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Measuring Vulnerability to Poverty in Chile Using the National Socio Economic Characterization Panel Survey for 1996, 2001, 2006

Javier Bronfman¹

Abstract

Chile provides an interesting setting to analyze vulnerability to poverty, especially today, after the last poverty count presented in 2013 by the Ministry of Planning. After twenty years of declining poverty, national indicators showed an increase in poverty from 13% in 2006 to 14% in 2011. Using the CASEN panel data set, this paper explores some of poverty dynamics of poverty in Chile. To begin with, I examine socioeconomic transitions using transition matrices, confirming a great deal of social movement into and out of poverty. Furthermore, this paper advances the knowledge on vulnerability to poverty in Chile by estimating a vulnerability measurement. The evidence reveals a high level of vulnerability to poverty present in Chilean society; vulnerability to poverty affects a larger quantity of households than actual poverty counts. For each of the years surveyed (1996, 2001, and 2006), vulnerability to poverty surpasses poverty estimates by a significant percentage. This forward-looking measure of poverty should be taken into account when designing poverty alleviation policies by targeting social programs not just to those living below the national poverty line, but also to those at risk of becoming poor in the future.

Keywords: Poverty, Vulnerability, Chile

JEL Code: I31, I32, I38

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I. Introduction

Poverty is a paramount concern when monitoring development progress. However, standard poverty indicators are ex-post measures and are therefore limited in their usefulness in anticipating future poverty. Poverty measures are snapshots at a particular point in time. They overlook the multiple risks that individuals or households may face and their ability/resources (or lack thereof) to cope with these risks and avoid becoming poor (or poorer) in the future. There is growing evidence that, beyond large segments of the population being below the national poverty line, a large portion of the population in developing countries is vulnerable to poverty or becoming poor in the future. Grant et al. (2005), for example, indicates that although the estimated proportion of the chronically poor in Latin America ranges from 30 to 40 percent, those considered to be transitory poor (i.e., individuals that at least once during the period of study fell below a poverty threshold) is relatively much larger. Income variability that arises from fluctuations in earnings, particularly in temporary or informal employment, can affect households' ability to manage risk and cope with shocks. Poor quality of public services (e.g. healthcare) can aggravate the negative effects of health shocks. Thus, although average household incomes do not fall below officially defined poverty levels, the degree of household vulnerability can still be high, leading to increased debt and purging of assets.

Although, there has been some research done regarding this type of vulnerability in Chile, most researchers have focused on currently existing poverty and an ex-post examination of the problem.²

The purpose of this paper is to measure the level of individual vulnerability in Chile and analyze patterns of poverty and vulnerability between 1996 and 2006. Vulnerability here is defined as an ex-ante measure of well-being, which considers not only the current economic situation of a household but also its possible future condition. Vulnerability then is the probability of becoming or staying poor in the future (expected poverty). Given that the socioeconomic status of households can change over time, current poverty measures may not provide an adequate reflection of household and individual-level risks of future poverty.

² In the case of Chile studies regarding vulnerability and the possibility of becoming poor, have been conducted by Aguilar (2002), Castro and Kast (2004), Zubizarreta (2005), Nielsen et al. (2008), Castro and Arzola (2008) and Bérigolo et al. (2010).

Chile provides an interesting setting to analyze vulnerability especially after the latest poverty statistics presented by the government. After a twenty-year decline, official poverty rates in Chile increased from 14% in 2006 to 15% in 2009 and stabilized above 14% in 2011.

High economic growth over this period, coupled with government efforts to expand social programs and improve targeting mechanisms to deliver monetary transfers, have been credited with lowering poverty levels from 39% in 1990 to 14% in 2006. Poverty is undoubtedly an important concern when monitoring human development progress. However, standard poverty indicators are ex-post measures which overlook the multiple risks that individuals or household may face and their ability/resources (or lack thereof) to avoid becoming poor (or poorer) in the future. There is, by now, some evidence that indicates that a large proportion of the population in developing countries is vulnerable to poverty. Grant et al. (2005), for example, indicates that although the estimated population share who are chronic poor in Latin America ranges from 30 to 40 percent, those considered to be transitory poor (i.e., individuals that at least once during the period of study fell below a poverty threshold) appears to be much larger. Income variability that arises from fluctuations in earnings, particularly in temporary or informal employment, can affect households' ability to manage risk and cope with shocks. Poor quality of public services e.g., healthcare, can aggravate household exposure to health shocks. Thus, even though average household incomes do not fall into poverty levels, the degree of household vulnerability can be high, leading to increased debt and sale or pawning of assets. In the long run, it can also affect the vulnerability of later generations through withdrawal of children from school, thereby maintaining the cycle of poverty and capability deprivation. That said, a better understanding of vulnerability will provide policymakers with crucial information on where to focus, and how to develop, implement and improve public policy to alleviate poverty, as well as safeguard those in the edge of falling into poverty in the future. Relying solely on economic growth and monetary transfers directed to the poorest might not be the best way to improve human development and individuals' well-being.

The objective of this chapter is to measure vulnerability to poverty at the individual level to further identify people in need of social assistance, focusing the attention on the risk of becoming poor in the future rather than the poverty status at a given moment in time. Vulnerability of a person may be affected by his/her education and health status, as well as their situation in the labor market (Castro and Arzola 2008, Nielsen et al. 2008). The lack of insurance

and saving mechanisms accessible to the poor and the nearly-poor may also play an important role in influencing a person's vulnerability (Dercon 2005). Following the literature on vulnerability measurement and the methodological framework proposed by Chaudhuri et al. (2002), this study determines how vulnerable the Chilean population is, using panel data from the National Socioeconomic Survey (CASEN) for the years 1996, 2001, and 2006.

The chapter is structured as follows. Section II will discuss the relevant literature on vulnerability and its measurement. Section III describes the data. Section IV examines the trends in poverty and its dynamics in Chile. Section V explains the methodology used to estimate vulnerability to poverty. The final two sections discuss the results and provide concluding remarks respectively.

II. Literature Review

Undeniably, one of the major development issues that researchers have addressed is poverty. Since World War II, there has been increasing concern about the well-being of individuals, particularly in developing and poorer countries. Since the Millennium Development Goals, a growing literature on poverty and poverty alleviation has focused on measurement and the analysis of several poverty alleviation programs and policies.

Since current poverty measures are not able to capture future household status, a growing body of research is focusing on measuring vulnerability. As with current poverty measurements and poverty lines, the forward-looking vulnerability to poverty indicator is subject to discussion and disagreement. However, one widely accepted and used definition of vulnerability to poverty is the probability of a household or individual in time t of becoming or staying poor at time $t+1$ (Chaudhuri et al. 2002).

Chaudhuri et al. (2002) propose a model to capture vulnerability using cross-sectional data. Their model predicts mean household consumption as well as its variance to estimate a vulnerability index. Expanding Chaudhuri et al. (2002), Günther and Harttgen (2009) study vulnerability in Madagascar using hierarchical models. Their empirical estimations on household vulnerability in Madagascar offer interesting results, looking at the different effects of idiosyncratic and covariate shocks on consumption, and analyzing the impact of these shocks on

rural and urban areas. Covariate and idiosyncratic shocks have relatively different effects on the vulnerability of urban and rural households, with covariate risks impacting rural households more, while idiosyncratic shocks affect urban households more.

Bourguignon and Goh's (2004) methodological paper explores and estimates vulnerability by using repeated cross sectional data. They create pseudo-panel data and then compare their results with actual panel data, concluding that, under certain assumptions, both estimates are very similar (particularly in trend). They thus propose a feasible way to calculate vulnerability in the absence of quality panel data. Additionally, they find that losing a job is the most important factor affecting vulnerability.

