Poor	39,5	60,5	23,1
Non Poor	8,2	91,8	77,0
Total	15,4	84,6	100,0

Matrix 2: Overcrowding Deprivation (%) 2001 - 2006

	2006		
2001	Poor	Non Poor	Total
Poor	33,5	66,6	15,4
Non Poor	5,7	94,3	84,6
Total	10,0	90,0	100,0

Poverty Transitions:
Evidence for Income and Multidimensional Indicators

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Abstract

This paper presents empirical results of transitions of poverty measures for Chile, using the 1996 – 2001 – 2006 National Socioeconomic Panel Survey data. We compare the differences between poverty dynamics using the income method and the multidimensional approach. Also, we identify determinants associated with changes in the state of poverty. Over this period, Chile experienced significant reductions in both income and multidimensional poverty. We found that the percentage of people moving out of poverty using the income measure is higher than the percentage of people out of poverty when measured multi-dimensionally. The paper suggests that there are differences *between* the measures of multidimensional poverty and multidimensional poverty transitions variy considerably according to this. Transition matrices show that the percentage of people moving out of poverty using the income measure is higher than the percentage of people out of poverty when measured multi-dimensionally. The importance of education as a determinant of exiting poverty is clear in all measures, while the number of persons working at home is important only when considering the income measure only.

1. Introduction

Understanding the dynamics of poverty is essential for the creation of public policies oriented to this segment of the population. This is especially true when studying the factors determining movement between socioeconomic levels, because these are the determining factors on which we must build programs and policies in a way to better target resources. This paper seeks to provide evidence about transitions and factors influencing exiting or entering poverty in order to contribute to the development of social programs aimed at overcoming poverty in Chile.

Moreover, studying transitions and determinants of poverty also arises from the importance of undertstanding the part of the population that is not living in poverty but is nevertheless in a vulnerable position. Poverty reduction does not necessarily implies a reduced vulnerability of falling into poverty. Households that are subject to variability in their incomes, or that suffer from a negative external shock, may at one point be above the poverty line but quickly fall beneath the poverty line. Evidence about poverty transitions is relevant because in addition to poverty reduction measures, it is important to introduce long-term policies aimed at reducing vulnerability. The concept of vulnerability allows accounting for a dynamic notion of poverty as a present or potential condition while at the same time providing a better characterization of chronic poverty

Public policies aimed at overcoming or reducing poverty should differentiate between these two types of poverty. In the case of chronic poverty, measures should be directed towards increasing the capital of households, while in the case of transitory poverty, programs should be targeted towards promoting strong social networks, providing social security.

In Chile, poverty has traditionally been measured using the Income Method, also known as the Basic Needs Cost Method. According to this method, a person is considered poor if his or her income is below a minimum level that satisfies basic needs. This approach measures poverty in absolute terms and has been used in Chile since 1987. Due to this, indicators have been kept comparable over time.

According to the income measures, Chile has experienced a significant reduction in poverty. According to the *Encuesta Nacional Caracterización Socioeconómica* (CASEN), in 1990 the proportion of poor people was 38.6% and decreased to 13.7% in 2006 (latest data available to date). This can mainly be attributed to economic growth in the country during this period (Contreras, D. et al. 2007), and public policy efforts to create a better quality of life through a broad network of social protection and greater opportunities in social and economic fields.

Among the assumptions made when measuring poverty through income is that people make decisions based on their preferences and needs, and that income is the primary way for people to fill those needs. However, it has become extremely relevant to measure poverty through methods incorporating other dimensions that complement income. These are multidimensional poverty measures. This new approaches stems from the assumptions that the measures based exclusively on

there are attempts to correct this through adjustments and imputation methods, there is evidence that self-reported income is flawed as a measure to calculate poverty rates.

Thus, from a perspective of looking at poverty as a multidimensional phenomenon, the measurement of poverty should consider non-monetary aspects to account for these flaws and to complement the self-reported approach.

However, a multidimensional approach also entails certain complexities. The research on the subject is relatively recent and there is no consensus on some definitions and measures. This paper aims to identify differences in the analysis of the dynamics of poverty in Chile using two measures of multidimensional poverty and to identify determinants associated with changes in the state of poverty in Chile.

Therefore, the main objective of the study is to compare the differences between dynamics of poverty using the income method versus the multidimensional approach, over the years 1996 - 2001 - 2006. The specific objectives are to measure income poverty and multidimensional poverty, generate transition matrices, and estimate determinates of poverty and entrance and exit for the years 1996, 2001 and 2006. This study will add important information regarding poverty transitions with both measures and will contribute to the analysis of the dynamics of poverty in Chile.

To achieve these objectives, we develop a calculation of income poverty and multidimensional poverty. From this calculation, transition matrices are generated to observe the dynamics of poverty measured by income and by multidimensional measures. We then estimate discrete choice models to determine the probability of moving into and out of the state of poverty. Finally, the results of both methods of poverty measurement are compared.

The paper is structured as follows: in the second section, we will analyze the existing evidence on poverty using multidimensional factors. In the third and fourth section we describe the study methodology and data used. The fifth section contains the main results and the final chapter presents the main conclusions.

2. Theoretical Framework

This section will address two topics: first, a brief review of vulnerability as a social phenomenon. Then we describe different methodologies for estimating multidimensional poverty, identifying some criteria for choosing dimensions and some important factors when considering indicators.

2.1 Social Vulnerability

There is a very broad conceptualization of social vulnerability, which reviews specific aspects of their definition, both theoretical and operational. In the case of this paper, we are only interested in a conceptual definition as a contribution to the understanding of vulnerability as a broader concept of poverty.

The concept of social vulnerability arises from a need to expand the concept of poverty. Poverty as a social issue has become more complex in terms of its dimensions and definitionand requires the inclusion of elements of risk and safety. Thus arises the concept of vulnerability, which is dynamic and is broader than the concept of poverty.

The concept of social vulnerability can be understood as "a multidimensional process that converges into the risk or probability of the individual, household or community to be hurt injured or harmed to changes or permanence to external or internal situations. The social vulnerability of individuals and groups is expressed in several ways, either as fragility and helplessness to changes caused in the environment, as the institutional neglect from the state, which does not contribute to strengthening or systematic care of its citizens, as for internal weakness to address the changes of the individual or household to take advantage of opportunities presented to them, as permanent insecurity that paralyzes, disabled and discourages the possibility and act on future strategies for better standards of living" (Busso, 2001).

On the other hand, the concept of vulnerability of households, recognizes that "a household is considered vulnerable to future loss of welfare when the level is below the threshold set by any standard (or standards) socially accepted to have been caused by risk. The degree of vulnerability depends on the characteristics of risk and the ability of households to face it. This ability depends on the particular characteristics of the household and, above all, of its assets. The end result expected is defined in relation to a specific indicator of welfare-level minimally socially acceptable for example a poverty line" (Heitzmann, K., Canagarajah, R. Siegel, P. 2002).

From the above, we can conclude that the phenomenon of social vulnerability draws heavily on the combination of internal factors –the ability to respond to changes- and environmental or external factors -determinants that cause insecurity. Consequently, alternatives to reduce vulnerability will depend on the relationship between existing assets and opportunities that the State, market and society offer the individual or household.

To MIDEPLAN, vulnerability is understood as the risk of being below thepoverty line and includes both households who are currently in that state and those who may be in the future. It is a dynamic and comprehensive concept, designed to identify not only poor households but those who are not considered poor but are vulnerable to falling into poverty. It also takes into special account those family members who are at the highest risk, such as children, the elderly, persons with disabilities, teenage mothers, and female heads of household.

People in poverty are more vulnerable risks, as they have fewer resources to deal with their situation. In this sense, MIDEPLAN proposes that the essence of the approach to vulnerability lies in the ability to look at risk management as a safety net for individuals and households, enabling the elimination of poverty (by reducing vulnerability). In other words, risk management provides a way out of poverty or prevents the movement of other individuals or families into poverty.

According to what was said earlier in this study we define a home to be vulnerable when their level is or was under the poverty line (poverty line considering income poverty or multidimensional poverty). That is, the social vulnerability is defined as "the risk that has a home to fall into poverty." We use this definition in order to simplify the analysis and contribute to the study of the dynamics of poverty.

