Historical Social Immobility in Santiago: A Markovian Approach

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Introduction and Problem Statement

Research related to economic inequality is abundant, not only in Chile (Contreras, 1999; Solimano and Torche, 2008), but also around the world (Stiglitz, 2012; Piketty, 2014). Indeed, over the past decades, along with what we know as economic development, the vast majority of nations have become very unequal (OECD, 2012).

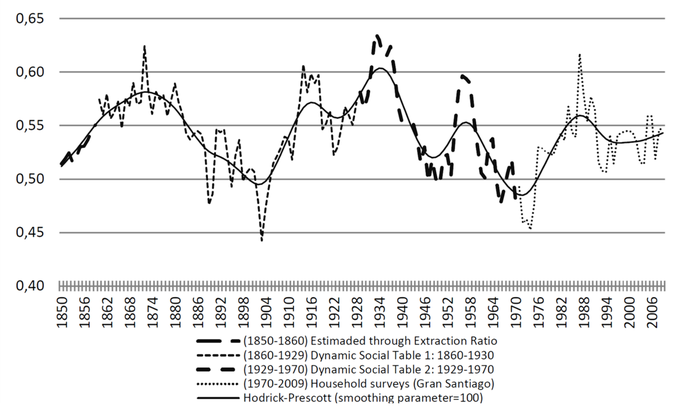
In this context, Chile shines as an emblematic case. As stated by the OECD (2015): *Chile is the most unequal OECD country when income inequality is measured with the Gini coefficient. The incomes of the 10% richest in Chile are 26 times higher than those of the 10% poorest.*

Because of the latter, Chile has been widely studied in terms of inequality (see Figure 1 for a brief historical overview of inequality in Chile). Nevertheless, there is a scarcely studied subject that drives inequality and that centers the attention of this research: social (im)mobility.

Social mobility is defined as a *movement of individuals, families, or groups through a system of social hierarchy or stratification. If such mobility... involves a change in social class, it is called "vertical mobility"* (Encyclopædia Britannica).

This document explores vertical social immobility in Chile under a short term, intra-generational, first-order Markovian framework. The relation between inequality and immobility is studied and a structural break is identified.

Figure 1: Chilean Household-Income Gini Index Before Transfers (1850-2009)



Source: Rodríguez Weber (2015)

Methodology and Results

The data source used to compute social immobility comes from the *Employment and Unemployment Survey of Great Santiago* (hereon EOD, from its Spanish abbreviation). According to University of Chile's Microdata Center (CMD): *A particularity of the EOD... is that in its almost 60 years of history, practically the same questionnaire has been applied..., this characteristic converts it into a statistical heritage for the country.*

I exploit this statistical heritage to conform a historical pseudopanel. Each consecutive year, a quarter of the previous sample is preserved. Therefore, a 1-year-long panel may be built for each initial year spanning from 1976 to 2014. For each initial and final year, in each (sub)sample, household income quantiles (in this case, quintiles) are computed. Quantile transitions are generated in a (first-order) Markovian fashion. Transition matrices are as (1).

$$M_t = \begin{bmatrix} p^t_{1,1} & p^t_{1,2} & p^t_{1,3} & p^t_{1,4} & p^t_{1,5} \\ p^t_{2,1} & p^t_{2,2} & p^t_{2,3} & p^t_{2,4} & p^t_{2,5} \\ p^t_{3,1} & p^t_{3,2} & p^t_{3,3} & p^t_{3,4} & p^t_{3,5} \\ p^t_{4,1} & p^t_{4,2} & p^t_{4,3} & p^t_{4,4} & p^t_{4,5} \\ p^t_{5,1} & p^t_{5,2} & p^t_{5,3} & p^t_{5,4} & p^t_{5,5} \end{bmatrix} \qquad \forall t = 1976, \dots, 2014 \tag{1}$$

Note that each $p^t_{i,j}$ in (1) indicates the probability of switching from quintile $i \in \{1, \dots, 5\}$ to quintile $j \in \{1, \dots, 5\}$ between year $t \in \{1976, \dots, 2014\}$ and year $t+1$ and each diagonal element $p^t_{i,i}$ accounts for the odds of staying in the same quintile, i.e. holding the same relative social position. Due to the latter, the *trace* of M_t is a simple additive indicator of short-run social immobility over each period. Define this indicator as $\Omega_t \coloneqq \mathrm{Tr}(M_t) = \sum_{i=1}^{5} p^t_{i,i} \in [0,5]$.

