

Trading Places: A Decade of Earnings Mobility in Chile and Nicaragua

Rafael Novella
Laura Ripani
Maria Cecilia Soto
Luis Tejerina [‡]

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Abstract

In this study we use recently available panel datasets from Chile and Nicaragua to compare earnings mobility over a decade for two Latin American economies with completely opposite performance in the region. We first measure earnings mobility using transitions mobility matrices and additionally, we propose a methodology that consists in analyzing the determinants of changes in ranking (based on earnings) for each country-year distribution, controlling for characteristics of the worker and characteristics of the labor market. Our results suggest that earnings mobility in Chile and Nicaragua follow different patterns, which is explained for differences in some individuals and institutional mechanisms that are particularly important for policy actions.

Keywords: earnings mobility, rankings, Chile, Nicaragua

JEL codes: D31, J3, J6, O54

[‡] Rafael Novella (grnove@essex.ac.uk): Inter-American Development Bank (IDB) and ISER/University of Essex, UK. Laura Ripani (laurari@iadb.org): IDB, US. Maria Cecilia Soto (sotomariacecilia@gmail.com): Universidad Torcuato Di Tella, Argentina. Luis Tejerina (luist@iadb.org): IDB, US.

1 Introduction

Economic literature has traditionally studied the impact of business cycle stages on the welfare status of the population through the comparison of inequality and poverty indexes, using different cross sectional datasets. Besides its importance, these analyses do not permit ascertaining the evolution of welfare impacts on particular agents through time. Mobility analysis, in contrast, uses longitudinal data to track the evolution of agents' incomes over time identifying the winners and losers of the economic process.

Mobility analysis answers questions like; were the workers with lower earnings in the middle of the 1990's the same workers with poor earnings ten years after? Are today's high earnings workers the same as ten years before? Do workers with middle earnings stay in the same position? Are these dynamics similar between countries which economies experienced more periods of growth than periods of contraction?

The studies on earnings mobility consist then in following the same individuals or households over time with the objective of capturing changes in their economic circumstances. But it is with longitudinal data that one can properly investigate the issues highlighted above. The lack of this type of data in most of the Latin American countries let the issue about how individuals' earnings change over time still unsolved².

In this study we analyze changes on individuals' earnings using longitudinal datasets for Chile and Nicaragua, countries that have experienced different macroeconomic performances on the decade starting in the middle of 1990's. This paper suggests an alternative way to measure earnings mobility. It consists on estimating individual's positional movements or changes in ranking based on individual's earnings information both unconditionally and conditionally on a set of individual, household and labor market characteristics. We try to answer empirically the questions mentioned above and to determine differences on general mobility for both countries.

As Fields et al. (2006) mention, the increasing availability of longitudinal data has being accompanied with an increasing number of studies on economic mobility in Latin American countries³ (see section 2.2 for more details about this literature). Both country-specific studies (the countries who have received more attention, in part because the availability of richer data, are Argentina, Mexico and Venezuela) and comparative analysis (Wodon, 2001; Fields et al., 2006b; Calónico, 2006; Ñopo et al., 2007), show in general the importance of analyzing economic mobility in a region where substantial macroeconomic instability occurred in the last decades.

² Recently some studies have attempted to overcome the lack of information in Latin American countries using pseudo-panel data for analyzing income mobility; Calónico (2006), Ñopo et al. (2007), and Antman and McKenzie (2007).

³ For a detailed review of these studies see Section 3 and 4 on Fields et al. (2006a).

One main reason for studying earnings mobility in Chile and Nicaragua is that these two countries represent nearly opposite extremes of economic performance in the region. Additionally, the availability of data for both countries makes possible to compare measures of the changes in real earnings over a decade (1996 - 2006 in the case of Chile and 1998 - 2005 for Nicaragua), in which exposure to different macroeconomic conditions occurred.

The main goal of this paper is to contribute to the design of social and labor policies through the analysis of mobility and the mechanisms through which it operates. This paper seeks to contribute to a limited literature on income mobility, and in particular on earnings mobility, in Latin America.

The paper is structured as follows. Section 2 explains the mobility concepts in detail and reviews some relevant findings on previous literature. Section 3 discusses the evidence of economic performance for both countries during the period of study. Section 4 describes the methodology used and the data. Section 5 presents the results and Section 6 concludes.

2. Conceptual framework and literature review

2.1 Conceptual framework

In the economic literature social mobility is explained by several theories. We present here three economic concepts that reinforce one another; the first two are more related to individual/household's decisions and the last one is more related to changes in the economy at macroeconomic level.

First, *cumulative advantage* refers to the situation when individuals who are better-off in the base year, are the one who benefits more and would be in the same high positions at the end of the period (Merton, 1968; Boudon, 1973; Huber, 1998). Under this theory, wealthier workers accumulate and benefits from their higher endowments of physical, human and social capital, face fewer credit constraints and have higher possibility to save.

Second, *poverty trap* refers to the opposite side of the distribution; to individuals/workers with lower levels of physical, human and social capital experiencing credit constraints and limitations to save. Their initial deprivation condition influences negatively the options to improve their social status (Carter and Barrett, 2004; Chronic Poverty Research Centre, 2004; Sachs, 2005).

Third, several authors (Johnson, 1997; Gottschalk, 1997; Topel, 1997; among others) argue that the increment in the intensity of use of technology in the production processes and globalization have boosted the labor demand for high skilled workers, increasing their earnings and deteriorating the relative earnings of low skilled workers.

Respect to the different concepts related to the measure of earnings mobility, Fields and Ok (1999) distinguish: 1) *absolute* (related to changes in monetary units) and *relative* (where a scale invariance is assumed) mobility; 2) *structural* (examines the effects of changes in the distribution of earnings) or *exchange* (focuses in positional changes without changes in the underlying distribution of earnings) in mobility; 3) *transition mobility matrices*.

Fields (2001 and 2005) considers six different concepts of earnings mobility: *time-dependence* (how much of present wellbeing is determined by the past), *positional-movement* (when there are changes in individual's economic position), *share-movement* (when individual's share of total income changes), *income flux* (what matters is the magnitude of the income change but not the direction), *directional income-movement* (what matter is the direction of the income change), and finally *equalization of longer-term incomes* (concerning with the degree of convergence to a more equal distribution of incomes).

From the discussion presented above and the objectives of this paper, the concepts of mobility that we adopt as theoretical framework are the following: *relative mobility* (since we are interested in changes in ranking and not in earnings changes neither in Chilean *pesos* nor in Nicaraguan *córdobas*), *exchange mobility* (since our variable of interest, ranking, is calculated based on each country-year distribution), *positional-movement* (our methodology proposes analyze changes in ranks), *income flux* (represented in our second equation to be estimated), and, finally, we use *transition mobility matrices* in order to make a first empirical approximation, without controlling for other factors, to earnings mobility in these two countries.