2.2 Multidimensional Poverty

There are two steps in measuring poverty (Sen, 1976): identification and aggregation. In the case of poverty measured conventionally (considering income as the sole indicator of poverty), identification of people in poverty corresponds to defining a poverty line (z). This poverty line presents the income needed to purchase a basic basket of goods and services. Thus poor people are those who have a per capita income less than the poverty line. The poverty level is measured as follows:

$$g_i = \frac{(z - x_i)}{z} \quad for\ x_i < z$$
$$g_i = 0 \quad for\ x_i \geq z$$

In the stage of aggregation, using the function proposed by Foster, Greer and Thorbecke (1984), the FGT measure is defined as follows:

$$FGT_{\alpha} = \frac{1}{n}\sum_{i=1}^{n} g_i^{\alpha}$$

where α is a measure of aversion to poverty. When α is zero ($\alpha = 0$), FGT corresponds to the incidence of poverty (Headcount Measure), where all people living in poverty are counted equally. When α equals 1 ($\alpha = 1$), FGT represents the poverty gap, where the level of poverty for each individual will depend on how far that person is from the poverty line. When α is equal to 2 ($\alpha = 2$), it is the

dimension indicating the cut-off where an individual would be deprived of that dimension. This builds a vector of the poverty line in which each vector element corresponds to the chosen thresholds for each dimension z = (z1, z2, z3 ..., zd).

The next step is to define how many dimensions (k) an individual must lack to be considered multi-dimensionally poor. There are different approaches to answering this question. The Union Approach, which presents all dimensions included in the measurement (d) where the deprivation of one dimension is sufficient that the person is considered to be poor multi-dimensionally, i.e k=1. The second approach is the Intersection Approach, which defines poor multi-dimensionally a person who is deprived in all dimensions k=d. The third alternative is to consider individuals to be poor at an intermediate level of dimensions between the minimum and maximum level.

Therefore, if c_i is the number of poverty dimensions for the individual i, he will be considered multi-dimensionally poor if c_i = k:

$$g_{ij} = \frac{(z_j - x_{ij})}{z_j} \quad for\ x_{ij} < z_j \ \ y \ \ c_i \geq k$$
$$g_{ij} = 0 \quad otherwise$$

For aggregation stage, Alkire and Foster (2008) use the following indicators:

• Headcount Ratio: incidence or the proportion of poor people. This is analogous to the headcount ratio used for the income poverty measure. It has the advantage of being easy to calculate and interpret, but the disadvantage of not satisfying the multidimensional monotonicity property, i.e. when increasing the range of deprivation experienced by a poor person is not reflected in the level of aggregate poverty.

$$H(X;z) = \frac{1}{n}\sum_{i=1}^{n}\left[\sum_{j=1}^{d} g_{ij}(k)\right] = \frac{q}{n}$$

• Adjusted Headcount Ratio: measures the total number of deprivation dimensions experienced by the poor in relation to the total number of dimensions that can be deprived. It is a measure that combines information of the incidence of poverty with the average deprivation of the poor. This indicator is sensitive to the frequency and extent of multidimensional poverty (Alkire and Foster 2008) and satisfies the monotonicity property, i.e. if the number of dimensions that are deprived increases, the poverty rate also increases.

• Adjusted Poverty Gap: the poverty gap measures the depth of poverty, i.e. how far below the threshold of poverty is the average impoverished person. This indicator is calculated based on the product of the Adjusted Headcount Ratio and the average poverty gap. The index also satisfies the monotonicity property

The following formula describes the measures mentioned above, when $\alpha = 0$ corresponds to the Headcount Adjusted Ratio. When $\alpha = 1$, the Adjusted Poverty Gap and when $\alpha = 2$, is the Adjusted P_2 Measure.

$$M_{\alpha}(X;z) = \frac{1}{nd}\sum_{i=1}^{n}\left[\sum_{j=1}^{d} w_j\left(g_{ij}(k)\right)\right]^{\alpha} \quad with \; \alpha \geq 0$$

2.3 Dimensions, Indicators and Thresholds

For the calculation of the multidimensional poverty measure, the selection of the dimensions indicators and thresholds for each indicator is complex, and incorporates methodological decisions and political considerations.

There is a wide discussion of which dimensions should be considered in measuring multidimensional poverty, what are indicators to be considered on a selected dimension, how to measure each dimension, and finally how the threshold criterion for poverty is chosen.

Alkire (2008) suggests that there are different options for selecting the dimensions: 1) use existing data2) make assumptions based on theoretical foundations 3) create a list according to consensus 4) use a process of participatory public deliberationand 5) choose dimensions according to empirical studies of values or behavior of individuals.

When considering the selection of indicators, the author suggests the need to have an index for each dimensionby combining existing indicators.Furthermore, he suggests that the indicators of each dimension should not be highly correlated. Finally, he recommends that sensitivity should be exercised, using more than a poverty line to analyze the robustness of the data.

Additionally, following Larrañaga (2007), the choice of other dimensions besides income must satisfy two conditions: 1) be a basic determinant of welfare, so that being deprived in that dimension is a threat to the quality of life, and 2) income alone would not fix these deprivations. This would avoid duplication of the variables considered. In relation to the indicators for each dimension, Larrañaga suggests that the important decision is to choose between resources and outcomes as they relate directly to welfare. Additionally, these indicators must meet requirements for identification, aggregation and comparison.

In summary, there are several recommendations of dimensions, indicators and thresholds. There are certain conditions or properties that are more desirable, but there is no consensus on which dimensions define poverty and therefore there are no standard indicators or thresholds.

3. Methodology

For the analysis of the dynamics of multidimensional poverty we must measure poverty using the income definition as well as by considering other dimensions. Once the poverty rate considering both measures was estimated, we analyzed the dynamics of poverty by observing the movements into and out of poverty using a transition matrix.

We also consider the determinants of change between poverty states between 1996 and 2001 and again between 2001 and 2006. In other words, the determinants of transition from a state of poverty to one not of poverty. For the latter, we used two types of estimations: Probit and Multinomial Probit. We follow the proceeding steps.

3.1 Income Poverty and Multidimensional Poverty Measures

As noted above, there are various measures of aggregation that can be used. The method used for this study was the Headcount Ratio. It was chosen because it estimated poverty directly. The main advantage of this measure is that it provides easily interpretable and disaggregated information, facilitating the analysis of poverty transitions.

The model is as follows: there is a matrix of $n \times d$, where x_{ij} element corresponds to the result of the individual i in dimension j, where i = 1, ..., n and j = 1, ..., d.

To carry out identification of poor households it is necessary to define thresholds for each dimension that separates deprivation from non-deprivation. The set of thresholds for each dimension considered is summarized in a vector *z = (z1, z2, z3…, zd).* Thus, if the individual is under the threshold on a dimension, he is defined as deprived in that dimension.

It is then necessary to define the number of dimensions *k* in which an individual must be deprived to be considered multi-dimensionally poor. we consider two approaches: the Union Approach *(k=1)* and an intermediate measure, where an individual is considered poor multi-dimensionally if a person is deprived in two dimensions *(k=2)*. Two approaches were used to compare the results and verify whether there were differences. Therefore, if c_i is the number of private dimensions for the individual *i*, he will be considered poor if multi-dimensionally $c_i = k$.

Once identified as multidimensionally poor households we proceed to the aggregation stage:

$$H(X;z) = \frac{1}{n}\sum_{i=1}^{n}\left[\sum_{j=1}^{d} g_{ij}(k)\right] = \frac{q}{n}$$

Where g_{ij} is the poverty gap of the individual *i* in the dimension *j*

$g_{ij} = \frac{z_j - x_{ij}}{z_j}$ *for* $x_{ij} < z_j$ *y* $c_i \geq k$

3.1.2 Dimensions, Indicators and Thresholds

Based on the literature and available data, the dimensions considered in this study are: income, education, health, housing and overcrowding. The dimensions, indicators and thresholds used are described below.

Income

For the income dimension, the threshold is the yearly official poverty line provided by the *Ministerio de Planificación* (MIDEPLAN). This is represented by per-capita income. Therefore, if the individual is below the poverty line then the person is counted as deprivate in the income dimension.

The income dimension will be one of the five dimensions included in the multidimensional measure but it is also the indicator for the income poverty measure. Note that when in the next section we show the results of the income poverty measure it is simply the official poverty line provided by MIDEPLAN.