Zhang and Wan (2008), using panel data from China, study the extent to which researchers can effectively measure vulnerability. By estimating vulnerability and comparing the prediction to the actual poverty rate, they find that the reliability of vulnerability measures depends highly on initial assumptions. Vulnerability measures are enhanced and more reliable when using the \$2 US dollar instead of \$1 US dollar a day poverty line coupled with the assumption of a log normal distribution of permanent income, and the use of a 50 per cent threshold for the probability of becoming poor in the future.

Another set of research, like Calvo and Dercon (2005), draws from welfare economics' axiomatic foundations to address vulnerability. Calvo and Dercon (2005) provide a series of desirable axioms that vulnerability measurements should satisfy, and present an alternative measure that satisfies all axioms. Their proposed measurements, $V^*\alpha$ and $V^*\beta$, are bound by the arbitrary selection of the degree of risk chosen, along with coming up with normative or empirically tested parameters.

Kamanou and Morduch's (2002) paper proposes another method to estimate vulnerability using Monte Carlo simulations and bootstrapping predictors. They use this method to show that vulnerability widely exceeds the poverty rate in Cote d'Ivoire. Unfortunately, they did not analyze the specific causes or determinants of vulnerability.

Ligon and Schechter (2003) provide a different model to assess vulnerability, offering a utilitarian-based methodology to estimate household vulnerability by decomposing it into a set of indexes, poverty, aggregate risk, idiosyncratic risk and random error (unexplained risk). They use panel data from Bulgaria to examine the sources of vulnerability, finding that human capital

as well as household assets play an important role in determining vulnerability. Additionally, they found that urban families seem to be more vulnerable than their rural peers.

Concerned with the theoretical foundation of many vulnerability measurements, Elbers and Gunning (2003) use an intertemporal stochastic optimization model in order to capture household vulnerability more rigorously. Using simulations, they made comparison and robustness checks with other vulnerability measurements such as those proposed by Chaudhuri et al. (2002). Their results indicate that incorporating assets into the regression-based vulnerability measures can improve the accuracy of vulnerability to poverty estimates.

Thomas (2003) develops a different approach using macro data to measure vulnerability to poverty. In particular, he develops a methodology to assess covariate shocks and their impacts on future poverty or vulnerability. Based on aggregate country-level data on income or expenditure per capita and its distribution, the study estimates the covariates of vulnerability following Chaudhuri et al. (2002), with the addition of macro-level data and country shocks such as droughts, armed conflicts, water supply, and oil prices.

Regarding research specifically done for Chile, Scott (2000) empirically examined poverty dynamics using a relatively small rural household panel data set from 1968-1986. His study findings indicate that there is little income mobility, and that poverty alleviation is mainly due to monetary transfers and subsidies. Aguilar (2002), using the first wave of the CASEN panel survey for 1996-2001, constructs transition matrices and cross tabulations to analyze social mobility in Chile and finds a strong relationship between poverty, household size and labor market participation. Another interesting finding is the fact that people in poverty do not make extensive use of governmental safety nets when they face negative shocks, most households instead resorting to close family members.

Using the same data set as Aguilar (2002), Castro and Kast (2004) examine poverty dynamics and its determinants, finding large social mobility (in terms of movement into and out of poverty), with 32% of people in Chile living below the poverty line at some point in the five-year period of the survey. Using cross tabulations and a set of indexes they also find a correlation between employment characteristics, particularly informal work and poverty.

With the same panel data for Chile, Neilson et al. (2008) explores poverty dynamics and differentiates between chronic and transiently poor. They find that 20% and 18% of the population were poor in 1996 and 2001 respectively. However, more than 30% of the people

lived under the poverty line in at least one of the years, and 9% were chronically poor (poor in both years). Additionally, they explore the ex-ante probability of falling into and exiting from poverty. Like most of the research done on poverty dynamics in Chile, their results relate poverty to the nature of labor market participation, household size, number of dependents, human capital (education and health), and asset holdings, finding that chronic poverty is directly related to unemployment and lack of education.

Zubizarreta (2005), using the same panel data for 1996 and 2001, provides an even more detailed and systematic approach to income mobility and determinants of poverty analysis. Using multinomial logit models, he examines the determinants of each type of transition, finding that larger households and those with more children have a lower probability of exiting poverty. Female-headed households show a higher probability of escaping extreme poverty (as defined by the national extreme poverty line). His findings align with most of the earlier work done in Chile.

Rodriguez et al. (2008) explores the “Ficha de Protección Social” (FPS), used by the Chilean Ministry of Planning (MIDEPLAN) to determine household socio-economic status and their eligibility to social programs. Following the literature on vulnerability, the authors propose to incorporate a vulnerability dimension into the “FPS” in order to improve its quality and prediction power. Using data from CASEN 1996 and 2001, the authors define and construct an index of income generating capacity, consisting of the predicted income divided by its estimated variance (similar to the Chaudhuri et al. (2002) proposed methodology).³ In order to evaluate the gains of the new index, the authors compare it to MIDEPLAN targeting methodology, finding better predictive results when incorporating income variability.

More recently, Bérigolo et al. (2010) provide vulnerability estimates for 18 Latin American countries between the early 1990s and the mid-2000s. Using the international poverty line (\$1 US dollar per day), their results point to a much higher rate of vulnerability than actual poverty in Latin America, although there is great variation among countries. While aggregate vulnerability in the region has decreased over the studied period, some countries have not been part of this trend.

This study builds on previous results on the analysis of poverty dynamics in Chile, and expands the knowledge on vulnerability to poverty in Chile by measuring this state of risk at the individual level.

³ The proposed index is $W_i = E(\ln Y_i) / \sigma(\ln Y_i)$

III. Data

Since 1985, the Chilean government has conducted the National Socio-Economic Characterization Survey (“Encuesta de Caracterización Socioeconómica Nacional”, or CASEN). Reliable national and regionally representative surveys have been conducted in 1985, 1987, 1990, 1992, 1994, 1996, 1998, 2000, 2003, 2006, 2009 and 2011. Most social science studies on Chile rely on these data sets for its rich content, however, the data do not permit researchers to investigate poverty and socio economic dynamics, since it does not provide information from the same households in each year. The desire to better understand household-level changes over time prompted the Ministry of Planning (MIDEPLAN) to undertake the first panel version of the National Socio Economic Characterization Survey. Although the dataset was not conceived as a panel in its first wave, it was turned into a panel in 2001 when MIDEPLAN decided to re-survey a random sample from the 1996 CASEN survey data. By revisiting, 5,209 households from four regions (III, VII, VIII and the Metropolitan Region) after five years, the first panel dataset was constructed. The third wave took place in 2006, creating a 10-year CASEN (1996, 2001, 2006) panel survey dataset.

There are two caveats regarding the survey data that need to be mentioned namely, the issue of attrition and the use of income per capita for identifying who are poor. Figure 1.1 shows the attrition rate associated with the panel survey data, with the number of retained or original (1996) survey respondents in the subsequent (2001, 2006) samples represented by the darker areas. The decline in the number of retained respondents shows the extent of the attrition problem over time. The light gray section of the bar represents the newly added respondents. Since the survey is based on households as well as individuals during a 10-year period, new members of original families became part of the latter samples. The attrition rate for the 1996-2001 period is 28.1%, and 50.9% for the 1996-2006 period.⁴ Although this attrition rate may seem high, for a 10-year three-wave panel data set it is a reasonable rate, when compared to international standards⁵ (Bendezú et al. 2007; Czajka et al. 2008; Fitzgerald et al, 1998).