2.2 Literature review

Empirical studies have analyzed income/earnings mobility in Latin America mostly from a country-specific perspective but also from a comparative perspective. Basically because of restrictions on data availability, the countries which have received more attention are Argentina, Mexico and Venezuela. In this section we discuss briefly the main findings of some comparative studies and in more detail the empirical findings for Chile and Nicaragua.

Fields et al. (2007) examine changes in individual earnings during different business cycles, using sequences of shorts panel datasets, in three countries: Argentina, Mexico and Venezuela. Just in the cases of Mexico and Venezuela, the authors find some small evidence of high earnings workers experiencing the largest earnings gains or the smallest earnings losses, independently on the business cycle stage (i.e. *divergent mobility hypothesis*). Moreover, the paper finds that those workers who gained the most in a positive cycle are also who gained the most in recession (i.e. the evidence rejects the *symmetry of mobility hypothesis*). In the same direction, Fields and Sánchez Puerta (2008) do not find any evidence of divergent mobility in Argentina for the period 1996 - 2003. In both studies the weak evidence of divergent mobility contrasts with the rising inequality in the region, which is explained according to the authors by the different outcomes of using panel and cross sectional data.

Duryea et al. (2006) focus also in these three countries and in other six transition economies in Europe to analyze job mobility and earnings changes across different statuses in the labor market. Among the most relevant findings of this study is the existence of some selection mechanisms behind the final effect of job mobility on earnings: positive selection for those workers who switch from self-employment to a formal salaried job and negative selection for formal salaried workers switching to informal salaried jobs. Despite the selection problem, the study shows that job mobility has important positive effects on wages of workers moving from informal salaried jobs to self-employment and negative effects on wages of workers moving from formal to informal salaried jobs.

For Argentina and Mexico, Wodon (2001) uses a Gini index of mobility to find that there is no evidence of labor income mobility's increases for the period between late 1980s and the second half of the 1990s. The study also finds a negative correlation between mobility and growth in the case of Argentina and the opposite for Mexico, which, according to the author is attributable to differences in labor market institutional adjustments (Argentina adjusts his labor market through quantities, i.e. in term of unemployment, and Mexico through prices, i.e. in term of real wages). Finally, the study shows that, in Mexico, mobility patterns are heterogeneous within groups: younger and less educated workers show higher within-group earnings mobility in comparison to older and more educated workers.

Using pseudo-panel data, Ñopo et al. (2007) analyze mobility patterns in 14 Latin American countries between 1992 and 2003, finding that very high levels of income (and poverty) immobility exist in the region, both unconditionally and conditionally. However, the study highlights the importance of controlling for personal and socioeconomic characteristics; doing this, the unconditional immobility decreases more than 30 percent. Differences in immobility rates among countries are considerable, being the extreme cases Brazil, Colombia and Costa Rica (less mobility) and Bolivia, Mexico and Venezuela (higher mobility). Using also pseudo-panel data but labor incomes, Calónico (2006) obtains analogous results: higher mobility in Mexico, Venezuela and Chile and less mobility in Argentina, Colombia, Uruguay and Brazil.

In the case of Chile, Scott and Litchfield (1994) study income mobility and the evolution of inequality over the period 1968 – 1986 for rural households. They use a transition matrix between absolute income classes and different models (OLS and order logit model) for the determination of directional income movements. According with the transition matrix, half of the population moved to a higher income class, around a quarter moved down and what is very interesting, one out of ten initial poor households moved upwards⁴. Their analysis show that household moved but not so far from their initial positions; being the movement bigger for those who moved upwards. The multivariate analysis performed show the

⁴ This fact is analyzed in detail by Scott (2000), who shows that the upward mobility for around 60 percent of the initial poor households who moved, were not enough to overcome the poverty line.

importance of age, head of household's education, amount of land owned and initial per capita income as determinants of upward income mobility.

The National Characterization Socioeconomic Survey (CASEN) panel dataset of Chile has been used in several studies of economic mobility. Contreras et al. (2005) use the first two waves of this survey, 1996 and 2001, to study poverty dynamics following a methodology similar to the one of Scott and Litchfield (1994); that is, using transition matrix and logistic regressions. From the transition matrix they find significant positional mobility across the lowest seven deciles of the income distribution, which indicates, according to the authors, a high vulnerability of non-poor households to become poor. In another study for Chile and for the same period, Contreras et al. (2007) analyze the distributional effects of growth using parametric and non-parametric techniques to determine percentages of income changes. They find some evidence of convergent mobility mainly in the lower tails of the income distribution (i.e. growth in Chile has contributed to the reduction of the poverty rates).

Paredes and Zubizarreta (2005) use the CASEN 1996 and 2001 to compare mobility among extreme poor, poor and non-poor households. The study reports high transition rates out of extreme poverty conditions. Additionally, the factors determining the mobility of extreme poor households are different to those determining mobility of poor households, which has, according to the authors, several repercussions for the better design of social policies of poverty alleviation.

Chile is also included in some of the comparative studies presented above. In Ñopo et al. (2007), the Chilean economy shows moderate immobility among the 14 Latin American countries studied. Moreover, the study shows a positive relationship between education and the probability of moving out of poverty or not falling into it. Calonico (2006) finds that Chile is one of the countries showing the highest level of mobility. The author uses, as we mentioned before, labor income as variable of interest, which is similar to what we do in this paper.

Economic literature about intragenerational income mobility in Nicaragua is very scarce⁵. Davis and Stampini (2002) use panel data from the 1998 and 2001 LSMS surveys to analyze the dynamic of poor households moving in and out of poverty. The authors find that vulnerability of becoming poor is highly associated with working in agriculture, instability e informality at work, geographical location (Central Region), and mainly, with lower levels of education.

Andersen (2003) uses the same data to calculate Markov transition matrices finding significant differences in the mobility rates by type of household. Households located in

⁵ Ñopo et al. (2007) excluded Nicaragua from their analysis because they are interested in studying total income mobility (from labor and non-labor activities) and Nicaragua's household survey does not collect that information.

urban areas, with more education and fewer children have highest degrees of upward mobility and less vulnerability. An interesting finding is that more education is robustly related with less vulnerability, higher probability of upward mobility and, lower probability of downward mobility. Living in urban areas and having fewer younger members in the household show similar relations with vulnerability and upward/downward mobility.

Parker and Gardner (2002) combine Nicaragua GDP data with the data of other 23 countries in a category of countries called “Tropical America”, with the objective of studying the evolution of international inequality over the period 1972 - 1982.

After reviewing the existent literature about economic mobility in the region, it is possible to observe many studies using total income as their variable of interest, but at the same time a lack of literature on studies focusing on labor income/earnings mobility. In addition to contribute on this topic, the present paper seeks to analyze earnings mobility in Nicaragua where just a few studies on the topic have been done.