Education

In the case of the educational dimension, the indicator was the proportion of people in the household over 14 years old with eight years of schooling, i.e. those who have completed primary education. In this case the threshold was 50%, thus if less than 50% of people over 14 years old in the household have completed primary education, the household is considered deprived in the education dimension.

This indicator was used because years of schooling are a good proxy of educational access and educational outcomes. The measure used was 8 years of schooling because it is the required level of schooling in 1996.

Health

For the health dimension, the indicator is the percentage of people in the household who declare that they do not have health insurance or belong to Group A (Indigent) of the National Health Fund (FONASA). The threshold selected is 50% of household members lacking health insurance or belonging to Group A.[2]

Housing

The measure of poverty in housing is an index created by the *Ministerio Vivienda y Urbanismo* (MINVU) from three indicators. Those indicators are:

1) Housing Material Index: the predominant materials used in exterior walls, roofs and floors of houses, which are classified as acceptable, recoverable or unrecoverable, according to the following categories:

Clasification	Exterior Walls	Roof	Floor
Acceptable	Steel or reinforced concrete, masonry brick, concrete or stone partition lined both sides (wood or other).	Tejas; concrete slab with inner sky, zinc or slaty-sky interior: zinc, slaty, tile, tiled or wood interior with no sky.	Radier coated (parquet or ceramic table, linoleum, FLEXIT, tile, carpet, etc.), wooden table or on bearers or joists.
Recoverable	Adobe, unlined interior partition (wood or other) Barro, thatch, drywall or other traditional craft.	Phonolite; straw coiron, reeds or cane.	Radier uncoated, wood, plastic or pies directly on land.
Unrecoverable	Waste material and / or recycling (cardboard, cans, sacks, plastic) and other materials.	Waste material and / or recycling (plastics, cans, etc).	Dirt floor.

Housing can be analyzed by:

- Acceptable material: households whose houses have walls, ceilings and floors that are classified as acceptable.
- Recoverable material: Households whose homes have walls, floor or ceiling of acceptable or recoverable material or households whose homes have more than one indicator recovered but none unrecovered.
- Unrecoverable material: households whose houses have at least one unrecoverable material.

2) Sanitation: consists in availability of water within housing and the mechanism of wastewater disposal. For this, the following categories are considered:

Clasification	Water Availability	Excreta Disposal
Acceptable Sanitation	With faucet un the house	Toilet conected to sewer Toilet conected to septic tank
Sanititation Deficit	With tap water in the site but outside the home. Do not have the system, leads	Sanitary latrine is connected to the black well Box on black hole Drawer on ditches or canals Drawer connected to another system No toilet (WC)

3) Type of housing: classified into two types, acceptable housing: houses, townhouses, apartments and rooms in old houses or tenements and unrecoverable housing: consists of shacks, improvements, huts or similar buildings.

The *overall quality of housing index* consists of these three conditions, materials, sanitation and housing type, and sorts them into three categories, "Acceptable", "Recoverable" and "Unrecoverable," according to the following criteria:

Quality of Housing Index			
Categories	**Type of Dwelling**	**Sanitation Index**	**Materiality Index**
Acceptable Housing	Acceptable	Acceptable	Acceptable Recoverable (only if the wall is recoverable, other acceptable)
Recoverable Housing		Acceptable or deficit	Acceptable Recoverable
Unrecoverable Housing	Unrecoverable	Acceptable	Accepable Recoverable Unrecoverable
		Deficit	Accepable Recoverable Unrecoverable

The threshold chosen for this dimension was the level of "unrecoverable housing", i.e. if the household lives in a home classified as unrecoverable, then the home is considered deficient in this dimension. If the housing is acceptable or able to be made so, it is not considered deficient.

Overcrowding

Finally, overcrowding was defined by *Ministerio Vivienda y Urbanismo* (MINVU) as the space available per resident and consists of:

- No overcrowding defined as those households with 2.4 or fewer people per bedroom.
- Mediumvercrowding defined as those households with more than 2.5 but less than 5 people per bedroom.
- Critical overcrowding defined as those households with five or more people per bedroom.

Both medium and critical overcrowding are considered to be deficient in this category

Considering these five dimensions, income, education, health, housing and overcrowding, each with their own indicators and thresholds for poverty, we use the Headcount Ratio method to determine multidimensional poverty.

3.2 Vulnerability: Transition Matrix

Once we estimated the rates of income poverty and multidimensional poverty, we analyzed the dynamics of poverty and the vulnerability by observing the trajectory of households over time.

A household is classified as poor or not poor by income and poor or not poor multi-dimensionally. This was done for each respective year: 1996, 2001, and 2006. With this information and through transition matrices, we observed changes in the different states of households over time. Then we have four possible states, those households who were poor in the two periods, those who came out of poverty, those who entered poverty and finally those households which remained always non-poor. Making this analysis we can identify those households that are in a chronic state of poverty and those that are transient and vulnerable to falling into poverty.

Chronic poverty is a result of low household productive capital, while in the transient poverty is associated with negative shocks that the household is unable to absorb(Contreras, D. et al.). It is this second group that is called "vulnerable" because they do not necessarily fall under the poverty line in every moment of time, but rather are households that are more likely to fall into this situation, since it was previously below the poverty line

3.3 Probit and Multinomial Probit Estimations

We estimated discrete choice models for the determinants of the probability of entering and exiting poverty for both income poverty and multidimensional poverty. In the latter case, we considered two measures: multidimensional poverty using the Union Approach *(k=1)* and intermediate approach of multidimensional poverty using two dimensions *(k=2)*.

At first we estimated Probit models for the determinants of the probability of entering poverty and the probability of escaping poverty. The dependent variables are as follows:

$$Yentered_{t1,t2}\begin{cases} 1\ if\ household\ is\ Non\ Poor\ in\ t_1\ and\ Poor\ in\ t_2\ (NP-P) \\ 0\ if\ household\ is\ Non\ Poor\ in\ t_1\ and\ Non\ Poor\ in\ t_2\ (NP \quad NP) \end{cases}$$

$$Yexited_{t1,t2}\begin{cases} 1\ if\ household\ is\ Poor\ in\ t_1\ and\ Non\ Poor\ in\ t_2\ (P-NP) \\ 0\ if\ household\ is\ Poor\ in\ t_1\ and\ Poor\ in\ t_2\ (P-P) \end{cases}$$

This was done for changes in the state of poverty between 1996 and 2001 and for changes in state of poverty between 2001 and 2006. In a second stage we estimated multinomial Probit model, considering four possible categories. Here we estimate the determinants of being in each of these alternatives.

$$\begin{cases} Non\ Poor\ in\ t_1 and\ Non\ Poor\ in\ t_2\ (NP-NP) \end{cases}$$

3.3.1 Variables

The explanatory variables used for both estimates, Probit and Multinomial Probit, are divided into categories geographic, demographic, human capital, labor, health, and physical capital.

The geographic variables are Capital Region and Urban – Rural Area.

The demographic variables are Household Head Age (HH_Age), Household Head Sex (HH_Sex), number of people over 65 years at home (Age>65), and Household Head Couple (HH_Partner), which takes the value of 1 if the household head has a spouse and 0 if the household head has no partner.

The educational variables are education level of the household head or spouse (Parents_Education) and Maximum Education at Home (Max_Education) which is the level of education achieved by the most educated person in the household.

The labor variables are Occupation of Head of Household (HH_Working) with value 1 for employed and value 0 for unemployed or retired. It also includes a Dependency Ratio (Dependency_ratio), which is calculated by dividing the number of people working by the total number of people in the household.
The health variables considered are: Disability, in which the variable takes value 1 if someone in the household has a disability and takes value 0 otherwise and Health Shock which considers any household major illness during the period.

Finally, we use home ownership as a proxy for physical capital assets of the person.

4. Data

The database used in this investigation is from the CASEN Panel Survey for 1996, 2001 and 2006.

From the 1996 CASEN survey the *Ministerio Planificación* (MIDEPLAN) took a representative sub sample of households living in regions III, VII, VIII as well as the Metropolitan Region, which was surveyed in 2001 and then 2006. This sub-sample consisted of 5209 households. The survey over-represents the poorest households in the four regions.

Table 4.1 shows the number of households and people surveyed in each wave of the Casen Panel Survey.