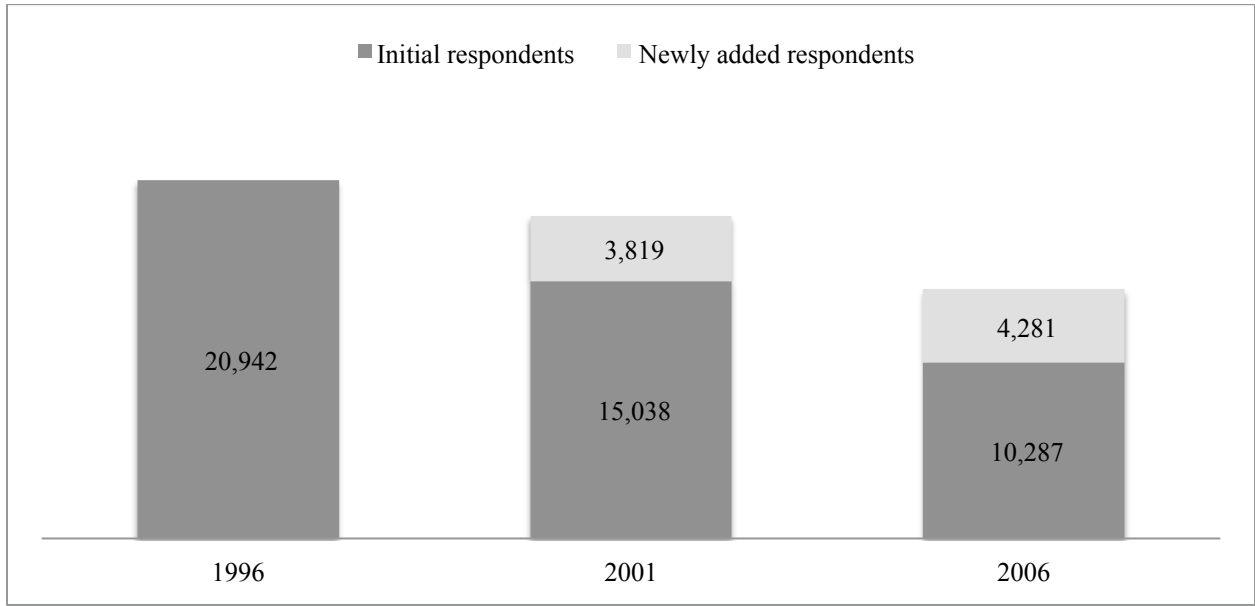
To address this issue, the Ministry of Planning and University Alberto Hurtado constructed population and attrition weights. Throughout the research presented here, I make use

⁴ This attrition rate is considered reasonable for a 10-year, three-wave panel data.

⁵ E.g. Panel Study of Income Dynamics, European Community Household Panel.

of these weights in order to minimize any attrition bias and maintain the representativeness of the survey sample.⁶

Figure 1.1 Number of interviewed individuals in three waves of the CASEN panel survey data (1996, 2001 and 2006)



Source: Bendezú et al. (2007).

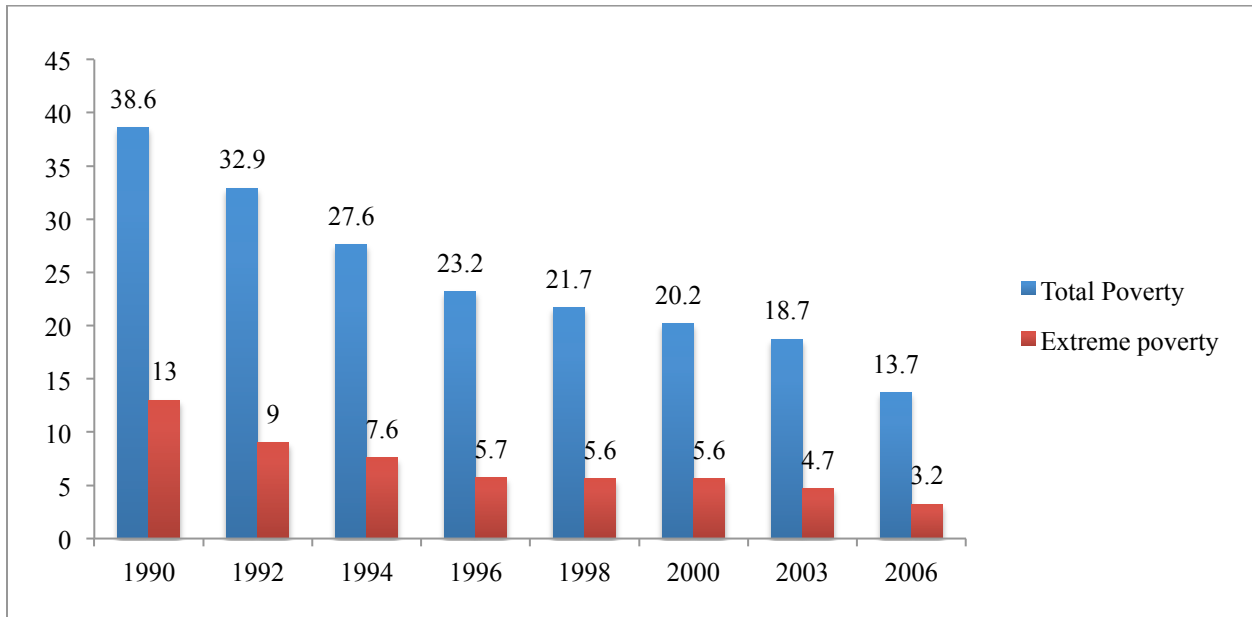
The second caveat refers to the choice of poverty measure used in these studies. Due to the unavailability of consumption data and the fact that Chile’s poverty line, as in many countries, refers to the income level deemed sufficient to satisfy basic needs. I make use of the national per capita income based poverty lines instead of the alternative per capita consumption, in identifying the poor in this research. This study will use the 10,287 individuals surveyed in the three waves of the panel in order to assess changes in vulnerability and poverty between 1996 and 2006.

⁶ For a complete discussion on the panel CASEN attrition problem and data quality, see Bendezú et al. (2007) and PNUD (2009).

IV. Background on Poverty in Chile

Chile is a high middle-income country whose social development over the last three decades has ran parallel with general economic success and high GDP growth rate. Poverty has fallen from 39% in 1990 to 14% in 2006.⁷ Poverty in Chile is measured by a national poverty and extreme poverty lines set by the Ministry of Social Development.⁸ Figure 1.2 shows the trend in poverty and extreme poverty in Chile from 1990 to 2006, and Figure 1.3 shows the proportion of poor, extreme poor and non-poor using panel data from 1996, 2001, and 2006.