3. Economic performance

3.1 Chile

Chile is a country that has shown high growth rates and a stable macroeconomic situation during the last 20 years.⁶ Even though it is a country that experienced a systematic reduction in poverty rates (it cut its poverty rate in half between 1990 and 2003—from 38.6% to 18.8%), its income distribution is one of the most uneven among countries at a comparable development stage, with virtually no improvement since the 1960s.⁷ According to IDB (2006), the popular perception in Chilean society is that family background counts more than personal merit in deciding the opportunities an individual will have to better his or her lot (UNDP, 2004), and education, ethnicity, and geography overwhelmingly determine a person’s social mobility prospects. Thus, while healthy economic growth rates are a must to combat poverty, Chile has seen that they are not enough to achieve more equitable development.

3.2 Nicaragua

Nicaragua is the second-poorest country in Latin America and the Caribbean, with per capita GDP of US\$1,023 in 2007.⁸ Its economy, traditionally based on agricultural exports, is small and open and continues to be vulnerable to external shocks and natural disasters. Since 1997, its terms of trade have fallen by two thirds. The country is highly dependent on remittances (about 12% of GDP) and donations from industrialized countries (about 4% of GDP and

⁶ Though the economy grew 5.7% annually, on average, between 1990 and 2004, Chileans’ per capita income is barely 30% of the U.S. figure and 40% of the OECD average. The productivity gap with the advanced economies is even wider than the income gap.

⁷ See Inter-American Development Bank (2006).

⁸ See Inter-American Development Bank (2008).

16% of the central government's total budget). While some individual indicators have improved, poverty continues to affect close to one half of the population and there are significant regional and gender differences in terms of access to social services. The main factors that stand in the way of better progress in these areas and the risks facing the country in the short and medium terms are: (i) macroeconomic stability and fiscal sustainability; (ii) constraints on growth; and (iii) environmental sustainability and natural disaster prevention.

4. Methodology and Data

4.1 Methodology

In order to measure mobility in labor markets we use earning as our underlying welfare metric and proceed to measure what we understand as mobility in a variety of ways.

First, following most of the economic mobility studies, we begin the analysis by looking at descriptive statistics of the data using transition mobility matrices among quintiles of earnings. These matrices convey information about the earning's dynamics (i.e. changes of position within the earning distribution) being followed by workers in the two countries under study. However, transition matrices just contain descriptive information since they fail to control for other factors and they present some additional problems that will be discussed below.

Second, our analysis is based on the concept of *positional mobility* (See Fields, 2005), that is, we rank workers from who receive the lowest labor income to who earn the most, in each year and for each country, and assign them a rank position in their respective distribution. Next, we calculate the change in position over the period studied for each worker and use that result as an indicator of earnings mobility. We also estimate the absolute value of these changes, in order to have a measure concerning with the magnitude of the changes and not with the direction. The equations to estimate are the following:

$$\Delta Rank_i = \alpha_i + \beta x_{i,t} + \gamma \Delta z_i + \varepsilon_i \quad (1)$$

$$|\Delta Rank_i| = \alpha_i + \beta x_{i,t} + \gamma \Delta z_i + \varepsilon_i \quad (2)$$

Where $\Delta Rank_i$ denotes the change in rank of individual i between t and $t-1$, x denotes a set of individual and household's characteristics at time t , Δz denote changes in explanatory variables between time t and $t-1$, such as changes in working hours, changes between sectors of the economy (indicating the sector to which they changed, not the sector of origin), and changes in education. Finally, ε is the error term with the usual assumptions. Equation (2) changes the dependent variable to denote absolute values. In this case we are more interested in the variables that explain any type of mobility instead of the ones explaining a positive jump in the distribution.

The reasoning behind the use of changes in ranking as indicator is that individuals will make human capital investments and labor market decisions based on the potential to advance relatively to their peers in the labor market. Therefore an absolute increase in earnings is not considered a labor market improvement unless it leads to the individual being better than someone else.

The methodology proposed seeks to improve some features of previous measures of earnings mobility, for example upgrading those theories that calculate the effect of one, or a set of, variable on the probability of jumping to a higher earning quintile. The latter approach is intuitive but it has the problem that the cutoff points defining different earning quintiles are selected arbitrarily, that is, a worker located at the margin of a cutoff point between quintiles can jump to the next quintile through an increase of only one dollar. Alternatively, if the worker is located slightly above the cutoff line, he or she will need a much larger monetary increment to jump from one quintile to the next. However, in terms of welfare it is clear that the second worker will be much better off from the increase in earnings than the worker who only improved by one dollar. Another problem with this type of approach refers to the truncated nature of the dependent variable, since it is impossible for individuals in the bottom quintile to jump down and for the individuals in the top decile to jump upwards.

By increasing the domain of the measured changes in workers' mobility, the methodology proposed in this paper diminishes the problems explained in the previous paragraph. However, there are still some issues that need to be discussed. First, we do not account for those improvements that do not lead to changes in ranking; for example, the fact that a worker gets closer to the next better off worker might represent an improvement and a sign of mobility, but since there is no change in ranking, there is no mobility under our definition. Therefore, we may have a downward bias in our estimate of mobility. However, we expect this to be relatively small and present in both countries, which would not affect our comparisons.

Second, there might be a truncation problem similar to the one described above for the quintile approach. This is the case for example of a worker located in the upper side of the distribution who greatly improves his/her situation, but by definition finds an upper limit to the number of individuals this worker can surpass. There might be an equivalent problem at the lower end of the distribution; workers have an upper bound in the number of persons they can fall behind to if their economic condition worsens.

4.2 Data

In the past, studies of labor and social mobility have been limited in Latin American countries by data availability. Being an inter-temporal phenomenon, longitudinal data is needed in order to measure mobility (either inter- or intra-generational). Intergenerational mobility studies require even more specific data: panel data sets following households for

more than one generation. Some of the data limitations have been overcome in past studies by using retrospective information such as the assets available to the household in an earlier period, or the level of parents' education (see Galiani, 2006). Alternatively, pseudo panel data has been used in order to follow cohorts of households or individuals over a period of time (Calonico, 2006; Ñopo, et.al., 2007; among others).

Developed countries systematically collect longitudinal data of households or individuals, in some cases over long periods of time, and the resulting data has been broadly used in economic literature⁹. On the other hand, longitudinal data has not been in general available in developing countries; one of the exceptions is the ICRISAT Indian panel of villages that has followed a small number of households for 10 years (Townsend, 1995; Morduch 2002; among others) or the Philippines panel of villages (Fuwa, 2007).

In Latin America we have identified panel data in 8 countries: Argentina, Brazil, Chile, Ecuador, Mexico, Nicaragua, Peru and Venezuela. Panels in these countries are very heterogeneous; in some cases they have a high frequency (i.e. they have observations for the same household every month) but follow households for a short period, usually between one and two years (this is the case of Argentina, Brazil, ENAHO in Peru, Ecuador, the employment survey in Mexico and Venezuela) and in other cases they have a low frequency but follow households or individuals for a longer period (this is the case of Nicaragua, Chile, ENNIV in Peru and the ENNVIIH panel being developed in Mexico). Existing panels also vary in the amount of information collected: usually the higher frequency panels come from employment surveys which tend to have relatively less socioeconomic information and data on individuals' income and consumption; panels that come from household surveys are more complete in terms of information and do include all this data.