Table 4.1: Panel Casen 1996 – 2001 – 2006

	Households	Individuals
1996	5209	20942
2001	4648	18587
2006	3769	14568
1996 - 2001	3795	15038
2001 - 2006	3126	12100
1996 - 2001 - 2006	2648	10287

In the first wave, 5,209 households were interviewed totaling 20,942 people. By 2001 there were only 4,648 households totaling18,587 people. Finally in 2006 the number of households was reduced to 3,769 totaling 14,568 people.

Because it is a panel survey, it is necessary to determine the level of attrition sample over time. Attrition can present several problems for analysis of the data, principally if the characteristics of the households that are lost, i.e. non-respondents, differ systematically from the characteristics of those that are not. This means that attrition is selective and any estimates made from this data may be biased.

The rate of attrition for the sample is 28% after five years and 50% after 10 years. This is comparable to similar surveys. According to a study on the nature of this sample's attrition (Bendezú, 2007) it consistently lost people between 20 and 29 years, people who rented their homes, and persons of higher income deciles. Although this may lead to bias in the estimates, longitudinal survey weights compensate for this attrition.

This multi-topic survey includes several useful topics for identifying poverty, both income and multidimensional, and determinants that could contribute to transitions between states of poverty or remaining in states (poor, non-poor). The main topics covered by the survey are household composition, education, employment and income.

5. Results

5.1 Deprivation by Dimensions

Table 5.1 shows the percentage of households that are under the threshold for each of the five dimensions: income, education, health, housing and overcrowding. An important observation is that for the income dimension defined by the poverty line, the percentage of people below the threshold decreases over time. The reduction is almost the same for the period between 1996 to 2001 as the one for 2001 to 2006.

For the dimension of education, in which the threshold is that 50% of household members over 14 years of age have at least 8 years of education, the percentage increased slightly between 1996 and 2001 and decreased slightly between 2001 and 2006. The health dimension has similar movement; the percentage held between 1996 and 2001 and then there was a small decrease of about 1.4 percentage points between 2001 and 2006. In the housing dimension, there is a decrease in the percentage of households below the threshold during 1996 and 2001, but then stops declining. The overcrowding dimension shows a clear decline over the period. The reduction in the initial period is over 8 percentage points and then 5 percentage points between 2001 and 2006.

Table 5.1: Deprivation by Dimensions (%)

Dimensions	1996	2001	2006
Income	19,3	14,9	8,0
Education	14,3	15,4	14,5
Health	25,9	25,8	24,4
Housing	3,9	1,7	1,5
Overcrowding	23,1	15,4	10,0

In relation to the level of deprivation of the population, Table 5.2 shows that the percentage of households above the threshold for all dimensions has grown over the years, reaching over 61% in 2006. On the other hand, people who are below the threshold in four or five dimensions is 2% or less for any given year.

Table 5.2: Households by number of deprived dimensions (%)

Number Deprivations	Percentage		
	1996	2001	2006
0	46,1	53,8	61,5
1	32,4	26,3	25,8
2	12,9	14,1	8,1
3	6,6	4,8	3,6
4	2,0	0,9	0,9
5	0,1	0,1	0,1

Table No. 5.3 shows these results and reports the percentages at each value of "cut off" as possible (k = 1, ..., 5).

Table 5.3: Multidimensional Poverty: Headcount Ratio (%)

	Headcount Ratio (H)		
	1996	2001	2006
Union Approach (k>=1)	51,4	44,3	36,8
2 dimensions (k>=2)	18,5	16,8	11,7
3 dimensions (k>=3)	6,8	4,3	3,6
4 dimensions (k>=4)	0,9	0,5	0,2
Intersection Approach (k=5)	0,1	0,0	0,1

It is important to keep in mind that the Headcount Ratio is a multidimensional poverty measure that does not satisfy the monotonicity property since the measure does not change if a poor person increases the number of deprivationsTherefore, we calculate the Adjusted Headcount Ratio, which takes into account the number of deprivations per person. The following tables show the average deprivation of the poor in each "cut off" and poverty rates using this new measure.

Table 5.4: Average Deprivations of the Poor (%)

	Average Deprivations of the Poors (A)		
	1996	2001	2006
Union Approach (k>=1)	1,9	1,8	1,7
2 dimensions (k>=2)	2,6	2,5	2,5
3 dimensions (k>=3)	3,3	3,2	3,3
4 dimensions (k>=4)	4,1	4,1	4,2
Intersection Approach (k=5)	5,0	5,0	5,0

Table 5.5: Multidimensional Poverty: Adjusted Headcount Ratio (%)

	Adjusted Headcount Ratio (M0)		
	1996	2001	2006
Union Approach (k>=1)	19,0	15,9	12,5
2 dimensions (k>=2)	9,5	8,4	6,0
3 dimensions (k>=3)	4,5	2,8	2,4
4 dimensions (k>=4)	0,7	0,4	0,1
Intersection Approach (k=5)	0,1	0,0	0,1

We can find significant differences in terms of magnitude of poverty between the two measures. But poverty in both measures decreases oveofr time and always decreases dramatically when defining poverty with a cut off = 3 or more dimensions. This shows that few people have deficiencies in more than two

5.3 Transition Matrix

Transition matrices are given below for each period and for each of the three measures of poverty: poverty measured by income, multidimensional poverty *k=1* and multidimensional poverty *k=2*.

The data shows that in 1996-2001 the percentage of households who move out of income poverty was 59.7% while the percentage of household who enter poverty only reaches 8.8%. On the other hand, 40.3% of households are below poverty line the two years. For the following period, 2001 - 2006, those leaving poverty are above 74% and those who become poor are only 5.0%.

Chronic poverty was reduced by 15 percentage points over the two periods. Considering the definition of transient poverty as those households that exit and enter poverty in the period studied, it can be said that 18.6% of the hosusehold between 1996 and 2001 are in this situation, therefore are in a vulnerable contidion. In the case of the next period, 2001 – 2006, the transient poverty is reduced to 15.4%.

Matrix 1: Income Poverty (%) 1996 - 2001

	2001		
1996	Poor	Non Poor	Total
Poor	40,3	59,7	19,3
Non Poor	8,8	91,2	80,8
Total	14,9	85,2	100,0

Matrix 2: Income Poverty (%) 2001 - 2006

	2006		
2001	Poor	Non Poor	Total
Poor	25,2	74,8	14,9
Non Poor	5,0	95,0	85,2
Total	8,0	92,0	100,0

Looking at the results for the period 1996 - 2001, for multidimensional poverty k=1, we see that those moving out of poverty are only 32.0% and those entering poverty are 19.2%. The households that can be classified in chronic poverty reach 68.0% andо those in a transient poverty status are 25.7%. In the following period, the percentage of movement out of poverty increases to 38.3% while movement into poverty decreased slightly (17.0%). The households that can be considered vulnerable in this period increased to 26.3%. This can be explained because there are more households leaving poverty between 2001 – 2006 than in the first period.

Matrix 1: Multidimensional Poverty (k=1) (%) 1996 - 2001

	2001		
1996	Poor	Non Poor	Total
Poor	68,0	32,0	51,4
Non Poor	19,2	80,8	48,6
Total	44,3	55,7	100,0

Matrix 2: Multidimensional Poverty (k=1) (%) 2001 - 2006

	2006		
2001	Poor	Non Poor	Total
Poor	61,7	38,3	44,3
Non Poor	17,0	83,0	55,7
Total	36,8	63,2	100,0

In the case of multidimensional poverty k=2, between 1996 and 2001 movement out of poverty was 51.7% while movement into poverty was 9.7%. This contrasts

Matrix 1: Multidimensional Poverty (k=2) (%) 1996 - 2001

	2001		
1996	Poor	Non Poor	Total
Poor	48,3	51,7	18,5
Non Poor	9,7	90,3	81,5
Total	16,8	83,2	100,0

Matrix 2: Multidimensional Poverty (k=2) (%) 2001 - 2006

	2006		
2001	Poor	Non Poor	Total
Poor	40,5	59,6	16,8
Non Poor	5,9	94,1	83,2
Total	11,7	88,3	100,0

From these matrices it follows that, when measuring poverty by income, the percentage of individuals moving out of poverty in each period is greater than when considering multidimensional poverty by either of the two definitions used here. This could be due to the fact that multidimensional measures of poverty consider dimensions that are more persistent over time. For example, there is a lot of similarity in the educational dimension over time compared to the income dimension. The appendix includes transition matrices for each dimension showing the low rate of change in the education and health dimensions.