Figure 1.2 Poverty trends for the 1990-2006 period

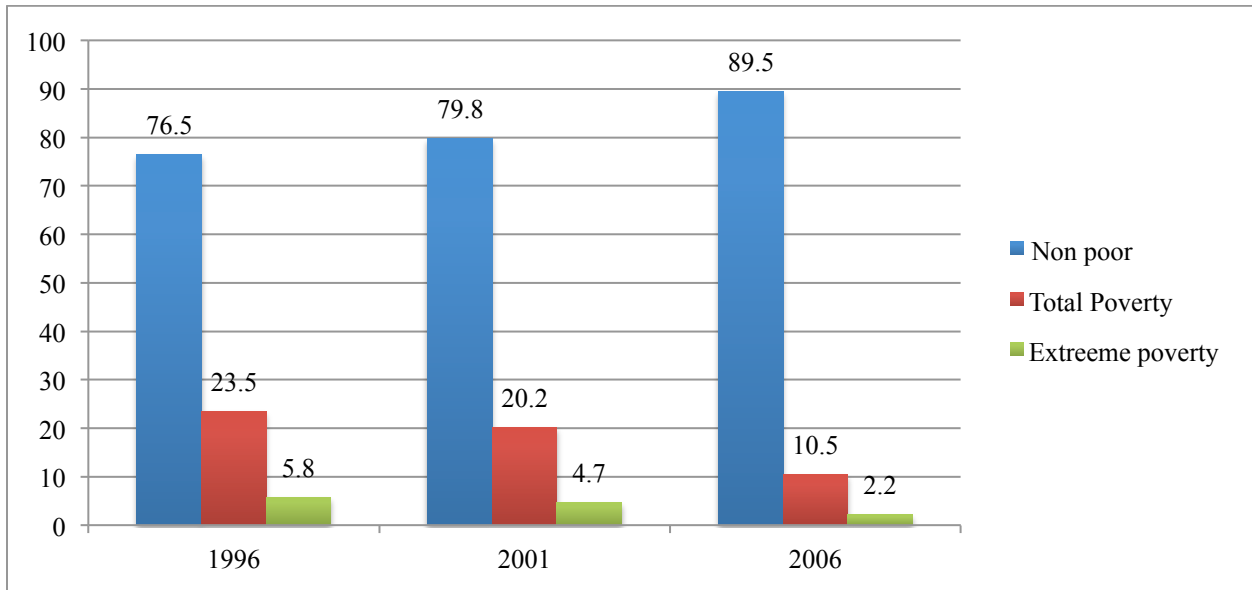


Source: MIDEPLAN, using cross-sectional CASEN data for each year.

⁷ This declining trend was interrupted in 2009, when poverty rose slightly, to 15%.

⁸ Appendix A. provides the national poverty and extreme poverty lines for urban and rural areas in 2005 purchasing power parity (PPP) dollars.

Figure 1.3 Poverty headcount ratios in Chile for 1996, 2001 and 2006



Source: Author’s calculation using the CASEN 1996, 2001, 2006 panel data.

Note: Numbers represent the percentage of the population in each socioeconomic state.

Both Figures 1.2 and 1.3 show how poverty has decreased over time in Chile. However they provide little information on how shocks can push individuals and households into or out of poverty. Examining transition matrices can shed light on these dynamics. The CASEN panel survey data can help differentiate between those who never leave poverty (the chronic poor) and those who have been below the poverty line at some point in time (the transient poor). Table 1.1 shows the transitions between poverty states from 1996 to 2001 and from 2001 to 2006. In 2001, 12% of the poor were “new” poor while 52% had exited poverty, and 48% remained. From 2001 to 2006, only 6% of the poor were newly poor, while 72% exited poverty and 29% remained.

Table 1.1 Poverty transition matrices during 1996-2001 and 2001-2006 periods

Transition matrix 1996-2001		
1996	2001	
	Non poor	Poor
Non Poor	88.4%	11.6%
Poor	51.9%	48.1%

Transition matrix 2001-2006		
2001	2006	
	Non poor	Poor
Non Poor	94%	6%
Poor	71.5%	28.5%

Source: Author's calculation using the CASEN 1996, 2001, 2006 panel data.

These transition matrices allow the categorization of individuals as either chronic poor or transient poor. Table 1.2 summarizes the percentages of chronic poor and transient poor in Chile during the decade covered by the survey. Although the cross section data shows a positive pattern in lowering poverty over time for Chile, what the panel data shows is that 31% of the population experienced poverty, at least in one of the waves. This evidence shows the large amount of vulnerability to which many Chilean people are subject. Additionally, 4% of the population lived under the poverty line in all three periods (chronic poor).

Table 1.2 Categories of individuals in CASEN panel data by poverty status

	1996-2001-2006
Never Poor	64.5%
Transient Poor	31.3%
Chronic Poor	4.2%

Source: Author's calculation using the CASEN 1996, 2001, 2006 panel data.

The rest of the chapter will empirically measure the level of individual vulnerability to poverty in Chile, using the methodology proposed by Chaudhuri et al. (2002). This represents the first

attempt to estimate the probability of individual exposure to future poverty in Chile. These estimations can help further identify those in need of social assistance, as well as inform policymakers on the proportion of population that might not be living below the income poverty line, but at risk of falling into poverty. Addressing vulnerability requires a different set of policies that could help individuals and households cope with shocks rather than lifting them out of poverty. Thus, focusing the attention on the risk of becoming poor in the future rather than the poverty status at a given moment in time could help design policies specifically for this target population.

V. Methodology

The usual measure of poverty (i.e. measuring income or consumption against a predefined poverty line) provides little information on the ability of households to cope with the risks and shocks that they face. Even households living above the poverty line are vulnerable to shocks that can shift their relative position downwards. The literature on vulnerability to poverty defines it as the risk of becoming poor or staying poor in the future. Vulnerability to poverty then can be thought as the combination of low capacity to generate income and high variability of income or expenditure.

The empirical strategy to estimate the probability that a household or individual will fall or stay in poverty is based on a structural model that estimates expected income or consumption levels and the associated variances. In order to estimate this probability using cross sectional data, it is necessary to make some assumptions about the stochastic process generating household income or consumption (see Chaudhuri 2000 and Chaudhuri et al. 2002 for a detail analysis of the vulnerability model's assumptions).⁹

The basic model for measuring vulnerability (i.e., downward risk) in Chile is:¹⁰

$$Vul_{ht} = \Pr(Y_{h,t+1} \leq PL_i) \text{ where } i=1, 2 \text{ for urban and rural official poverty lines respectively.}$$

⁹ Both Hoddinott and Quisumbing (2003) and Ligon and Schechter (2004) conduct a comprehensive analysis of the existing methods to estimate vulnerability, concluding that Chaudhuri's method qualifies as one of the most appropriate when working with cross sectional data or with two to three-wave panels.

¹⁰ Following Chaudhuri et al. (2002) pp. 6-8. This methodology is design to estimate vulnerability using cross-section data. In the case of this study, even though panel data is available, vulnerability is still measured using each year separately. The panel is then used to validate the estimations (see Table 1.4 and 1.5).

Vulnerability for a household h in time t is defined as the probability of future income being below a pre-set threshold (i.e. poverty line). Income at time t is a function of observable characteristics X_h , their parameters β_t and an error term that captures idiosyncratic shocks.

$$Y_{h,t} = f(X_h, \beta_t, e_{ht}) \quad (1)$$

Thus, vulnerability is represented by,

$$Vul_{ht} = \Pr(Y_{h,t+1} = f(X_h, \beta_{t+1}, e_{h,t+1}) \leq PL_i | X_h, \beta_t, E_{ht}, e_{ht}) \quad (2)$$

To calculate a vulnerability index for each individual, the following steps were taken. A Feasible Generalized Least Squares (FGLS) regression on per capita income is estimated,

$$LnY_{ht} = X_{ht}\beta + e_{ht} \quad (3)$$

$LnY_{h,t}$ is the log per capita household income in time t , and $X_{h,t}$ represents the set of pertinent household head characteristics in period t . These include: sex, life cycle stage (age, age square) years of education, wealth proxy (home ownership dummy), labor force status-based proxy variables for earnings insecurity (unemployed dummy, domestic service worker dummy, self-employed dummy), household structure, household size, presence of children (under seven years old), and employed members to household size ratio. The model also controls for region-level fixed effects by including regional dummy variables. e_{ht} is the unexplained part of household income.

Since shocks affect different households in different ways, the variance of the unexplained part of consumption can be estimated as the predicted output $\hat{Y} = Y_{h,t+1}$ and the residual $\sigma_{e,ht}$ of equation 3. The following reduced form can then be estimated, $\sigma_{e,ht}^2 = X_h\theta$ to obtain the expected log income and variance for each individual (following Amemiya, 1977).

$$\hat{E} = [LnY_{ht} | X_{ht}] = X_{ht}\hat{\beta} \quad (4)$$

$$\hat{V} = [LnY_{ht} | X_{ht}] = \hat{\sigma}_{e,ht}^2 = X_{ht}\hat{\theta} \quad (5)$$

With the above estimates and assuming a lognormal distribution for income¹¹, I am able to estimate vulnerability by computing,

¹¹ Using a large cross-country income distribution dataset spanning nearly 800 country-year observations from industrial and developing countries, Lopez, J. and Servén L. (2006) empirically showed that a lognormal density approximates the size distribution of per capita income.

$$\hat{V}ul_{ht} = \hat{P}(LnY_{ht} < LnPl_{it}) = \Phi\left(\frac{(LnPl_{it} - X_{ht}\hat{\beta})}{\sqrt{X_{ht}\hat{\theta}}}\right) \quad (6)$$

where Φ denotes the cumulative density of a standard normal distribution.