The data used in this study come from the National Characterization Socio-economic Survey (CASEN) of Chile, panel dataset for the years 1996, 2001 and 2006 and from the Nicaraguan Living Standards Measurement Survey (LSMS) surveys for the years 1998, 2001 and 2005. As it was mentioned above, one of the main reasons for choosing these two countries was data availability; these are the only two countries in which it is possible to find data for such a long period of time. Fortunately for our purposes, both datasets contains some features that make relevant the joint analysis of the panels. Since the period in which both datasets were collected is similar, we should not expect high differences in the international environment both countries faced. Another reason for choosing Chile and Nicaragua is that these countries are respectively among the most and the least developed countries in the region, based on income per capita. Therefore, when analyzing these two countries we are considering markets and institutions that were at very different levels of development but which faced similar international context over a similar period of time.

⁹ The best well-known panel data sets are the PSID and NLS in the US, the BHPS in the UK, the GSOEP in Germany, among others.

In what follows, it is important to keep in mind that if x_{t-2} , x_{t-1} and x_t correspond to workers' earnings in panel waves' 3, 2 and 1, respectively, we just consider workers for whom x_{t-2} , x_{t-1} and x_t are observed and strictly positive and thus ranking positions could be assigned to each worker on each country-year distribution. It is important to remark that panel's wave 2 in both countries is considered, for this study, just to identify the continuity of workers on the longitudinal data but not for estimation purposes. The inclusion of wave 2 forms part of a further investigation.

The resulting data set is two balanced panel datasets that comprises 3,046 workers, in total, with positive earnings in the three years surveyed, with ages between 25 and 65.

4.2.1 The Chilean CASEN

The final sample used in the study consists on 1,792 observations corresponding to workers appearing in the 1996, 2001 and 2006 period, from which 22 percent are female workers. Table 1 shows some summary statistics of the main variables used in the analysis for the years 1996 and 2006.¹⁰

Table 1 (part 1): Summary statistics Chilean CASEN 1996 and 2006

| Variables | | mean / (s.d.) | mean / (s.d.) |
|-----------------------------|-------------------------------|-----------------|---------------------|
| worker's characteristics | Years of education | 9.15 (4.06) | 9.33 *** (4.18) |
| | Max. educ. = Primary | 0.15 (0.36) | 0.18 *** (0.38) |
| | Max. Educ. = Secondary | 0.19 (0.39) | 0.22 *** (0.42) |
| | Max. Educ. = Superior-non Uni | 0.03 (0.18) | 0.04 (0.19) |
| | Max. Educ. = University | 0.05 (0.22) | 0.06 ** (0.24) |
| household's characteristics | Age | 37.99 (7.89) | 48.12 *** (7.98) |
| | Married=1 | 0.79 (0.41) | 0.78 (0.41) |
| | Single=1 | 0.21 (0.41) | 0.09 *** (0.28) |
| | Household size | 3.89 (1.44) | 3.51 *** (1.35) |
| | Number of adults in the hh | 2.31 (0.90) | 2.56 *** (1.04) |
| | Number of children in the hh | 1.35 (1.18) | 0.79 *** (0.95) |

From the first two panel of table 1 it is possible to observe a slight but significant increase in workers' education, mainly at basic levels. Also, some family dynamics occurred during the

¹⁰ In order to consider any potential biases caused by the reduced sample included in the panel, attrition rates were also considered in the analysis. For further details see Bendezú, et al., 2007.

decade; fewer workers manifested to be single and the number of household's members decreased.

Table 1 (continuation): Summary statistics Chilean CASEN 1996 and 2006

| | | | | |
|------------------------------|---|--------------------|------------------------|--------------------|
| worker's job characteristics | Rural=1 | 0.21 (0.41) | 0.21 (0.41) | |
| | Region III | 0.07 (0.26) | 0.07 (0.26) | |
| | Region VII | 0.21 (0.41) | 0.21 (0.41) | |
| | Region VIII | 0.31 (0.46) | 0.31 (0.46) | |
| | Metropolitana | 0.41 (0.49) | 0.41 (0.49) | |
| | Labor income (thousands of nominal pesos) | 138.31 (186.24) | 252.25 *** (323.98) | |
| | Has a job contract | 0.59 (0.49) | 0.61 (0.49) | |
| | Contribute to pension system | 1.00 (0.00) | 0.89 *** (0.32) | |
| | Hours of work (on main job) | 45.35 (14.94) | 46.64 *** (13.21) | |
| | Has a secondary job | 0.05 (0.22) | 0.06 * (0.24) | |
| firm's characteristics | Employer=1 | 0.01 (0.12) | 0.04 *** (0.20) | |
| | Self employed=1 | 0.23 (0.42) | 0.24 (0.43) | |
| | Firm size 0-1 | 0.20 (0.40) | 0.27 *** (0.44) | |
| | Firm size 2-4 | 0.20 (0.40) | 0.14 *** (0.35) | |
| | Firm size 5-9 | 0.11 (0.32) | 0.07 *** (0.26) | |
| | Firm size 10-49 | 0.23 (0.42) | 0.19 *** (0.39) | |
| | Firm size 50-199 | 0.13 (0.33) | 0.14 (0.35) | |
| | Firm size >200 | 0.09 (0.29) | 0.15 *** (0.35) | |
| | sector's characteristics | Agriculture | 0.22 (0.41) | 0.19 *** (0.39) |
| | | Manufacturing | 0.16 (0.37) | 0.14 *** (0.34) |
| Electricity | | 0.01 (0.08) | 0.00 * (0.05) | |
| Commerce | | 0.16 (0.36) | 0.18 *** (0.39) | |
| Public services | | 0.23 (0.42) | 0.23 (0.42) | |
| Communications | | 0.07 (0.25) | 0.08 * (0.27) | |
| Minning | | 0.03 (0.16) | 0.02 (0.15) | |
| Construction | | 0.11 (0.31) | 0.11 (0.32) | |
| Finance | | 0.02 (0.15) | 0.04 *** (0.19) | |
| Other | | 0.01 (0.08) | 0.00 ** (0.03) | |

Note: ***significancy at 99%, ** 95% and * 90%. Own calculations basen on panel CASEN.
Results based on 1792 observations.

The second part of table 1 shows differences in workers, firms and economical sectors' characteristics over the decade 1996 – 2006. According to the first panel it is possible to see increases in workers' earnings (in nominal terms), in the number of working hours in the main job, in the percent of workers with a secondary job and those becoming employers.

The second panel of the table shows clearly that workers transitioned from small and medium size firms to bigger and individual firms. Finally, the bottom panel shows transition between economical sectors. While agriculture and manufacturing activities lost importance, services and financial sectors gained relative importance.