Moreover, the percentage of people who fall into poverty, i.e. those that became poor during the time period is considerably lower when comparing income poverty with multidimensional measure via Union Approach. However, it is very similar when compared with the multidimensional poverty measure (k = 2).

Therefore, we can conclude that, in terms of dynamics of poverty, income poverty measures behave similarly to the multidimensional poverty measure when counting deprivation in two or more dimensions. This may be due to correlation in deprivate dimensions with lack of income.

5.4 Probit Estimations

To understand what is correlated with household transitions into and out of poverty over time, it is necessary to look at the determinants that explain the change in status. For this we estimate Probit and Multinomial Probit models for each measurement of poverty utilized. This is done for both the period 1996 - 2001 and for the period 2001-2006.

5.4.1 Probit

The estimation results shown below are for Probit models to determine the probability of entering or exiting poverty (considering the three poverty measurements) for both time periods. As explained in Section 3, when estimating the probability of entering poverty, the dependent variable takes the value 1 if the household was "not poor" in period 1 and changes to "poor" in period 2. Consequently, for the estimation of the probability of escaping poverty, the dependent variable takes the value 1 if the household was "poor" in period 1 and "not poor" in period 2.

5.4.1.1 Probability of Entering Poverty

If we look at what happens in the first period, we can conclude that for all poverty measures considered, increased age of the household head decreases the probability of entering poverty.

Comparing the income poverty measure to the multidimensional measures, living in the capital region is a determinant of entering poverty for the first, but not the second.

In the second period, there are certain differences between the income poverty measure and multidimensional measures; we observe that the dependency ratio negatively affects the probability of entering income poverty and seems not to be a relevant variable for multidimensional poverty. The variable "head household working" is similar.

5.4.1.2 Probability of Exit Poverty

If we observe only the first period, (Table 5.7: Probability Estimation Poverty Exit 1996-2001 and 2001-2006), the higher the dependency ratio, the more likely the household is to exit poverty in an income measure but not in a multidimensional measure. Meanwhile, a health shock is the reverse situation; having had an illness during this period negatively affects the chance to escape income poverty but is not significant in explaining multidimensional poverty.

When considering the period 2001 - 2006, we can conclude that the higher the educational level of the most educated person in the household, the more likely the household is to exit poverty since it occurs in all three poverty measures considered

On the other hand, having a person with a disability in the household negatively affects the probability of exiting poverty for income poverty and multidimensional poverty with k=1.

Table 5.6: "Estimation of the Probability of Entering 1996 – 2001 y 2001 - 2006" (mfx)

	Entered_96_01	Entered_96_01_1d	Entered_96_01_2d
Capital_Region_96	-0.038	-0.047	-0.038
	(0.0626)	(0.2514)	(0.0852)
Area_96	0.029	0.113	0.010
	(0.1426)	(0.0408)*	(0.7318)
HH_Age_96	-0.005	-0.008	-0.004
	(0.0000)**	(0.0018)**	(0.0110)*
HH_Sex_96	-0.020	0.058	-0.049
	(0.6355)	(0.5418)	(0.3922)
HH_Partner_96	0.034	-0.189	0.048
	(0.3976)	(0.1047)	(0.2466)
Dependancy_Ratio_96	-0.085	-0.359	0.071
	(0.2569)	(0.0324)*	(0.2877)
Age > 65_ 96	0.199	-0.030	0.121
	(0.0045)**	(0.6898)	(0.0461)*
Disability_96	-0.010	-0.051	0.077
	(0.6868)	(0.6044)	(0.1152)
HH_Working_96	0.027	0.081	-0.014
	(0.4453)	(0.3329)	(0.7522)
Max_Education_96	-0.008	-0.025	-0.012
	(0.0395)*	(0.0028)**	(0.0002)**
Parents_Education_96	-0.007	0.004	-0.006
	(0.1426)	(0.6004)	(0.2426)
Home Owner_96	-0.054	-0.019	-0.070
	(0.1139)	(0.7430)	(0.0638)
Health_Shock_96	0.023	-0.012	0.041
	(0.4031)	(0.8219)	(0.1102)
Observations	1265	593	1065

Robust p values in parentheses
* significant at 5%; ** significant at 1%

	Entered_01_06	Entered_01_06_1d	Entered_01_06_2d
Capital_Region_01	0.001	-0.092	-0.016
	(0.9542)	(0.0280)*	(0.1991)
Area_01	0.005	0.027	-0.052
	(0.7011)	(0.6274)	(0.0560)
HH_Age_01	-0.000	-0.001	-0.000
	(0.6197)	(0.6186)	(0.8508)
HH_Sex_01	0.014	-0.112	-0.039
	(0.4139)	(0.3460)	(0.2790)
HH_Partner_01	-0.027	0.065	0.039
	(0.1885)	(0.5210)	(0.1058)
Dependancy_Ratio_01	-0.139	-0.133	0.026
	(0.0029)**	(0.3988)	(0.6369)
Age > 65_ 01	-0.020	-0.074	-0.010
	(0.2565)	(0.2610)	(0.6762)
Disability_01	0.030	0.100	0.032
	(0.1927)	(0.2100)	(0.1527)
HH_Working_01	0.058	0.057	-0.030
	(0.0013)**	(0.4104)	(0.2889)
Max_Education_01	-0.006	-0.018	-0.008
	(0.0007)**	(0.0007)**	(0.0007)**
Parents_Education_01	0.003	0.000	0.000
	(0.2491)	(0.9566)	(0.9065)
Home Owner_01	-0.022	-0.054	-0.001
	(0.2007)	(0.3800)	(0.9517)
Health_Shock_01	0.026	0.108	0.006
	(0.0311)*	(0.0053)**	(0.6320)
Observations	1405	667	1088

Robust z-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Table 5.7: "Estimation of the Probability of Exit Poverty 1996 – 2001 y 2001 – 2006" (mfx)

	Exited_96_01	Exited_96_01_1d	Exited_96_01_2d		Exited_01_06	Exited_01_06_1d	Exited_01_06_2d
Capital_Region_96	0.079	0.051	0.024	Capital_Region_01	0.058	0.121	0.024
	(0.3541)	(0.3519)	(0.7668)		(0.3547)	(0.0363)*	(0.7676)
Area_96	-0.073	0.033	0.116	Area_01	-0.063	0.095	0.110
	(0.4294)	(0.5984)	(0.1651)		(0.3974)	(0.2349)	(0.2472)
HH_Age_96	0.001	0.001	0.003	HH_Age_01	0.009	0.005	0.004
	(0.7586)	(0.7120)	(0.5353)		(0.0090)**	(0.2283)	(0.4411)
HH_Sex_96	0.249	-0.078	0.125	HH_Sex_01	0.383	0.204	0.307
	(0.0709)	(0.4805)	(0.5078)		(0.0638)	(0.1262)	(0.0872)
HH_Partner_96	-0.275	-0.053	0.083	HH_Partner_01	-0.079	-0.179	-0.115
	(0.0103)*	(0.6410)	(0.6584)		(0.5802)	(0.1832)	(0.4569)
Dependancy_Ratio_96	1.518	-0.180	0.286	Dependancy_Ratio_01	0.538	0.394	-0.283
	(0.0209)*	(0.3495)	(0.3843)		(0.2465)	(0.0925)	(0.3136)
Age > 65_ 96	0.194	-0.158	0.345	Age > 65_ 01	0.103	-0.156	0.143
	(0.2363)	(0.1108)	(0.0179)*		(0.3578)	(0.2066)	(0.3269)
Disability_96	0.188	-0.094	-0.323	Disability_01	-0.321	-0.287	0.103
	(0.0965)	(0.2855)	(0.0218)*		(0.0078)**	(0.0160)*	(0.4930)
HH_Working_96	-0.265	0.065	-0.159	HH_Working_01	-0.198	-0.169	0.046
	(0.0753)	(0.4445)	(0.2176)		(0.0692)	(0.1416)	(0.7637)
Max_Education_96	0.007	0.040	0.044	Max_Education_01	0.040	0.050	0.052
	(0.6769)	(0.0006)**	(0.0594)		(0.0046)**	(0.0001)**	(0.0305)*
Parents_Education_96	0.017	0.028	0.042	Parents_Education_01	0.001	-0.004	-0.025
	(0.5386)	(0.1516)	(0.1397)		(0.9437)	(0.8062)	(0.3820)
Home Owner_96	0.078	0.044	0.037	Home Owner_01	-0.073	-0.029	0.027
	(0.3839)	(0.5566)	(0.6879)		(0.2524)	(0.7538)	(0.7759)
Health_Shock_96	-0.241	0.078	0.001	Health_Shock_01	-0.074	-0.112	-0.097
	(0.0280)*	(0.4257)	(0.9921)		(0.2907)	(0.1251)	(0.2933)
Observations	524	951	479	Observations	375	770	349
Robust z-statistics in parentheses				Robust z-statistics in parentheses			
* significant at 5% level; ** significant at 1% level				* significant at 5% level; ** significant at 1% level			

5.4.2 Multinomial Probit

Multinomial Probit models explain the determinants of transition from one state to another, i.e. entering or exiting poverty between two periods of time.

