Poverty Dynamics in Chile Using Synthetic Panels

Paulina Henoch
Libertad y Desarrollo
Rodrigo Troncoso
Universidad del Desarrollo
Libertad y Desarrollo

Introduction

- Poverty levels, and their evolution, are important inputs to evaluate and design social programs.
- But, mobility is important as well (Paredes and Zubizarreta, 2005; Denis, et al., 2007; and Castro and Kast, 2004).
- For the same poverty rate, higher mobility means less chronic poverty.
- Policy challenges are different depending on mobility (Grübel, 2015).
- Some studies using panel data for Chile:
  - Arzola and Castro (2008) use CASEN Panel 1996-2001-2006.
  - Maldonado et al. (2016) use CASEN Panel 2006-2007-2008-2009.

Introduction

- Both sources of data are subject to concerns regarding the size of attrition bias (50% and 30% of attrition, respectively).
- More generally, there are not always reliable panel data available in developing countries.
- Besides, there are some limitations with panel data:
  - Higher costs
  - Attrition (decreasing efficiency and risk of bias)
  - Smaller samples difficult the study of mobility in subpopulations.
- Dang et al. (2014) propose a method to construct synthetic panels to study mobility using repeated cross-section surveys.
- We use this method to study mobility in Chile for the period 2006-2013.

Method

- Dang et al. (2014) propose the use of time invariant characteristics of households, time-varying characteristics available for both periods, and deterministic characteristics (as age), to build synthetic panels using repeated cross-section data.
- Assumptions (parametric estimation):
  - The population is the same in both rounds
  - Unobservable determinants of income are positively correlated in time
  - Between two periods, unobservables have a normal bivariate distribution

Method

- Incomes for periods 1 and 2 are given by:

$$\ln(y_{i1}) = \beta'_1 x_{i1} + \varepsilon_{i1} \qquad (1)$$

$$\ln(y_{i2}) = \beta'_2 x_{i2} + \varepsilon_{i2} \qquad (2)$$

- ε_{i1} and ε_{i2} are unobservable determinants of income each period.
- Let us call $\rho = corr(\varepsilon_{i1}, \varepsilon_{i2})$
- Considering composite errors: $\varepsilon_{it} = \mu_i + v_{it}$, a part of ρ would depend on $var(\mu i)$

Method

- The parametric approach considers a bivariate normal distribution of error terms.
- Estimates of transition probabilities between poor/non-poor states:

$$\widehat{P}(y_{i1} < z_1 \; y \; y_{i2} < z_2) = \Phi(\frac{z_1 - \beta'_1 x_{i2}}{\sigma_{\varepsilon 1}}, \frac{z_2 - \beta'_2 x_{i2}}{\sigma_{\varepsilon 2}}, \rho) \quad (3)$$

$$\widehat{P}(y_{i1} < z_1 \; y \;\; y_{i2} > z_2) = \Phi(\frac{z_1 - \beta'_1 x_{i2}}{\sigma_{\varepsilon 1}}, -\frac{z_2 - \beta'_2 x_{i2}}{\sigma_{\varepsilon 2}}, -\rho) \quad (4)$$

$$\widehat{P}(y_{i1} > z_1 \; y \;\; y_{i2} < z_2) = \Phi(-\frac{z_1 - \beta'_1 x_{i2}}{\sigma_{\varepsilon 1}}, \frac{z_2 - \beta'_2 x_{i2}}{\sigma_{\varepsilon 2}}, -\rho) \quad (5)$$

$$\widehat{P}(y_{i1} > z_1 \; y \;\; y_{i2} > z_2) = \Phi(-\frac{z_1 - \beta'_1 x_{i2}}{\sigma_{\varepsilon 1}}, -\frac{z_2 - \beta'_2 x_{i2}}{\sigma_{\varepsilon 2}}, \rho) \quad (6)$$

Method

- A problem is that an estimation of ρ needs panel data.
- Dang et al. (2014) suggest:
  - Estimate mobility for extreme values of ρ: 0 and 1.
  - Estimate ρ using similar panel data surveys for the same country.
  - Use lower and upper limits for ρ: 0.3 and 0.7, for instance.
- We use CASEN Panel 1996-2001 to estimate ρ using a similar econometric model for income.
- Instead of using a range of values for ρ, we use bootstrap to estimate standard error:
  - First stage: re-sample CASEN Panel to estimate ρ.
  - Second stage: re-sample repeated cross section surveys to estimate eq. (3)-(6).

Data

- To construct synthetic panels, we use repeated cross-section surveys CASEN 2006, 2009, 2011 and 2013.
- To estimate ρ we use CASEN Panel 1996-2001 (lower attrition). Point estimate: 0.2749
- We considered only households headed with people aged 25 to 60 years.
- Explanatory variables for income equations (1) and (2):
  - Age and sex of householder, ethnicity, literacy, educational level, occupational branch, profession, parental educational level.

Results

- Dynamic poverty:
  - 28.6% of households were poor in 2006 or 2013, or both.
  - 7.9% were poor both years, while 20.6% were poor in 2006 or 2013.
- Mobility:
  - 2 out of 3 households (63.1%) that were poor in 2006, were not poor in 2013, while 7.1% of households that were not poor in 2006 were under the poverty line in 2013.