4.2.2 The Nicaraguan LSMS

The panel for Nicaragua includes those individuals who in 1998 were at least 21 years old and were active in the labor market (either employed or unemployed in both 1998 and 2005). We end up with a sample of 1254 observations for which we have information for the three years of the panel and from which 35 percent are female workers.¹¹

Table 2 shows some summary statistics of the main variables used in the analysis for the years 1998 and 2005. Over the period 1998 and 2005, workers in Nicaragua increased their level of education in almost a year of schooling, with significant increases at basic and superior (university) levels. With respect to family dynamics, more workers became singles or living without a partner. In addition, the total number of member in the household decreased as did it the number of younger members of the household.

When looking at the characteristics related to the job, it is observed that while worker's earnings (in nominal terms) and the proportion of employers increased, the proportion of self-employed workers decreased substantially.

The last panel of Table 2 shows changes in the distribution of the workers among economic sectors. The sector that acquired a significant higher relative importance is agriculture, whereas sectors as commerce and public services lost on relative importance.

¹¹ Contrary to the Chilean case, the work needed to build the panel for Nicaragua was significantly higher. Informants in the years 2001 and 2005 were asked if they were interviewed in the past surveys, those who answered positively were then asked what their identification number was when they were interviewed. As expected, there were many errors caused by a wrong recollection of individuals' number in a survey collected five years before. The first exercise to construct the panel was to match the individuals reporting correctly their number assigned in past surveys. For many observations however, the number was declared incorrectly. In these cases and after checking for other characteristics it became obvious that some individuals need to be matched using more information than just the identification number. Then, the matching procedure among this subsample of households, who were surveyed in 2001 and 2005 but had mismatched individuals, was based on year of birth. Under this, the only source of error would consist in the wrong matching of twins, which we expect to occur rarely. Next we proceeded to analyze any bias that might appear from the smaller sample that at last becomes part of the panel. The results of comparing and testing differences in mean between each cross-sectional sample and the panel sample show that the attrition problem was minimal.

Table 2: Summary statistics Nicaraguan LSMS 1998 and 2005

| Variables | 1998 | 2005 | | |
|------------------------------|---|------------------|------------------|-----|
| | mean / (s.d.) | mean / (s.d.) | | |
| worker's characteristics | Years of education | 5.87 (4.55) | 6.61 5.42 | *** |
| | Max. educ. = Primary | 0.27 (0.45) | 0.29 (0.46) | * |
| | Max. Educ. = Secondary | 0.09 (0.29) | 0.09 (0.28) | |
| | Max. Educ. = Superior-non Uni | 0.08 (0.27) | 0.04 (0.19) | *** |
| | Max. Educ. = University | 0.05 (0.22) | 0.08 (0.27) | *** |
| household's characteristics | Age | 38.50 (8.81) | 45.69 (8.81) | *** |
| | Married=1 | 0.78 (0.42) | 0.74 (0.44) | *** |
| | Single=1 | 0.22 (0.42) | 0.26 (0.44) | *** |
| | Household size | 4.24 (1.85) | 4.23 (1.84) | ** |
| | Number of adults in the hh | 1.93 (0.78) | 2.40 (1.11) | *** |
| | Number of children in the hh | 1.95 (1.67) | 1.54 (1.52) | *** |
| worker's job characteristics | Labor income (hundreds of nominal córdobas) | 15.49 (23.09) | 34.25 (97.08) | *** |
| | Contribute to pension system | 0.26 (0.44) | 0.24 (0.43) | |
| | Hours of work (on main job) | 51.44 (22.19) | 51.24 (16.48) | |
| | Has a secondary job | 0.13 (0.33) | 0.14 (0.35) | |
| | Employer=1 | 0.07 (0.25) | 0.08 (0.28) | * |
| | Self employed=1 | 0.35 (0.48) | 0.00 (0.03) | *** |
| sector's characteristics | Agriculture | 0.32 (0.47) | 0.34 (0.47) | ** |
| | Manufacturing | 0.07 (0.25) | 0.08 (0.27) | |
| | Services | 0.10 (0.30) | 0.11 (0.32) | |
| | Commerce | 0.23 (0.42) | 0.20 (0.40) | * |
| | Public services | 0.12 (0.32) | 0.10 (0.30) | *** |
| | Communications | 0.04 (0.19) | 0.04 (0.20) | |
| | Minning | 0.00 (0.07) | 0.01 (0.07) | |
| | Construction | 0.05 (0.22) | 0.05 (0.21) | |
| | Finance | 0.01 (0.08) | 0.01 (0.09) | |
| | Education | 0.03 (0.16) | 0.03 (0.16) | |
| | Business | 0.02 (0.14) | 0.02 (0.15) | |
| | Other | 0.02 (0.15) | 0.01 (0.12) | * |

Note: ***significancy at 99%, ** 95% and * 90%. Own calculations basen on panel LSMS.

Results based on 1254observations.

Some differences appear when comparing the two countries; on average, Chilean workers have almost three more years of schooling and have completed secondary education in higher proportion compared to the workers in Nicaragua. A slight difference appears also in the household composition: more workers in Nicaragua declared to become single over the period of analysis. Contributions to the pension system, as indicator of the degree of job formality, reflect more informality in labor markets in Nicaragua than in Chile. However, in Nicaragua but not in Chile there is an important decrease in the proportion of self-employed workers. Finally, there are some inverse changes in relative importance of economical sectors between the countries; agriculture gained importance in Nicaragua but lost it in Chile and the opposite for commerce.

In table 3 we compare the changes on some of the main variables to be included in the regression analysis. While the last two tables showed trends within each country, Table 3 shows differences between countries.

Since our main variable of interest is the change in ranking over the time period studied, it is very unlikely than a worker keeps the exact same position over almost ten years. This fact is reflected in the 99 percent of workers who changed their rankings in both countries¹². On the same direction, in both countries half of the workers experienced an improvement in their rankings and the other half keep or reduced their position. On average, workers in Chile moved more than workers in Nicaragua, but since this result depends on the total possible range of movement, the result should be taken carefully¹³.

As it was mentioned above, workers in Chile have around three more years of education in the base and final year than workers in Nicaragua. However, this gap is been reducing over the time. Household size is significantly higher in Nicaragua than in Chile in both periods. In the two countries however the number of members is decreasing but more rapidly in Chile than in Nicaragua. Adults relative to young members have relatively more importance in the household composition in Chile than in Nicaragua. The proportion of workers located in rural areas is significant higher in Nicaragua than in Chile.

As it was also mentioned above, an indicator of informality on the labor market (contributions to the pensions system) indicates that there is more informality in Nicaragua than in Chile over the period of analysis. The number of hours of work has increased in Chile and decreased in Nicaragua. Despite the increase of workers having a secondary job in both countries, a higher proportion of workers have a secondary job in Nicaragua than in Chile. The proportion of workers indicating being employers is bigger in Nicaragua than in Chile. Whereas in Chile the proportion of self-employed workers was almost constant in

¹² Just one worker in Chile and two in Nicaragua did not change their ranking over the period of study.