We estimated six Multinomial Probit models, one for each time period and each measure of poverty used (income, multi-dimensional k=1 and multidimensional k=2). The dependent variable in each estimate considered four states:

1. Non Poor in t1 and Non Poor in t2 (NP – NP)
2. Poor in t1 and Non Poor in t2 (P – NP)
3. Non Poor in t1 and Poor in t2 (NP – P)
4. Poor in t1 and Poor in t2 (P – P).

The estimation results are shown in Tables 5.8, 5.9 and 5.10. The following describes the main results by states and periods.

5.4.2.1 Non Poor – Non Poor (NP – NP)

For the period 1996 - 2001 and all poverty measures, the age of the head of household, educational level of the most educated person in the household and home ownership all increase the likelihood of staying out of poverty.

Living in urban areas and the dependency ratio are variables that affect the probability of being poor in poverty income measure but not in the multidimensional measure.

There are certain similarities between the estimates of income poverty and multidimensional poverty with k=2. For example, living in the capital positively affects the probability of remaining out of poverty using income poverty and multidimensional with k=2 measures, but not for multidimensional poverty k=1.

For the period 2001 – 2006 and all poverty measures, the age of head of household, educational level of the most educated person in the household and home ownership all increase the likelihood of remaining out of poverty. This is the same as in the first period.

As in the previous case, living in the capital improves the probability of remaining out of poverty both for income poverty and multidimensional poverty.

5.4.2.1 Poor – Poor (P - P)

For the first period and using the income poverty measure, the dependency ratio negatively affects the probability of remaining in poverty for both periods. The labor status determines the probability of being poor in both 1996 and 2001.

Using the multidimensional poverty measure, the variable age of household head has a negative effect, i.e. the higher the age of the household head, the less likely

Analyzing the measures separately, the higher dependency ratio makes it less likely to stay poor in both periods. In the case of households in the metropolitan area, and analyzing poverty multidimensionally, the educational level of the most educated person at home and age of household head are variables that negatively affect the probability of being poor.

5.4.2.3 Poor– Non Poor (P – NP)

In the first period, 1996 - 2001, the older the household head, the lower the probability of leaving poverty between 1996 and 2001. This is true for any measure of poverty used.

In this period there are some similarities between income poverty and multidimensional poverty when considering k=2. Living in the metropolitan area negatively affects leaving poverty for both. The same relationship exists when you look at the education variables. Higher education levels for the person in the household with the most education, lowers the probability of being poor for both periods.

Looking at the results for the period 2001 to 2006, there are also some similarities between the estimates of income poverty and multidimensional poverty k=2, specifically the effects of household age, educational level of most educated person in the household and household ownership. The latter two have a negative impact on the probability of exiting poverty.

5.4.2.4 Non Poor – Poor (NP – P)

The last condition is to have fallen into poverty.

In the first period, considering income poverty, living in an urban area positively affects the probability of falling into poverty, while the higher the age of the household head and the higher the dependency ratio, the less likelihood there is of falling into poverty.

In the case of multidimensional poverty, there are important differences between the measures k=1 and k=2. For k=1, living in urban areas positively affects the probability of entering poverty while the dependency ratio and age of adults in the household decreases the probability. In the case of k=2, age of head of household negatively affects the level of education thus making the household more likely to fall into poverty.

For the second period, 2001 - 2006, the significant variables in income poverty are the dependency ratio and level of education of most educated person household, both of which negatively affect the chances of entering poverty. Having a health shock, however, increases the likelihood of falling into poverty for this measure.

In the case of multidimensional poverty k=1, health shock increases the likelihood

Table 5.8: "Multinomial Probit Estimation: Income Poverty"

	Income Poverty							
	Estimation 1996 - 2001				Estimation 2001 - 2006			
Variable	NP - NP	P - NP	NP - P	P - P	NP - NP	P - NP	NP - P	P - P
Capital_Region	0.1055483	-0.0642107	-0.0272207	-0.014117	0.0489983	-0.0406147	-0.0051386	-0.0032451
	(0.000)**	(0.006)*	(0.139)	(0.059)	(0.028)*	(0.015)*	(0.676)	(0.177)
Area	-0.0578237	0.0240605	0.0308941	0.0028692	-0.0303223	0.0262227	0.0029524	0.0011472
	(0.012)*	(0.093)	(0.049)*	(0.109)	(0.141)	(0.017)*	(0.860)	(0.130)
HH_Age	0.0104007	-0.00447	-0.0054568	-0.0004739	0.0039267	-0.0032522	-0.0004121	-0.0002625
	(0.000)**	(0.000)**	(0.000)**	(0.063)	(0.004)*	(0.001)*	(0.645)	(0.051)
HH_Sex	0.0206087	-0.021478	0.0057548	-0.0048855	-0.0294394	0.024794	0.0087302	-0.0040848
	(0.732)	(0.612)	(0.878)	(0.370)	(0.321)	(0.136)	(0.728)	(0.402)
HH_Partner	-0.0045977	0.0023912	-0.0016505	0.003857	0.0051228	0.0057638	-0.0124984	0.0016117
	(0.934)	(0.947)	(0.965)	(0.176)	(0.885)	(0.762)	(0.690)	(0.222)
Dependancy_Ratio	0.5147801	-0.2876699	-0.1384098	-0.0887004	0.5203303	-0.3665955	-0.1154592	-0.0382756
	(0.000)**	(0.003)*	(0.039)*	(0.022)*	(0.000)**	(0.000)**	(0.020)*	(0.036)*
Age > 65	-0.1087622	0.0145312	0.0992407	-0.0050097	0.0151288	0.002642	-0.0182128	0.000442
	(0.121)	(0.663)	(0.151)	(0.148)	(0.638)	(0.908)	(0.384)	(0.801)
Disability	-0.0827943	0.0840066	0.0008286	-0.0020409	-0.036254	-0.0056659	0.0322643	0.0096557
	(0.199)	(0.167)	(0.975)	(0.215)	(0.351)	(0.735)	(0.305)	(0.263)
HH_Working	-0.0529071	0.036547	0.0087538	0.0076062	-0.0866683	0.0257163	0.0549613	0.0059907
	(0.172)	(0.106)	(0.776)	(0.022)*	(0.002)*	(0.211)	(0.001)*	(0.042)*
Max_Education	0.025409	-0.0170078	-0.007029	-0.0013722	0.0152017	-0.0071521	-0.0072805	-0.000769
	(0.000)**	(0.000)**	(0.051)	(0.074)	(0.000)**	(0.005)*	(0.000)**	(0.075)
Parents_Education	0.0062578	-0.0006212	-0.0052985	-0.0003381	0.0011897	-0.004061	0.0028917	-0.0000204
	(0.327)	(0.900)	(0.265)	(0.404)	(0.790)	(0.205)	(0.345)	(0.917)
Home Owner	0.1458462	-0.0846824	-0.045362	-0.0158019	0.2006813	-0.1703613	-0.0261808	-0.0041392
	(0.002)*	(0.023)*	(0.178)	(0.070)	(0.000)**	(0.001)*	(0.217)	(0.213)
Health_Shock	-0.031043	-0.0149033	0.0443817	0.0015646	-0.0416552	0.0055695	0.0349848	0.0011009
	(0.370)	(0.342)	(0.136)	(0.661)	(0.067)	(0.723)	(0.033)*	(0.381)
Observations	1545	1545	1545	1545	1437	1437	1437	1437

Robust p values in parentheses
* significant at 5%; ** significant at 1%

Table 5.9: "Multinomial Probit Estimation: Multidimensional Poverty k=1"