Results

Intragenerational mobility of households (%)

a) Between 2006 and 2009

	Pobre 2009	pobre 2009	Total
Pobre 2006	47,2%	52,8%	100%
No pobre	15,1%	84,9%	100%

b) Between 2009 and 2011

	Pobre 2011	No pobre	Total
Pobre 2009	46,4%	53,6%	100%
No pobre	14,2%	85,8%	100%

c) Between 2011 and 2013

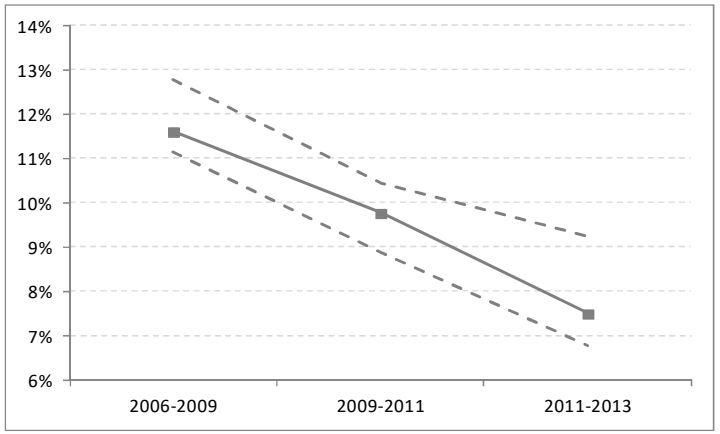
	Pobre 2013	No pobre	Total
Pobre 2011	38,6%	61,4%	100%
No pobre	9,4%	90,6%	100%

d) Between 2006 and 2013

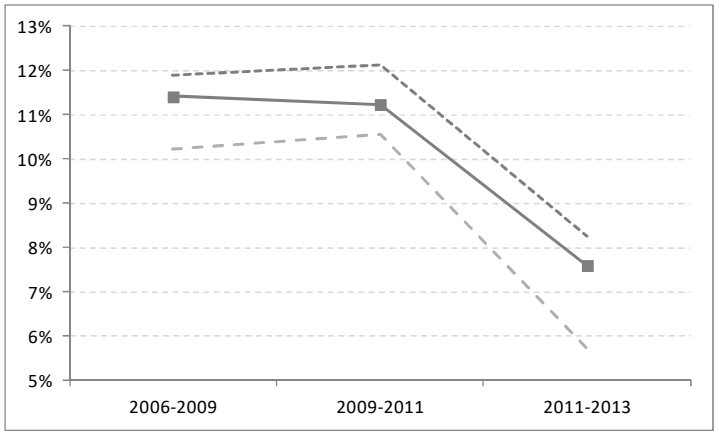
	Pobre 2013	No pobre	Total
Pobre 2006	36,9%	63,1%	100%
No pobre	9%	91%	100%

Results

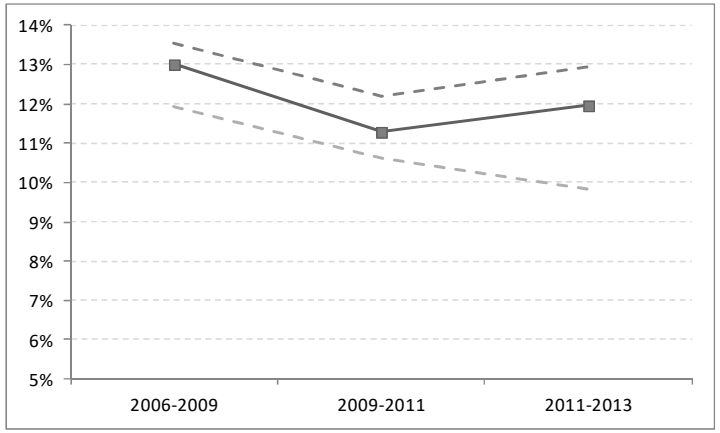
Households remaining in poverty



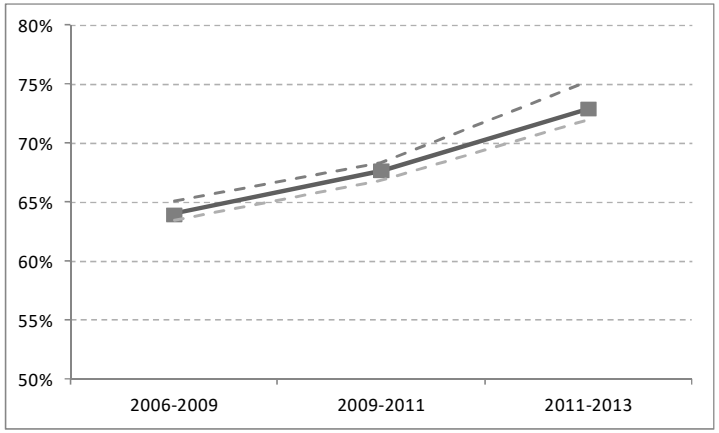
Households becoming poor



Households that came out of poverty



Households remaining not poor



Results

- Education:
  - Households headed by people with incomplete school education are more likely to remain poor.
  - Instead, there are almost no poor households headed by people with complete higher education.
  - Lower educational levels of householders are related to higher probabilities of becoming poor.
  - Higher educational levels of householders are related to a lower probabilities of being poor.

Results

- Profession:
  - Unskilled householders are more likely to remain in poverty, while skilled householders are more likely to remain above the poverty line.
- Householder's gender:
  - Households headed by women are more likely to remain poor.
  - This could also be due to the fact that female-headed households have fewer people who could work: 33% of female householders have no partner, while only 9% of male householders.
- Urban / Rural:
  - Rural households are more likely to remain under the poverty line.

Poverty Dynamics in Chile Using Synthetic Panels

Paulina Henoch
Libertad y Desarrollo
Rodrigo Troncoso
Universidad del Desarrollo
Libertad y Desarrollo