¹³ On average in Chile workers moved 381 positions of 1792 (21%) and in Nicaragua workers moved 291 positions of 1254 possible (23%)

Nicaragua the number of self-employed workers has decreased drastically in the seven-year period. Finally, the data shows no differences on the rate of workers changing from one economical sector to another.

Table 3: Comparison of main regression variables

| Variables | Chile | | Nicaragua | |
|------------------------------------|-------|--------------------|-----------|------------------------|
| | n | mean / (s.d.) | n | mean / (s.d.) |
| Ranking changed | 1792 | 0.999 (0.02) | 1254 | 0.998 (0.04) |
| Ranking increased | 1792 | 0.50 (0.50) | 1254 | 0.51 (0.50) |
| Change in ranking (absolute value) | 1792 | 381.40 (335.50) | 1254 | 291.50 *** (255.80) |
| Increases in education | 1762 | 0.77 (1.53) | 1254 | 1.03 *** (1.79) |
| Change in married status | 1792 | 0.10 (0.30) | 1254 | 0.09 (0.29) |
| Changes in household size | 1792 | -0.39 (1.02) | 1254 | -0.01 *** (0.19) |
| Changes in number of adults | 1792 | 0.26 (1.05) | 1254 | 0.47 *** (0.75) |
| Change in number of children | 1792 | -0.56 (0.93) | 1254 | -0.40 *** (0.84) |
| Located in rural area wave 1 | 1792 | 0.21 (0.41) | 1254 | 0.39 *** (0.49) |
| Changes in contribution | 1792 | 0.13 (0.33) | 1254 | 0.16 ** (0.36) |
| Changes in hours of work | 1768 | 1.29 (18.69) | 1254 | -0.20 * (23.74) |
| Changes in having secondary job | 1792 | 0.10 (0.30) | 1254 | 0.22 *** (0.41) |
| Changes in being employer | 1792 | 0.03 (0.20) | 1254 | 0.02 (0.31) |
| Changes in being self-employed | 1792 | 0.01 (0.43) | 1254 | -0.35 *** (0.48) |
| Changed from one sector to another | 1792 | 0.39 (0.49) | 1254 | 0.37 (0.49) |

Note: ***significance at 99%, ** 95% and * 90%. Own calculations based on panel LSMS and CASEN.

The empirical evidence showed in this section reflects differences in the individual and institutional environment that workers faced in both countries. Workers in Nicaragua seem to face a mix of individual (lower education, higher economical dependency in the household), and institutional (higher informality in the labor market, losses of hours of work) situations that might decrease their opportunities to improve their welfare.

5. Results

5.1. Transition mobility matrices

The first round of results comes from the *transition mobility matrices* in terms of earnings quintiles. Table 4 shows workers' earnings transition between the lowest-earnings quintile (1) and the highest-earnings quintile (5).

Table 4: Transition mobility matrix, Chile 1996 - 2006

| | | 2006 | | | | | Total |
|-------|---|-------|-------|-------|-------|-------|-------|
| | | 1 | 2 | 3 | 4 | 5 | |
| 1996 | 1 | 40.59 | 30.07 | 16.38 | 8.56 | 4.4 | 100 |
| | 2 | 25.6 | 34.94 | 18.07 | 14.16 | 7.23 | 100 |
| | 3 | 13.65 | 26.55 | 19.85 | 24.57 | 15.38 | 100 |
| | 4 | 9.66 | 18.62 | 19.66 | 28.62 | 23.45 | 100 |
| | 5 | 6.98 | 8.66 | 11.73 | 20.67 | 51.96 | 100 |
| Total | | 20.03 | 24.05 | 17.08 | 18.86 | 19.98 | 100 |

Note: Own calculations based on CASEN panel.

The cells on the extreme of the main diagonal (1:1) and (5:5) concentrate the higher proportions of workers: after ten years, low-earnings workers remained being the ‘poorest’ in 2006 and the high-earnings workers keep being the ‘richest’. These results are consistently found on most of the empirical literature using *transition mobility matrices* and they might be explained by the above presented theories of *cumulative advantage* for the top cell and *poverty traps* for the bottom cell.

Another interesting fact to highlight is the U-shape form of the distribution of the proportion of workers staying in the same quintile, where the lowest point is found in quintile 3. This is a sign that the highest rates of mobility in Chile occurred around the middle-earnings quintiles.

The dynamics of two out of the three middle-earnings quintiles (2 and 4) are similar to the ones shown above, in the sense that the proportion of workers staying on the diagonal represents the highest value for each quintile in 1996.

A common feature among all the quintiles is that improvements on workers’ welfare (i.e. movements above the diagonal) became more infrequent when quintiles increase. The opposite also occurs: losses on worker’s welfare (i.e. movements below the diagonal) became less frequent when one approaches the poorest quintiles.

Some adventurous conclusions about vulnerability to poverty might be extracted from this matrix. The biggest movement of 1996 workers situated in quintile 2 and 3 was to an inferior quintile, that is, they worsen their social condition.

Similar to Chile, in the *transition mobility matrix* of Nicaragua the two cells of the main diagonal with higher concentration of workers are cells (1:1) and (5:5). In both cells however, the proportion of workers is smaller than the corresponding cells for Chile, which reflects higher mobility at the extremes of the distribution and might be less inequality.

Another interesting difference of this matrix is the less pronounced U-shape distribution of workers staying in the main diagonal. In this case, the distribution is almost flat for the three

middle-earnings quintiles and increases at both extremes sides. This might reflect that Nicaragua has a more homogenous population of middle-earnings worker's.

Table 5: Transition mobility matrix, Nicaragua 1998 - 2005

| | | 2005 | | | | | Total |
|-------|---|-------|-------|-------|-------|-------|-------|
| | | 1 | 2 | 3 | 4 | 5 | |
| 1998 | 1 | 39.45 | 25 | 15.63 | 11.72 | 8.2 | 100 |
| | 2 | 23.58 | 28.05 | 22.76 | 15.04 | 10.57 | 100 |
| | 3 | 14.34 | 21.91 | 27.09 | 25.1 | 11.55 | 100 |
| | 4 | 13.94 | 15.14 | 23.51 | 27.09 | 20.32 | 100 |
| | 5 | 8.8 | 9.6 | 13.6 | 18.8 | 49.2 | 100 |
| Total | | 20.1 | 19.94 | 20.49 | 19.54 | 19.94 | 100 |

Note: Own calculations based on Nicaraguan LSMS panel.

In the same direction, this matrix shows that vulnerability is a situation that might also affect workers located in quintile 4 (the biggest movement out the diagonal is to an inferior quintile).

All the other mobility patterns are similar to the ones present in the case of Chile: mobility from the initial quintile occurs with high frequency to a nearer quintile.

The analysis of the *transition mobility matrices* for Chile and Nicaragua showed some differences and similarities on workers' mobility patterns based on earnings. While Nicaragua seems to have a broader group of middle-earnings workers moving to others quintiles, Chile has more mobility for the specific group of workers in quintile 3. In addition, workers located in both extremes of the earnings distribution in Chile show less mobility than their counterparts in Nicaragua. At the other hand, the transition matrices for Chile and Nicaragua show that vulnerability of becoming poor is a major issue presented basically in middle-earning quintiles and they also show that mobility more often occur on the neighborhood of the initial position.