Table 1: Descriptive Statistics for Ω_t pre-2000

Variable	Obs.	Mean	Std. Dev.	Min	Max
$\Omega_{t\leq 2000}$	25	1.792	0.085	1.626	1.964

Source: Author's calculations based on EOD (June 1976 to June 2001).

Table 1 shows descriptive statistics for Ω_t from 1976 to 2000. A simple interpretation of the mean indicates that an average household had a 36% chance of staying in its quintile after a year. Note that quintiles are recalculated each period, so most variation is given by households in the neighborhood of the quintile thresholds.

Figure 2: Gini coefficient and Ω_t pre-2000 (1976-1999)

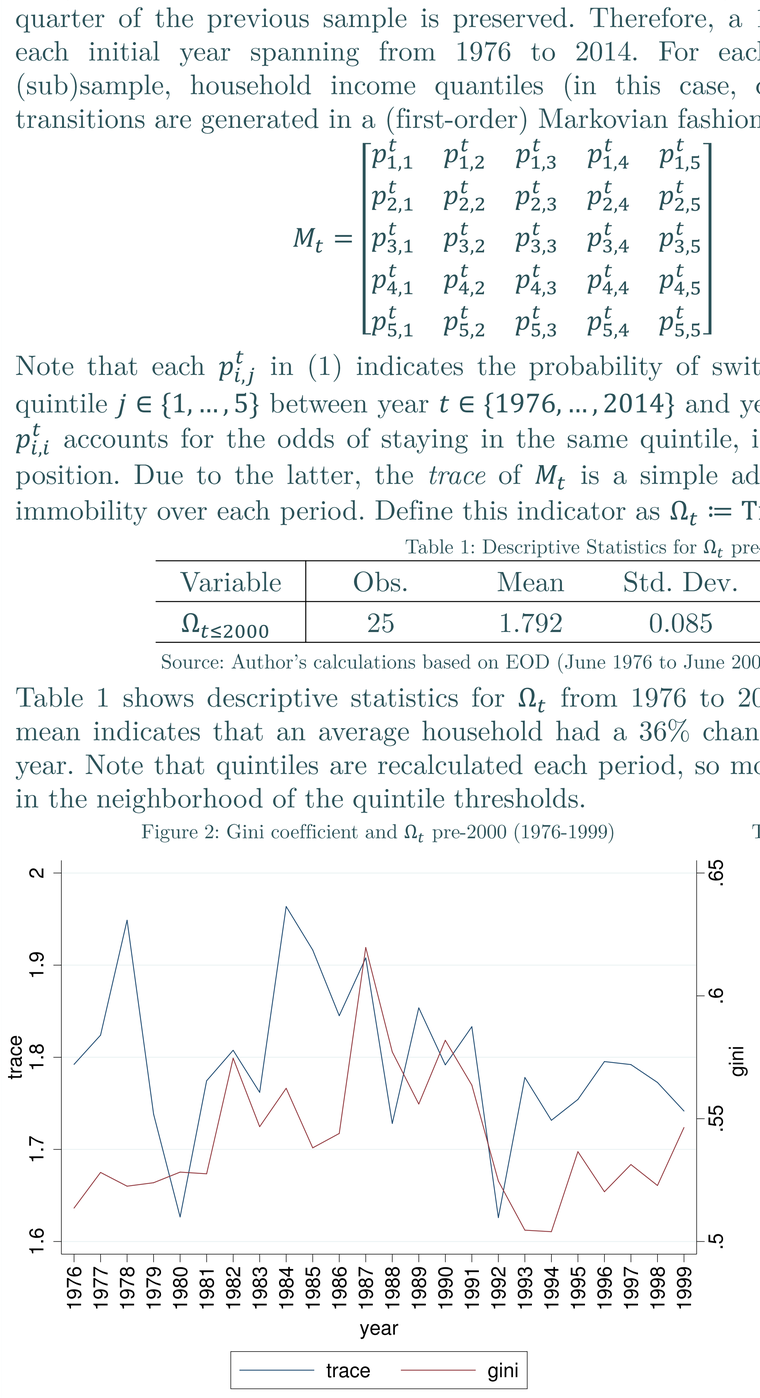


Table 2: OLS Estimates for $\Omega_{t*} = \alpha + \beta \mathrm{Gini}_t + \varepsilon_t$

	(1) $\Omega_{t<2000}$
Gini	1.040*
	(1.69)
Constant	1.233***
	(3.69)
Observations	24
R^2	0.1146

t statistics in parentheses
*p<0.1, **p<0.05, ***p<0.01

Source for Figure 2 and Table 2: Author's calculations based on EOD (June 1976 to June 2000).

Figure 2 is consistent with Graph 2 in Ruiz-Tagle (1999), with Ω_t overlaid.

Figure 2 and Table 2 show how inequality (measured through the Gini index) and immobility (measured through Ω_t) had similar and highly correlated paths before 2000. Both indicators are calculated with the available microdata for each year but maintaining the methodology in order to allow longitudinal comparisons.

Notwithstanding, when paying attention to what happens in the beginning of this twenty-first century, the results are quite different. Indeed, as Table 3 shows, Ω_t has raised quite a bit.

Table 3: Descriptive Statistics for Ω_t pre-2000 and post-2000

Variable	Obs.	Mean	Std. Dev.	Min	Max
$\Omega_{t\leq 2000}$	25	1.792	0.085	1.626	1.964
$\Omega_{t>2000}$	14	2.052	0.211	1.755	2.369

Source: Author's calculations based on EOD (June 1976 to June 2015).

In fact, there is a deeper structural difference that arises post-2000: Ω_t and the Gini index are no longer positively correlated (see Figure 3).

Moreover, when replicating Table 2 using the whole sample, the relation between these two variables flips to a negative one, just as shown in Table 4.