The results of the vulnerability regression model for log per capita income and estimated variance can be found in Appendix B. As expected, the income variance regression results do not have a high R^2 , given that this regression tries to estimate an unobserved and potentially unobservable state of risk. To obtain individual estimates, the household head vulnerability estimate is extrapolated to the rest of the household members to obtain the corresponding vulnerability head counts. Unlike most papers using Chaudhuri's, this study evaluates vulnerability at the individual level by taking into account the household size.

To estimate individual-level vulnerability, a unitary household model is assumed, meaning that if the household head is determined to be vulnerable, every individual in the household is also vulnerable. The unitary household model does present some limitations since it does not provide information on the intra-household allocation of resources, and assumes that resources are pooled to maximize household well-being. Due to lack of information on household dynamics, a unitary household model is assumed in this analysis. Moreover, these assumptions are consistent with the way poverty is measured in Chile and thus provide useful information to policymakers.¹²

The above methodology was applied to each wave for both urban and rural areas, making use of the respective urban and rural poverty lines. Household heads were identified to be vulnerable if the calculated probability of their predicted log per capita income is lower than the poverty line, given the poverty rate in 1996 of 24%.¹³ Two other probability thresholds are used to gauge high-vulnerability and extreme vulnerability (i.e. 50% and 75% probability of becoming poor in the future).

¹² For a thorough discussion on intra-household allocation models see: Alderman et al. (1995), Carter and Katz (1997) and Lundberg and Pollak (1996).

¹³ This threshold is used for all three waves, regardless of each years poverty head count estimate, in order to maintain comparability.

VI. Results

Table 1.3 shows the vulnerability estimates for Chile for 1996, 2001 and 2006. As hypothesized, the level of vulnerability in Chile exceeds the poverty levels by a significant amount. In 1996, poverty affected 24% of the population, while 49% of the country was considered vulnerable to poverty. Furthermore, 19% were highly vulnerable (above a 50% probability of falling or staying in poverty) and 7% were extremely vulnerable (a 75% or higher probability of becoming poor in the future). In 2001, the poverty rate was 20% while the vulnerability rate was 41%, with 17% considered highly vulnerable and 6% extremely vulnerable. Although by 2006, poverty had declined significantly (to 11%), vulnerability rates were almost three times larger, reaching 30% of the population. Additionally, the highly vulnerable proportion showed no improvement and stayed at 17%, while the portion of the population identified as extremely vulnerable increased to 15% in that period. While poverty and vulnerability rates have decreased over time, highly and extremely vulnerable rates have remained the same, or even increased, suggesting that those most vulnerable are not able to cope with risk or deal with shocks. One possible explanation could come from labor market dynamics (Contreras et al. 2008a and 2008b). Higher levels of unemployment and the increase of informal work participation especially among women, or working without a contract and social protection benefits could be some of the reasons behind the increase in high and extreme vulnerability between 2000 and 2006. Although the economy recovered after the 1997 economic crisis with lower unemployment and lower inflation, a high percentage of new workers, particularly women, were not covered by social protection and unemployment insurance, thus increasing overall levels of vulnerability (Riffo and Todaro 2007).

In terms of urban-rural disparities in 1996, Table 1.3 also shows that individuals living in rural areas appeared to be more vulnerable than their urban counterparts. This urban-rural difference changes in 2001 when urban dwellers had a higher vulnerability head count ratio, although using the high and extreme vulnerable thresholds, rural dwellers are still worse off than urban ones in 2001. In 2006, vulnerability was the same for urban and rural individuals, probably due to the increase in agricultural production and exports experienced during this period (Banco Central 2007). It is worth mentioning that poverty is more prevalent in rural areas for all survey

years, and vulnerability differences between urban and rural areas tended to converge in the most recent year (2006).

Table 1.3 Poverty and vulnerability estimates for 1996, 2001 and 2006, urban and rural areas

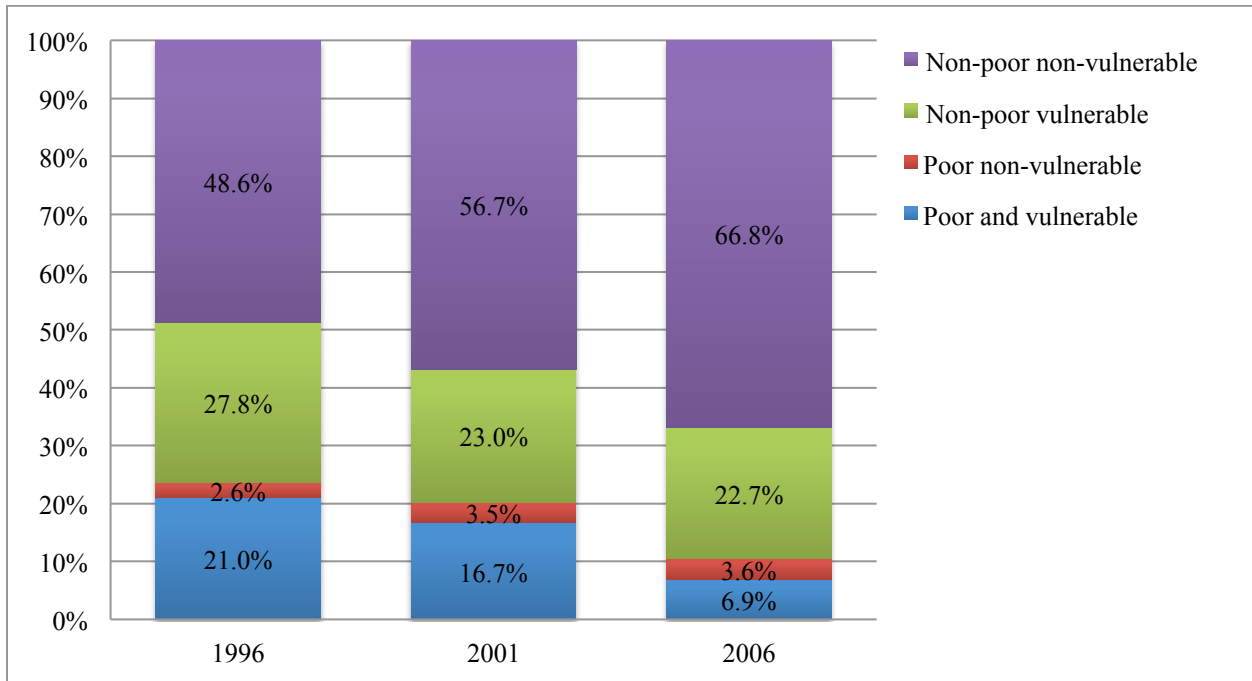
		Poverty rate	Vulnerability (Pov. rate)	High-vulnerability (50%)	Extreme-vulnerability (75%)
1996	Urban	22.2%	47.3%	17.3%	6.8%
	Rural	33.6%	60.3%	30.3%	10.9%
	Total	23.6%	48.8%	18.8%	7.3%
2001	Urban	19.6%	48.8%	16.4%	5.5%
	Rural	25.1%	39.7%	18.2%	6.4%
	Total	20.2%	41.1%	16.6%	5.6%
2006	Urban	10.2%	29.1%	17.2%	14.8%
	Rural	13.0%	33.3%	16.9%	15.1%
	Total	10.5%	29.6%	17.2%	14.8%

Source: Author's calculation using the CASEN 1996, 2001, 2006 panel data.