5.2. Multivariate analysis

As we discussed in Section 4.1, the methodology proposed in this paper consists in determining the factors affecting changes in ranking over the period of study (and where rankings are defined as the positional order in the distribution of workers' earnings for each country and year combination). In addition to the advantages to apply this methodology mentioned in Section 4.1, the multivariate analysis of earnings' mobility permits the identification of key factors to be addressed by social and labor policies.

Table 6 present the OLS estimations of equation (1) and (2) in Section 4.1 using the CASEN panel data set of Chile. The first two models correspond to the estimation of changes in ranking and the next two models correspond to the estimation of the absolute values of changes in ranking. Model I and III differ from models II and IV in that the firsts control

for the economic sectors of origin and include a dummy variable in the case the worker changed of sector in the period 1996 – 2006. The latter two models do not include this dummy variable but include all the economic sector of destination.

Table 6 (part 1): Estimations results Chile 1996 - 2006

| Variable | $\Delta Rank_i$ | | $ \Delta Rank_i $ | |
|-------------------------------------|------------------------|------------------------|-----------------------|-----------------------|
| | (I) | (II) | (III) | (IV) |
| Years of schooling 2006 | 2.50 (3.28) | 2.51 (3.28) | -2.74 (2.38) | -2.36 (2.38) |
| Changes in education | 26.23 *** (8.21) | 25.71 *** (8.16) | 2.82 (5.94) | 2.06 (5.88) |
| Male=1 | -96.93 *** (30.89) | -104.71 *** (31.49) | -11.72 (22.31) | -16.04 (22.73) |
| Age | -5.18 *** (1.69) | -5.12 *** (1.70) | 1.33 (1.17) | 1.49 (1.18) |
| Married=1 | 44.49 (31.30) | 46.46 (31.46) | 14.44 (21.76) | 16.95 (21.99) |
| Change in marital status | 48.69 (44.33) | 44.94 (44.28) | -4.76 (32.10) | -3.09 (32.31) |
| Number of children | 41.18 *** (14.73) | 36.02 ** (15.05) | -11.10 (10.07) | -12.44 (10.15) |
| Changes in number of children | -27.58 * (15.33) | -26.56 * (15.41) | 1.39 (11.19) | 2.26 (11.20) |
| Number of adults | 10.79 (15.36) | 11.09 (15.34) | 8.28 (10.73) | 8.75 (10.81) |
| Changes in number of adults | -42.18 *** (15.69) | -43.43 *** (15.76) | -17.77 (11.87) | -16.29 (11.93) |
| Rural=1 | 10.21 (39.11) | 15.14 (39.33) | 50.23 * (26.61) | 50.51 * (26.89) |
| Region VII | 6.15 (51.92) | 40.00 (52.85) | -56.99 (35.69) | -47.36 (37.05) |
| Region VIII | -40.29 (50.37) | -9.93 (51.54) | -9.27 (34.17) | -1.28 (35.60) |
| Metropolitana | -144.89 *** (49.58) | -112.95 ** (50.78) | -17.39 (33.67) | -4.13 (34.94) |
| Contribute to pension system | 71.68 (46.10) | 68.38 (46.58) | -18.98 (32.03) | -17.35 (32.33) |
| Changes in hours of work | 3.96 *** (0.69) | 3.89 *** (0.69) | -0.46 (0.48) | -0.42 (0.48) |
| Has secondary job | 448.06 *** (78.25) | 439.75 *** (77.67) | -53.18 (52.88) | -51.89 (53.12) |
| Changes in having secondary job | -247.76 *** (59.57) | -251.46 *** (59.41) | 135.13 *** (42.51) | 137.22 *** (42.90) |
| Is the worker an employer, 2006 | 188.10 ** (89.79) | 189.61 ** (90.24) | -150.69 ** (64.11) | -159.37 ** (64.96) |
| Changes in being employer | -43.16 (93.42) | -52.00 (94.00) | 220.61 *** (65.36) | 233.11 *** (66.42) |
| Is the worker a self-employed, 2006 | -75.76 * (41.12) | -83.30 ** (41.49) | 130.79 *** (28.43) | 126.40 *** (28.58) |
| Changes in being self-employed | -96.63 *** (36.63) | -99.30 *** (36.37) | -72.05 *** (25.15) | -68.36 *** (24.94) |

Models I and II are coherent between each other, in the sense that the same variables determine a change in ranking in the same direction and at the same level of statistical significance.

Table 6 (continuation): Estimations results, Chile 1996 - 2006

| <i>Stayed in same economic sector</i> | | | | |
|--|----------|------------|------------|------------|
| Agriculture | 116.37 * | 119.99 * | 172.65 *** | 177.90 *** |
| | (62.93) | (63.31) | (37.00) | (37.11) |
| Manufacturing | 51.46 | 55.52 | 214.20 *** | 214.02 *** |
| | (60.29) | (60.46) | (36.28) | (36.42) |
| Commerce | 27.99 | 33.23 | 251.32 *** | 253.67 *** |
| | (65.18) | (65.45) | (37.60) | (37.71) |
| Public services | 95.38 * | 95.80 * | 151.22 *** | 148.93 *** |
| | (51.15) | (51.47) | (28.72) | (28.94) |
| Communications | 0.61 | 8.22 | 270.81 *** | 272.28 *** |
| | (80.71) | (80.83) | (49.79) | (49.88) |
| Mining | -11.99 | 17.55 | 244.43 *** | 254.63 *** |
| | (120.77) | (120.25) | (75.26) | (75.64) |
| Construction | -12.37 | -5.02 | 252.96 *** | 255.50 *** |
| | (68.34) | (68.63) | (39.23) | (39.36) |
| Finance | 0.23 | 6.67 | 182.54 ** | 180.65 ** |
| | (110.21) | (111.14) | (81.60) | (81.96) |
| Changed of economic sector | 48.60 | - | 252.68 *** | - |
| | (51.53) | - | (27.73) | - |
| <i>Changed to this economic sector</i> | | | | |
| Agriculture | - | -57.68 | - | 278.38 *** |
| | - | (78.35) | - | (48.58) |
| Manufacturing | - | 118.39 * | - | 246.65 *** |
| | - | (66.63) | - | (39.21) |
| Electricity | - | 281.45 * | - | 135.82 |
| | - | (149.14) | - | (151.95) |
| Commerce | - | 55.18 | - | 230.86 *** |
| | - | (63.44) | - | (37.72) |
| Public services | - | 18.03 | - | 273.47 *** |
| | - | (70.38) | - | (44.20) |
| Communications | - | 92.30 | - | 205.68 *** |
| | - | (74.27) | - | (40.60) |
| Minning | - | 389.74 *** | - | 325.29 *** |
| | - | (126.44) | - | (103.34) |
| Construction | - | 55.31 | - | 322.04 *** |
| | - | (71.46) | - | (44.76) |
| Finance | - | -61.50 | - | 172.60 *** |
| | - | (75.04) | - | (51.98) |
| Other | - | 238.60 *** | - | 33.90 |
| | - | (70.37) | - | (35.96) |
| Constant | 125.9112 | 102.57 | 100.67 | 78.45 |
| | (132.94) | (133.10) | (90.75) | (91.30) |
| N | 1718 | 1718 | 1718 | 1718 |
| R-squared | 0.1384 | 0.1486 | 0.072 | 0.0783 |

Note: * significant at 1%, ** significant at 5%, *** significant at 10%

The first main result is the importance of the investments in education to explain changes in ranking. In addition, female workers and younger workers show greater probabilities of mobility. Increases over time in the number of household' members affect negatively the change in ranking. Respect to the geographical distribution of workers, it seems that those located in the Region Metropolitana face less mobility.