But what does this soaring indicator say? A simple back-of-the-envelope calculation may illustrate this: Ω_t raised 0.7 in the last 15 years (as Figure 3 depicts), and 0.7/5=0.14, i.e. 14% more chances to stay in your quintile!

When decomposing the increment of this indicator by upper, middle and lower income class, one may observe each subset contributes significantly to this increased immobility, with a higher share attributed to middle class households (quintiles 2 to 4).

The actual situation is so critical that when comparing recent presidential terms with a highly immobile period such as Chile's 1973-1990 dictatorship, one finds significantly higher chances of maintaining a quintile nowadays.

Figure 3: Gini coefficient and Ω_t pre- and post-2000 (1976-2014)

Source: Author's calculations based on EOD (June 1976 to June 2015).

Table 4: OLS Estimates for $\Omega_{t*} = \alpha + \beta \mathrm{Gini}_t + \varepsilon_t$

	(1) $\Omega_{t<2000}$	(2) $\Omega_{t\geq 2000}$	(3) Ω_t
Gini	1.040*	-5.124**	-2.721***
	(1.69)	(-2.67)	(-3.00)
Constant	1.233***	4.642***	3.326***
	(3.69)	(4.73)	(6.90)
Observations	24	15	39
R^2	0.1146	0.3537	0.1952

t statistics in parentheses; *p<0.1, **p<0.05, ***p<0.01

Source: Author's calculations based on EOD (June 1976 to June 2015).

Conclusions

Social immobility has risen significantly in the first 15 years of this twenty-first century. This contrasts with the path followed by social inequality. Thus, a major structural change is identified, as immobility is no longer positively correlated with inequality.

Immobility levels quantified with the proposed first-order Markovian indicator have reached historical peaks, mainly because of a stagnant middle-income class.

As a final comment, the need to focus research on immobility and not only on inequality is highlighted. A dynamic framework to study our society's composition may shed some light on how actual social inequality is gestated and configured.

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