Figure 1.4 identifies further the proportion of the population who are either poor or likely to become poor in the future. In 1996, 23.6% of the population was living below the national poverty line and 48.6% was identified as vulnerable, while either poor, or non-poor and vulnerable combined, account for 51.4% of the population in 1996. In 2001, 20.2% of the population was poor, 40% vulnerable and 43.2% was non-poor vulnerable or poor. In 2006, poverty dropped to 11%, yet vulnerability levels reached almost 30%, with the proportion of the population who are non-poor and poor vulnerable yet extending to one third of the population (33.2%).¹⁴

¹⁴ The difference between the official poverty rate and the one estimated here corresponds to the differences in sample of the survey data sets used for their estimations.

Figure 1.4 Poverty and vulnerability status of individuals in 1996, 2001 and 2006 waves (as percentage of the population)



Source: Author’s calculation using the CASEN 1996, 2001, 2006 panel data.

The panel data allows us to assess whether the vulnerability estimates provide an accurate approximation in time t of future poverty in time $t+1$. Tables 1.4 and 1.5 show the predictive power of the three vulnerability estimates (vulnerability, high vulnerability and extreme vulnerability), by cross-tabulating the individual vulnerability to poverty incidence in 1996 and 2001 with 2001 and 2006 observed poverty states, respectively. The vulnerability estimates appear to be accurate in predicting future states of poverty for 35% of the people in 1996 and 18% in 2001. Only 6% of predicted non-vulnerable in 1996 fell into poverty in 2001 and 5% did from 2001 to 2006. In terms of high and extreme vulnerability, the predictive power for those falling into poverty increases to 47% and 46% from 1996 to 2001 for those highly and extremely vulnerable, respectively. For the 2001-2006 period, the predictive power is somehow lower: 25% of those highly vulnerable in 2001 became poor in 2006 and 33% of the extremely vulnerable in 2001 fell into poverty in 2006. The predictive power of the vulnerability estimation is better for the 1996-2001 period compared to the 2001-2006 period. This could be due to the fact that

poverty decreased significantly in the later period, as well as the improvement in the design of the social protection scheme by improving its targeting mechanisms.

Table 1.4 Validation of 1996 vulnerability estimates using poverty incidence in next wave

		Poor in 2001	
		No	Yes
Vulnerability 1996	No	93.2%	6.8%
	Yes	65.2%	34.8%
High vulnerability 1996	No	86.0%	14.0%
	Yes	53.3%	46.7%
Extreme Vulnerability 1996	No	81.8%	18.2%
	Yes	54.5%	45.5%

Source: Author's calculation using the CASEN 1996, 2001, 2006 panel data.

Table 1.5 Validation of 2001 vulnerability estimates using poverty incidence in next wave

		Poor in 2006	
		No	Yes
Vulnerability 2001	No	94.9%	5.1%
	Yes	81.9%	18.1%
High vulnerability 2001	No	92.6%	7.4%
	Yes	75.0%	25.0%
Extreme vulnerability 2001	No	91.0%	9.0%
	Yes	67.5%	32.5%

Source: Author's calculation using the CASEN 1996, 2001, 2006 panel data.

VII. Concluding Remarks

Using the CASEN panel dataset for 1996, 2001, and 2006, this study explores some of the dynamics of poverty and vulnerability to poverty in Chile, filling some important research gap on welfare analysis for Chile by estimating the level of vulnerability to poverty. The chapter starts by examining poverty transition matrices, revealing a great deal of social mobility in terms of movement in and out of poverty. Between 1996, 2001 and 2006, 35% of people went through poverty at least once. The relative high number of people transitioned into and out of poverty demonstrates the need to carefully assess vulnerability levels in Chilean. The study adopts the

Chaudhuri et al. (2002) methodology to estimate vulnerability to poverty and tests whether the estimations capture the transitions observed in the poverty data.

The results of the estimations are clear: vulnerability to poverty in Chile affects a larger number of individuals than actual poverty. For each of the years surveyed, a large percentage of the Chilean population is vulnerable. These results suggest that a significant proportion of the population could be eligible for social protection programs, a number that is larger than what current targeting systems are able to identify. Policies and programs should not exclusively target those below the poverty line but also those at risk of becoming poor in the future. In the case of Chile this population reached about half of the population in 1996, 40% in 2001 and 32% in 2009.

Hence this study argues that a forward-looking measure of poverty should be taken into account when designing poverty alleviation programs, covering not just those in poverty today, but also those at risk of becoming poor tomorrow. This suggests the need to tailor programs to reduce risk and/or provide access to coping mechanism like insurance schemes, for households at risk of poverty if they face negative shocks. For example, programs could focus on vulnerable individuals, and at the same time, promote and facilitate access to decent employment through training programs and expanding the coverage of social safety net programs. Improvements in the quality of education and access to health care should be priorities for the Chilean government as well in order to promote shared prosperity.

Since vulnerability to poverty is linked to risk and coping mechanisms, it would be interesting and useful to investigate in future research the relationship between vulnerability and levels of social capital, the reliance on kin for support, employment in the informal economy, access to credit and the role of social programs in reducing vulnerability.

References

- Aguilar, Omar. 2002. “Dinámica de la Pobreza: Resultados de la Encuesta PANEL 1996-2001.” *Gobierno de Chile Ministerio de Planificación y Cooperación. División Social. Departamento de Información Social.*
- Alderman, Harold, Pierre-André Chiappori, Lawrence Haddad, John Hoddinott and Ravi Kanbur. 1995. “Unitary Versus Collective Models of the Household: Time to Shift the Burden of Proof”, *The World Bank Research Observer* 10(1): 1-19.
- Banco Central de Chile. 2007. “Informe de Política Monetaria”. Enero 2007. Santiago de Chile.
- Baulch, Bob and John Hoddinott. “Economic Mobility and Poverty Dynamics in Developing Countries.” *Journal of Development Studies* 36(6): 1–24.
- Bendezú, Luis, Angela Denis, Carmen L. Sánchez, Pamela Ugalde and José R. Zubizarreta. 2007. “La encuesta panel CASEN: metodología y calidad de los datos. Versión 1.0.” *Observatorio Social Universidad Alberto Hurtado.*
- Bérgolo, Marcelo, Guillermo Cruces, Leonardo Gasparini and Andrés Ham. 2010. “Vulnerability to poverty in Latin America: Empirical evidence from cross-sectional data and robustness analysis with panel data.” *Chronic Poverty Research Centre, Working Paper 170, ISBN: 978-1-906433-83-3.*
- Bourguignon, François, Goh, Chor-ching and Dae Il Kim. 2004. *Estimating individual vulnerability to poverty with pseudo-panel data.* Washington DC: World Bank.
- Calvo, Cesar and Stefan Dercon. 2005. “Measuring Individual Vulnerability.” Discussion Paper, Department of Economics, University of Oxford.
- Carter, Michael and Elizabeth Katz. 1997. “Separate spheres and the conjugal contract: Understanding the impact of gender biased development” in Lawrence Haddad, John Hoddinott and Harold Alderman (eds.) *Intrahousehold Resource Allocation in Developing Countries: Methods, Models and Policy*, pp 95-111. Baltimore, MD: Johns Hopkins University Press.
- Castro, Rodrigo, and María Elena Arzola. 2008. "Determinantes de la Movilidad de la Pobreza en Chile (1996-2006)." *Serie Informe Social* 112. Instituto Libertad y Desarrollo. Santiago, Chile.