	Multidimensional Poverty K=1							
	Estimation 1996 - 2001				Estimation 2001 - 2006			
Variable	NP - NP	P - NP	NP - P	P - P	NP - NP	P - NP	NP - P	P - P
Capital_Region	0.0594303	0.0106736	-0.0067743	-0.0633296	0.0851224	0.0450015	-0.0558427	-0.0742811
	(0.181)	(0.772)	(0.760)	(0.104)	(0.076)	(0.177)	(0.073)	(0.041)*
Area	0.0406454	-0.0151709	0.0603336	-0.0858081	0.0390898	0.0229459	0.0267441	-0.0887798
	(0.559)	(0.754)	(0.002)*	(0.168)	(0.572)	(0.602)	(0.376)	(0.116)
HH_Age	0.0149318	-0.0044489	-0.0010378	-0.0094451	0.0101442	-0.0034482	0.0009484	-0.0076444
	(0.000)**	(0.046)*	(0.442)	(0.000)**	(0.001)*	(0.098)	(0.600)	(0.001)*
HH_Sex	-0.1170892	-0.0050694	0.0074565	0.1147022	-0.0711337	0.1481539	-0.1073747	0.0303545
	(0.375)	(0.945)	(0.877)	(0.194)	(0.507)	(0.004)*	(0.261)	(0.692)
HH_Partner	0.0984876	-0.0104544	-0.0964569	0.0084237	0.0555186	-0.1335432	0.0587301	0.0192944
	(0.433)	(0.891)	(0.164)	(0.932)	(0.566)	(0.092)	(0.319)	(0.802)
Dependancy_Ratio	0.307992	-0.2283614	-0.1534533	0.0738227	0.1355524	0.1106991	-0.1123585	-0.133893
	(0.096)	(0.103)	(0.042)*	(0.640)	(0.457)	(0.436)	(0.191)	(0.392)
Age > 65	-0.1331655	-0.0494105	-0.0664808	0.2490568	-0.0677817	-0.0111288	-0.0665347	0.1454452
	(0.086)	(0.421)	(0.011)*	(0.003)*	(0.394)	(0.865)	(0.066)	(0.069)
Disability	-0.1095433	-0.0134186	-0.0449674	0.1679293	-0.0732741	-0.1270111	0.0693673	0.130918
	(0.209)	(0.827)	(0.168)	(0.049)*	(0.399)	(0.001)*	(0.269)	(0.112)
HH_Working	-0.0373783	0.0232078	0.0421845	-0.028014	0.0066767	-0.0785146	0.062351	0.0094868
	(0.684)	(0.705)	(0.299)	(0.710)	(0.937)	(0.263)	(0.076)	(0.890)
Max_Education	0.05886	0.0055289	-0.0038959	-0.060493	0.0625587	-0.0055935	-0.0022421	-0.0547231
	(0.000)**	(0.495)	(0.399)	(0.000)**	(0.000)**	(0.410)	(0.566)	(0.000)**
Parents_Education	0.0245467	-0.0006197	0.0076945	-0.0316215	0.0167669	-0.010024	0.0047932	-0.0115361
	(0.013)*	(0.943)	(0.085)	(0.007)*	(0.089)	(0.181)	(0.350)	(0.165)
Home Owner	0.2412947	-0.0556712	0.0547761	-0.2403997	0.1873673	-0.0922464	-0.0019281	-0.0931928
	(0.000)**	(0.323)	(0.013)*	(0.000)**	(0.006)*	(0.141)	(0.957)	(0.147)
Health_Shock	-0.0207162	0.0371777	-0.0062544	-0.0102071	-0.0932947	-0.0327691	0.0639292	0.0621346
	(0.752)	(0.569)	(0.815)	(0.847)	(0.062)	(0.356)	(0.023)*	(0.150)
Observations	1545	1545	1545	1545	1437	1437	1437	1437

Robust p values in parentheses
* significant at 5%; ** significant at 1%

Table 5.10: "Multinomial Probit Estimation: Multidimensional Poverty k=2"

	Multidimensional Poverty K=2							
	Estimation 1996 - 2001				Estimation 2001 - 2006			
Variable	NP - NP	P - NP	NP - P	P - P	NP - NP	P - NP	NP - P	P - P
Capital_Region	0.1373429	-0.0720639	-0.0185881	-0.0466908	0.0750523	-0.0358294	-0.0114496	-0.0277733
	(0.000)**	(0.004)*	(0.351)	(0.000)**	(0.008)*	(0.066)	(0.353)	(0.030)*
Area	0.0581854	-0.0214667	0.0094723	-0.0461909	0.1060671	-0.0209756	-0.0385184	-0.0465731
	(0.216)	(0.409)	(0.704)	(0.044)*	(0.040)*	(0.443)	(0.191)	(0.081)
HH_Age	0.0104759	-0.0043113	-0.0032759	-0.0028888	0.0059317	-0.0038534	0.0000172	-0.0020955
	(0.000)**	(0.000)**	(0.033)*	(0.000)**	(0.000)**	(0.001)*	(0.982)	(0.006)*
HH_Sex	0.0822569	-0.0230201	-0.0420081	-0.0172286	0.0249151	0.0487117	-0.0303143	-0.0433125
	(0.380)	(0.621)	(0.535)	(0.555)	(0.740)	(0.044)*	(0.478)	(0.367)
HH_Partner	-0.0969535	0.0445713	0.0488929	0.0034893	-0.0494937	-0.0107788	0.035282	0.0249904
	(0.113)	(0.129)	(0.192)	(0.883)	(0.326)	(0.747)	(0.110)	(0.217)
Dependancy_Ratio	0.176892	-0.1328738	0.0896562	-0.1336743	0.0283059	-0.0532859	0.0155004	0.0094796
	(0.156)	(0.079)	(0.197)	(0.024)*	(0.824)	(0.527)	(0.767)	(0.847)
Age > 65	-0.2600944	0.1731978	0.0856217	0.0012749	-0.094934	0.0850932	-0.0142534	0.0240942
	(0.005)*	(0.027)*	(0.261)	(0.948)	(0.211)	(0.187)	(0.521)	(0.386)
Disability	-0.152755	-0.0126887	0.0792652	0.0861785	-0.1608921	0.1136432	0.0287068	0.0185421
	(0.083)	(0.611)	(0.204)	(0.140)	(0.049)*	(0.140)	(0.281)	(0.400)
HH_Working	-0.0210448	0.0025414	-0.0073832	0.0258865	0.0560856	-0.0224669	-0.0255381	-0.0080806
	(0.700)	(0.937)	(0.856)	(0.106)	(0.353)	(0.584)	(0.357)	(0.768)
Max_Education	0.0447614	-0.0187596	-0.0106493	-0.0153524	0.032402	-0.0131784	-0.0076985	-0.0115251
	(0.000)**	(0.000)**	(0.002)*	(0.000)**	(0.000)**	(0.000)**	(0.001)*	(0.000)**
Parents_Education	0.0095292	0.0021931	-0.0061326	-0.0055897	0.0167614	-0.0144437	0.0011379	-0.0034555
	(0.222)	(0.677)	(0.289)	(0.095)	(0.023)*	(0.034)*	(0.571)	(0.190)
Home Owner	0.146349	-0.0573337	-0.0375982	-0.0514171	0.1534375	-0.1069691	0.0023086	-0.0487771
	(0.007)*	(0.125)	(0.287)	(0.046)*	(0.011)*	(0.040)*	(0.871)	(0.027)*
Health_Shock	-0.0565281	0.0142009	0.0384301	0.0038972	-0.0191736	0.0025672	0.0072973	0.0093091
	(0.198)	(0.597)	(0.182)	(0.844)	(0.553)	(0.916)	(0.603)	(0.429)
Observations	1545	1545	1545	1545	1437	1437	1437	1437

Robust p values in parentheses
* significant at 5%; ** significant at 1%

6. Concluding Remarks

Poverty in Chile has declined over time in all three measures used: poverty levels based solely on income, or poverty viewed multidimensionality considering measures of health, education, housing reliability and other measures. It should be noted that the absolute poverty rates differ according to the measure used.

Multidimensional poverty measures give different results when considering different methods of aggregation. Using a Headcount Ratio gives poverty rates higher than when considering the method Headcount Adjusted Ratio. Since the latter case is adjusted by the number of deprivations impoverished people experience, this is not unexpected.