Castro, Rodrigo and Felipe Kast. 2004. “Movilidad de la pobreza en Chile: Análisis de la Encuesta Panel 1996 – 2001”. *Serie Informe Social* 85. Instituto Libertad y Desarrollo. Santiago, Chile.

Chaudhuri, Shubham, Jyotsna Jalan, and Asep Suryahadi. 2002. “Assessing household vulnerability to poverty from cross-sectional data: A methodology and estimates from Indonesia”. *Department of Economics Discussion Papers*, Working Paper 0102-52. Columbia University, New York.

Contreras, Dante, Luiz de Mello and Esteban Puentes. 2008a. “Tackling Business and Labour Informality in Chile.” OECD Economics Department Working Papers 607, OECD Publishing.

Contreras, Dante, Luiz de Mello and Esteban Puentes. 2008b. “Encouraging Labour Force Participation in Chile”, OECD Economics Department Working Papers 608, OECD Publishing.

Czajka, John L., James Mabli, and Scott Cody. 2008. "Sample loss and survey bias in estimates of Social Security beneficiaries: A tale of two surveys." *Mathematica Policy Research, Inc.* Washington, DC.

Dercon, Stefan. 2005. “Risk, Insurance and Poverty: a Review.” In Stefan Dercon (ed.) *Insurance against Poverty*. Oxford University Press, Oxford, UK.

Elbers, Chis and Jan W. Gunning. 2003. “Estimating Vulnerability.” Paper presented at the conference Staying Poor: Chronic Poverty and Development Policy. University of Manchester April 7-9.

Fitzgerald, John, Peter Gottschalk and Robert Moffitt. 1998. “An Analysis of Sample Attrition in Panel Data: The Michigan Panel Study of Income Dynamics” *NBER Technical Working Paper* 220

Grant, Ursula, David Hulme, Karen Moore and Andrew Shepherd. 2005. *The Chronic Poverty Report 2004-05*. University of Manchester. Institute for development policy & management (IDPM). Chronic poverty research centre (CPRC).

Günther, Isabel and Kenneth Harttgen. 2009. “Estimating Households Vulnerability to Idiosyncratic and Covariate Shocks: A Novel Method Applied in Madagascar.” *World Development* 37 (7): 1222-1234

Haughton, Jonathan H. and Shahidur R. Khandker. 2009. *Handbook on Poverty and Inequality*. World Bank Publications, Washington D.C.

Hoddinott, John and Agnes Quisumbing. 2003. “Methods for Microeconomic Risk and Vulnerability Assessments.” *Social Protection Discussion Paper Series* 0324, The World Bank, Washington D.C.

Kamanou, Gisele and Jonathan Morduch. 2002. “Measuring vulnerability to poverty.” *WIDER*

Discussion Papers, World Institute for Development Economics (UNU- WIDER). ISBN 9291902411

Ligon, Ethan and Laura Schechter. 2003. “Measuring vulnerability.” *The Economic Journal* 113 (486): C95–C102.

López, J. Humberto and Luis Servén. 2006. “A Normal Relationship? Poverty, Growth and Inequality” *World Bank Policy Research Working Paper Series* 3814, Washington, D.C.

Lundberg, Shelly and Robert A. Pollak. 1996. “Bargaining and distribution in marriage.” *The Journal of Economic Perspectives* 10(4): 139-158.

Ministerio de Planificación (Mideplan). 2010. Resultados de *la Encuesta* CASEN 2009. Available at:
http://www.ministeriodesarrollosocial.gob.cl/casen2009/RESULTADOS_CASEN_2009.pdf

Neilson, Christopher, Dante Contreras, Ryan Cooper and Jorge Hermann. 2008. “The Dynamics of poverty in Chile.” *Journal of Latin American Studies* 40 (2): 251–273.

Observatorio Social, Universidad Alberto Hurtado. 2007. “La encuesta Panel CASEN: Manual de Usuario”. Available at: http://www.dev-out.cl/sites/default/files/Manual_del_Usuario_-_V_2.0.pdf

Rodríguez, Carlos, Patricio Domínguez, Eduardo Undurraga and José Ramón Zubizarreta. 2008. “Identificación y características de la población vulnerable: elementos para la introducción del riesgo.” In: *Camino al Bicentenario Propuestas para Chile*, Pontificia Universidad Católica de Chile. ISBN 9789561410350

Rutstein, Carrie and Barry Hughes. 2010 “An Analysis of the Population, Economic and Socioeconomic Dynamics of Chile through 2040.” Frederick S. Pardee Center for International Futures, University of Denver.

Scott, Christopher D. 2000. “Mixed fortunes: A study of poverty mobility among small farm households in Chile, 1968-86.” *Journal of Development Studies*, 36(6), 155-180.

Thomas, Timothy. 2003. “A Macro-Level Methodology for Measuring Vulnerability to Poverty, with a Focus on MENA Counties”, Paper presented at the Forth Annual Global Development Conference, Globalization and Equity, Cairo, Egypt, January 21

Zhang, Yuan and Wan, Guanghua. 2008. “Can we predict vulnerability to poverty?” United Nations University *UNU-WIDER Research Paper* 2008/82.

Zubizarreta, José. 2005. “Dinámica de la pobreza: el caso de Chile 1996-2001.” Unpublished Memoria para optar al título de Ingeniero Civil de Industrias, con Diploma en Ingeniería Matemática, Pontificia Universidad Católica de Chile

Appendices

Appendix A. Poverty Lines

National poverty lines and extreme poverty lines in PPP 2005 \$.

<i>Monetary Poverty lines</i>			
	1996	2001	2006
Urban	\$100.4	\$110.2	\$134.9
Rural	\$67.7	\$74.1	\$90.9
<i>Monetary extreme poverty line</i>			
	1996	2000	2006
Urban	\$50.2	\$55.1	\$67.4
Rural	\$38.7	\$42.3	\$52.0

Source: Panel CASEN 1996-2001-2006.

Note: These poverty lines are per capita per month income poverty lines.

The international poverty line corresponds to \$38 2005 PPP per capita per month.

National poverty lines and extreme poverty lines in November Chilean pesos for each year.

<i>Monetary Poverty lines</i>			
	1996	2001	2006
Urban	\$34,272	\$41,767	\$47,099
Rural	\$23,108	\$28,072	\$31,756
<i>Monetary extreme poverty line</i>			
	1996	2000	2006
Urban	\$17,136	\$20,884	\$23,549
Rural	\$13,204	\$16,041	\$18,146

Source: Panel CASEN 1996-2001-2006.

Note: These poverty lines are per capita per month income poverty lines.

Appendix B.

Table B1. FGLS Regression Estimates for 1996 log per capita income and income per capita variance, Urban and Rural households.

VARIABLES in 1996	Urban	Urban	Rural	Rural
	Income per capita	Income Variance	Income per capita	Income Variance
Age	0.0108 (0.0073)	0.0284** (0.0129)	0.0145 (0.0143)	0.0426*** (0.0151)
Age square	5.41E-05 (0.0001)	-0.000314** (0.0001)	4.42E-05 (0.0001)	-0.000411*** (0.0002)
Education (years)	0.0689*** (0.0041)	-0.00255 (0.0106)	0.0494*** (0.0097)	0.0248** (0.0111)
Home ownership dummy	0.338*** (0.0393)	-0.241** (0.1100)	0.253*** (0.0641)	-0.143** (0.0634)
Unemployed	-0.772*** (0.1130)	0.237 (0.2060)	-0.372 (0.2350)	-0.178 (0.1570)
Domestic servant worker	-0.401*** (0.0912)	-0.243** (0.1220)	0.304 (0.1850)	-0.434*** (0.1430)
Self-empl. w/o paid workers	-0.239*** (0.0538)	-0.155* (0.0939)	0.0277 (0.1310)	-0.116 (0.1210)
Self-emp. w/ paid workers	0.326*** (0.1060)	-0.09 (0.1100)	0.787*** (0.2280)	-0.362** (0.1440)
Waged salaried empl.	-0.165*** (0.0495)	-0.156* (0.0863)	-0.0204 (0.1330)	-0.302** (0.1260)
Male household head	0.0966** (0.0398)	0.0196 (0.0583)	0.211* (0.1100)	0.0355 (0.0958)
Couple HH	0.00749 (0.0417)	-0.032 (0.0568)	-0.195** (0.0984)	-0.0293 (0.1140)
Single adult HH	0.126** (0.0554)	0.0708 (0.0750)	-0.127 (0.1360)	-0.0378 (0.1530)
Household size	-0.0964*** (0.0123)	-0.0231 (0.0226)	-0.0846*** (0.0279)	-0.0705** (0.0336)
Number of young children	-0.0675*** (0.0235)	-0.0377 (0.0426)	-0.092 (0.0571)	0.086 (0.0674)
Empl. to HH size ratio	0.840*** (0.0672)	-0.0161 (0.1270)	0.805*** (0.1320)	-0.16 (0.1160)
7 th Region	-0.0959 (0.0614)	0.0758 (0.0552)	0.229** (0.1070)	-0.129 (0.1440)
8 th Region	-0.0314 (0.0555)	0.0477 (0.0508)	-0.0185 (0.1100)	-0.093 (0.1510)
Metropolitan Reg.	0.257*** (0.0545)	0.104* (0.0606)	0.399*** (0.1180)	-0.205 (0.1480)
Constant	9.437*** (0.1820)	0.159 (0.2660)	9.140*** (0.3450)	-0.0939 (0.3170)
Observations	2,299	2,042	552	552
R-squared	0.465	0.018	0.398	0.082

Source: Author's calculations using the Panel CASEN 1996-2001-2006. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table B2. FGLS Regression Estimates for 2001 log per capita income and income per capita variance, Urban and Rural households.

VARIABLES in 2001	Urban	Urban	Rural	Rural
	Income per capita	Income Variance	Income per capita	Income Variance
Age	0.0330*** (0.0062)	-0.000276 (0.0066)	0.0117 (0.0116)	0.00142 (0.0122)
Age square	-0.000106* (0.0001)	-2.48E-05 (0.0001)	6.96E-05 (0.0001)	-2.08E-05 (0.0001)
Education (years)	0.0683*** (0.0035)	0.00507 (0.0038)	0.0303*** (0.0081)	-0.00385 (0.0078)
Home ownership	0.388*** (0.0363)	-0.110** (0.0485)	0.310*** (0.0554)	-0.0912* (0.0552)
Unemployed	-0.553*** (0.0688)	0.0241 (0.0876)	-0.466*** (0.1410)	0.0586 (0.1000)
Domestic servant worker	-0.244*** (0.0898)	0.064 (0.1060)	-0.217 (0.2030)	-0.216** (0.1020)
Self-empl. w/o paid workers	-0.169*** (0.0492)	-0.0277 (0.0608)	0.0168 (0.0962)	0.0594 (0.0860)
Self-emp. w/ paid workers	0.322*** (0.0772)	-0.130* (0.0737)	0.890*** (0.2750)	0.34 (0.2990)
Waged salaried empl.	-0.0403 (0.0436)	-0.169*** (0.0590)	0.00438 (0.0968)	0.0551 (0.0942)
Male household head	0.0374 (0.0371)	0.0451 (0.0435)	-0.0267 (0.0843)	-0.107 (0.0790)
Couple HH	-0.0551 (0.0372)	-0.0241 (0.0384)	-0.0663 (0.0808)	-0.0723 (0.0732)
Single adult HH	0.103** (0.0458)	0.0505 (0.0494)	-0.0881 (0.0958)	-0.0405 (0.1280)
Household size	-0.130*** (0.0105)	-0.0358*** (0.0104)	-0.106*** (0.0188)	-0.0484** (0.0198)
Number of young children	-0.0109 (0.0424)	0.103* (0.0560)	-0.0306 (0.0739)	-0.0623 (0.0665)
Empl. to HH size ratio	0.603*** (0.0523)	0.105* (0.0570)	0.572*** (0.1060)	0.153 (0.1090)
7 th Region	-0.0952 (0.0685)	-0.16 (0.1100)	-0.211** (0.0918)	-0.0608 (0.0899)
8 th Region	-0.129** (0.0653)	-0.111 (0.1110)	-0.216** (0.0946)	-0.0481 (0.0919)
Metropolitan Reg.	0.0826 (0.0636)	-0.192* (0.1060)	0.0805 (0.1010)	-0.171* (0.0874)
Constant	9.199*** (0.1760)	0.757*** (0.2410)	9.969*** (0.3410)	0.659* (0.3970)
Observations	2,547	2,547	635	635
R-squared	0.458	0.035	0.389	0.05

Source: Author's calculations using the Panel CASEN 1996-2001-2006. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table B3. FGLS Regression Estimates for 2006 log per capita income and income per capita variance, Urban and Rural households.

VARIABLES in 2006	Urban	Urban	Rural	Rural
	Income per capita	Income Variance	Income per capita	Income Variance
Age	0.0323***	0.000424	0.0227**	0.0081
	-0.00617	-0.00748	-0.0115	-0.0133
Age square	-0.000103*	-3.55E-05	-7.92E-05	-8.10E-05
	-5.55E-05	-6.96E-05	-9.62E-05	-0.000108
Education (years)	0.0679***	0.0164***	0.0422***	0.00713
	-0.00356	-0.00413	-0.00887	-0.00881
Home ownership	0.312***	-0.158***	0.328***	-0.0867
	-0.0346	-0.0499	-0.0558	-0.0612
Unemployed	-0.343***	0.193	-0.655***	0.0508
	-0.0957	-0.185	-0.19	-0.197
Domestic servant worker	-0.274***	-0.274***	-0.349	0.0704
	-0.0794	-0.0725	-0.213	-0.163
Self empl. w/o paid workers	-0.141***	-0.0477	0.0423	0.0192
	-0.0492	-0.0517	-0.0949	-0.0887
Self emp. w/ paid workers	0.410***	0.0989	0.740***	0.215
	-0.102	-0.105	-0.218	-0.168
Waged salaried empl.	0.0354	-0.172***	-0.029	-0.112
	-0.0452	-0.0549	-0.0866	-0.0893
Male household head	-0.0677	0.0991	-0.140*	-0.0199
	-0.0418	-0.0605	-0.0779	-0.0845
Couple HH	0.0903**	-0.168***	-0.0795	0.0816
	-0.0425	-0.0615	-0.0838	-0.0961
Single adult HH	0.147***	0.0763	-0.071	0.274***
	-0.0471	-0.066	-0.0843	-0.0839
Household size	-0.0680***	-0.0244**	-0.103***	0.0106
	-0.0111	-0.0106	-0.0206	-0.0158
Number of young children	-0.0987	-0.0146	-0.119	-0.000516
	-0.062	-0.053	-0.215	-0.114
Empl. to HH size ratio	0.648***	-0.0332	0.533***	0.000674
	-0.0506	-0.0589	-0.0922	-0.103
7 th Region	-0.215***	0.0354	-0.0111	0.0472
	-0.0633	-0.0687	-0.0917	-0.154
8 th Region	-0.266***	-0.0336	-0.0825	-0.0629
	-0.0574	-0.0617	-0.0918	-0.161
Metropolitan Reg.	-0.0658	-0.0315	0.272***	-0.0714
	-0.0573	-0.0618	-0.104	-0.161
Constant	9.253***	0.640***	9.905***	0.0787
Observations	-0.182	-0.216	-0.384	-0.486
R-squared	0.374	0.051	0.328	0.049

Source: Author's calculations using the Panel CASEN 1996-2001-2006. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1