According to the transition matrices, the percentage of people moving out of poverty using the income measure is higher than the percentage of people out of poverty when measured multi-dimensionally. This is because multidimensional measures consider dimensions far more persistent such as education. Increasing the level of income is faster than increasing the years of schooling. However, increased years of schooling can be a more sustainable contribution to staying out of an impoverished state in the long-run.

Additionally it is important to note that there are differences between the measures of multidimensional poverty. The behavior of multidimensional poverty transitions varies considerably for different values of k. We can conclude that the income poverty measure behaves very similarly in some ways to the multidimensional poverty measure k=2.

In determining the factors that are influencing the transition into or out of poverty or remaining in the state of poverty, it appears that there are differences between both multidimensional measures, and with the traditional measure of income. However, it is clear the importance of education as a determinant of exiting poverty in all measures. This result is consistent when considering estimates of both the Probit and Multinomial Probit models. In all cases, the highest educational level of the home is a strongest factor for moving out of poverty.

Additionally, when considering the income measure only, the dependency ratio is far more relevant than the other variables in explaining changes in the state of poverty. The household age also plays an important role in the probability of exiting and entering poverty: the older the household head, the greater probability of leaving poverty. This is true for the result set of most estimates.

Chronic income poverty measure, shows that the the dependency ratio negatively affects the probability of remaining in poverty for both periods. Using the multidimensional poverty measure, the variable age of household head has a negative effect. The educational level of the people in the household is also a important factor, higher education is key in determining the permanence in poverty. Finally, owning the house decreases the likelihood of being multidimensionality poor for both periods.

cut-offs or dimensions changes the poverty rates and the rates of movement into and out of poverty. Therefore, it is important to consider dimensions other than income when measuring poverty because the traditional measure of poverty used in Chile has certain deficiencies. However, it is also important that the process of multidimensional poverty measurement is conducted using criteria that have international validity or that arise from national consensus. This can include the decision of the dimensions, the number of dimensions and the aggregation method used among others.

7. References

Alkire, S. 2007. "The Missing Dimensions of Poverty Data: Introduction to the Special Issue", Oxford Development Studies, 35 (4): 347-359.

Alkire, S. 2008. "Choosing Dimensions: The capability approach and multidimensional poverty", MPRA Paper No. 8862, posted 26.

Alkire, S. and Foster, J. E. 2007. "Counting and Multidimensional Poverty Measurement" OPHI Working Paper Series No. 07, OPHI.

Battiston, D., Cruces, G., Lopez-Calva, L., Lugo, M. and Santos, E. 2009. "Income and Beyond: Multidimensional Poverty in six Latin American countries" OPHI Working Paper Series No. 17, OPHI.

Bendezú, L., A. Denis, J.R. Zubizarreta, 2007. "Análisis de la atrición de la muestra de la Encuesta Panel CASEN". Documento de Trabajo Nº 1, Observatorio Social, Universidad Alberto Hurtado.

Bendezú, L., A. Denis, C. Sánchez, P. Ugalde, J.R. Zubizarreta, 2007. "La Encuesta Panel CASEN: metodología y calidad de datos". En J.R. Zubizarreta, ed. Documento Metodológico Nº 1, Observatorio Social, Universidad Alberto Hurtado

Bourguignon, F. and Chakravarty, S. 2003. "The measurement of multidimensional poverty", Journal of Economic Inequality, 1 (1): 25-49.

Busso, G. "Vulnerabilidad social: nociones e implicancias de políticas para Latinoamérica inicios del siglo XX", en Seminario Internacional las diferentes expresiones de la vulnerabilidad social en América Latina y el Caribe, 2001.

Castro, R., F. Kast, 2004. "Movilidad de la pobreza en Chile. Análisis de la Encuesta Panel 1996/2001". Serie Informe Social Nº 85, Libertad y Desarrollo, Santiago.

Castro, R., 2008. "Pobreza y Movilidad de Ingresos en Chile". Serie Informe Social Nº 111, Libertad y Desarrollo, Santiago.

Consejo Nacional de Evaluación de la Política de Desarrollo Social (CONEVAL) 2009, "Metodología para la medición multidimensional de la pobreza en México".

Contreras, D., Hermann, J., Cooper R. y Nielson C. 2008. "The Dynamics of Poverty in Chile". Journal of Latin American Studies 40, 251-273.

Conteras, D., Cooper R. and Nielson C. 2007. "Crecimiento Pro Pobre en Chile". Documento de trabajo 239, Departamento de Economía, Universidad de Chile.

Denis, A., Prieto, J. and Zubizarreta, R. 2007. "Dinámica de la pobreza en Chile: evidencias en los años 1996, 2001 y 2006". Persona y Sociedad, Universidad

Foster, J. E., Greer, J. and Thorbecke, E. 1984. 2A class of decomposable poverty indices", Econometrica, 52 (3): 761-6.

Fundación para la Superación de la Pobreza, 2009. "Panorama general de la pobreza y su dinámica en Chile: Últimas mediciones". Dirección de Investigación y Propuestas Públicas.

Heitzmann, Karin – Canagarajah, R. Sudharshan – Siegel, Paul B. (2002) Criterios para evaluar las fuentes de riesgoy de la vulnerabilidad. Papales de Discusión sobre Protección Social Nº 0218, Unidad de Protección Social, Red de Desarrollo Humano del Banco Mundial, Junio.

Larrañaga O. "La medición de la pobreza en dimensiones distintas al ingreso" 2007. Series Estudios Estadísticos y Prospectivos, CEPAL Naciones Unidas.

López-Calva, L. F. and Ortiz-Juárez, E. 2009. "Medición multidimensional de la pobreza en México: significancia estadistica en la inclusión de dimensiones no monetarias", Estudios Económicos, Special Issue: 3-33.

MIDEPLAN Componentes centrales de un sistema de protección social sustentable: Nuevo Escenario Social en Chile [Borrador]. Santiago, Departamento de Estudios, División Social MIDEPLAN, Diciembre 2005.

MIDEPLAN Síntesis de los principales enfoques, métodos y estrategias para la superación de la pobreza [Borrador]. Santiago, Octubre 2002.

Paredes, R., J.R. Zubizarreta, 2005. "Focusing on the Extremely Poor: Income Dynamics and Policies in Chile". Documento de Trabajo Nº 183, Departamento de Ingeniería Industrial y de Sistemas, Universidad Católica de Chile.

Sen, A. 1976. "Poverty: An Ordinal Approach to Measurement", Econometrica, 44: 219-231.

8. Appendix

Matrix 1: Deprivation in Education (%) 1996 - 2001

	2001		
1996	Poor	Non Poor	Total
Poor	79,6	20,4	14,3
Non Poor	4,7	95,3	87,8
Total	15,4	84,7	100,0

Matrix 2: Deprivation in Education (%) 2001 - 2006

	2006		
2001	Poor	Non Poor	Total
Poor	71,0	29,0	15,4
Non Poor	4,2	95,8	84,7
Total	14,5	85,5	100,0

Matrix 1: Health Deprivation (%) 1996 - 2001

	2001		
1996	Poor	Non Poor	Total
Poor	64,0	36,0	25,9
Non Poor	12,4	87,6	74,1
Total	25,8	74,2	100,0

Matrix 2: Health Deprivation (%) 2001 - 2006

	2006		
2001	Poor	Non Poor	Total
Poor	58,1	41,9	25,8
Non Poor	12,7	87,3	74,2
Total	24,4	75,6	100,0

Matrix 1: Housing Deprivation (%) 1996 - 2001

	2001		
1996	Poor	Non Poor	Total
Poor	27,0	73,0	3,9
Non Poor	0,7	99,3	96,1
Total	1,7	98,3	100,0

Matrix 2: Housing Deprivation (%) 2001 - 2006

	2006		
2001	Poor	Non Poor	Total
Poor	39,9	60,1	1,7
Non Poor	0,9	99,1	98,3
Total	1,5	98,5	100,0

Matrix 1: Overcrowding Deprivation (%) 1996 - 2001

	2001		
1996	Poor	Non Poor	Total
Poor	39,5	60,5	23,1
Non Poor	8,2	91,8	77,0
Total	15,4	84,6	100,0

Matrix 2: Overcrowding Deprivation (%) 2001 - 2006

	2006		
2001	Poor	Non Poor	Total
Poor	33,5	66,6	15,4
Non Poor	5,7	94,3	84,6
Total	10,0	90,0	100,0