Working for longer hours and having a secondary job are positively related with positive positional movements in the distribution of earnings. While a worker who is employer has more possibilities to improve his/her ranking, self-employed workers have much less chances to improve their position on the earnings distribution.

The bottom panel of Table 6 shows in detail the impact of movements between economic sectors on positional movements in rankings. Model I indicates that those workers who started working in agriculture and public services had more opportunities to change positively in ranking, but at the same time according with this specification the fact that a worker changed of sector does not impact his/her mobility options. In contrast, Model II agrees with Model I in the positive impact of start working on agriculture and public sectors but the model shows in addition that those workers who changed to manufacturing, electricity and mining sectors have more option to do a positive movement on the distribution of earnings.

The last two columns of Table 6 show the estimations of our measure of absolute mobility, which concerns about magnitude of mobility and not on directionality. Results change considerably under specifications III and IV. The individual and household's characteristics mentioned above have not longer an effect on the dependant variable. Now instead the factors that seems to explain a higher 'volatility' in the indicator are: living on rural areas, having get or lost a secondary job, having started or finished as an employer and being a self-employed worker. In contrast, the factors explaining smaller changes in the dependent variable are: being an employer and having transited in or out self-employment. This reflects that the degree of vulnerability on the labor market might affect enormously the magnitude of the ranking movements.

Another interesting issue from these two estimations is that staying in the same economic sector, and in any of them, have a positive impact on the magnitude of the change in ranking. However, the effect of staying on agriculture or public services is relatively smaller than the effect for other sectors. This result and the previous finding that workers on these sectors have higher probabilities of increase their positions in the distribution of earnings might indicate that agriculture and public sectors represent save and enriching sectors.

Similar to the regression analysis performed for Chile, Table 7 shows two specifications for our first measure of change in rankings and the last two for our measure of absolute mobility using the LSMS panel data of Nicaragua. In contrast to the evidence in Chile, in Nicaragua education does not seem to be a factor determining changes in ranking. Older workers and those whose families have more economically dependant members faced more restrictions to increase their welfare. Geographic differences also exists, playing a favor of those workers living on the Central and Atlántico regions.

The labor market conditions that facilitate workers' mobility are: the degree of formality of the labor market, more hours of work, having a secondary job and being an employer or self-employed worker. This last finding contrast with the impact of being a self-employed worker in Chile. However, having transited in or out of self-employment might decreases workers' chances to increase their welfare. No effect of stayed or moved among economic sector is identified by the model.

Table 7 (part 1): Estimations results, Nicaragua 1998 – 2005

| Variable | $\Delta Rank_i$ | | $ \Delta Rank_i $ | |
|-------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | (I) | (II) | (III) | (IV) |
| Years of schooling 2005 | 0.66 (2.89) | -0.14 (2.94) | -5.11 *** (1.94) | -4.36 ** (1.99) |
| Changes in education | 2.42 (7.00) | 2.11 (7.04) | 2.27 (4.69) | 2.28 (4.76) |
| Male=1 | -8.54 (27.82) | -8.38 (27.85) | -16.44 (18.25) | -21.82 (18.53) |
| Age | -3.54 ** (1.40) | -3.09 ** (1.39) | -0.86 (0.93) | -0.75 (0.94) |
| Married=1 | 10.94 (28.01) | 13.66 (28.20) | 8.19 (18.64) | 6.92 (18.95) |
| Change in marital status | 9.70 (38.70) | 10.23 (38.89) | 22.61 (24.14) | 24.83 (24.16) |
| Number of children | 0.82 (8.35) | 1.18 (8.35) | -1.74 (5.27) | -1.67 (5.31) |
| Changes in number of children | -46.56 ** (23.33) | -41.64 * (23.39) | -11.30 (13.73) | -11.28 (13.75) |
| Number of adults | -19.11 (14.02) | -16.21 (14.09) | 5.91 (9.46) | 5.68 (9.55) |
| Changes in number of adults | -26.78 (31.09) | -30.40 (31.05) | -16.72 (19.23) | -15.60 (19.22) |
| Rural=1 | 20.30 (28.83) | 40.58 (28.23) | 18.73 (19.67) | 16.96 (19.77) |
| Region=Central | 84.94 *** (32.78) | 91.16 *** (32.49) | -8.63 (23.12) | -9.14 (22.90) |
| Region=Pacífico | 37.00 (30.79) | 42.60 (30.69) | 44.82 ** (21.47) | 43.49 ** (21.42) |
| Region=Atlántico | 90.00 ** (44.62) | 104.48 ** (43.57) | 76.98 *** (29.15) | 75.14 ** (29.51) |
| Contribute to pension system | 99.66 *** (31.53) | 113.60 *** (32.14) | -15.83 (20.87) | -11.70 (21.43) |
| Changes in hours of work | 2.62 *** (0.48) | 2.44 *** (0.48) | -0.39 (0.32) | -0.38 (0.32) |
| Has secondary job | 157.13 *** (39.51) | 156.43 *** (39.30) | -6.70 (26.77) | -5.27 (26.73) |
| Changes in having secondary job | -40.83 (35.46) | -33.53 (34.87) | 58.61 ** (23.44) | 58.19 ** (23.30) |
| Is the worker an employer, 2005 | 116.14 * (64.22) | 125.39 ** (62.65) | 67.82 (41.49) | 63.89 (41.41) |
| Changes in being employer | -39.80 (53.23) | -43.13 (51.84) | -22.00 (34.55) | -20.31 (34.71) |
| Is the worker a self-employed, 2005 | 316.18 *** (88.87) | 324.71 *** (88.39) | -122.15 ** (60.03) | -123.12 ** (60.25) |
| Changes in being self-employed | -86.40 *** (28.10) | -95.48 *** (27.94) | -37.06 ** (18.42) | -34.37 * (18.39) |

Surprisingly, in specification III and IV worker's level of education matters to explain the magnitude of change of rankings. The negative sign however might be reflecting that education plays the role of insurance against a possible drastically change in rankings.

In addition to increase the possibilities of improvements in ranking, living on the Region Atlántico also facilitates workers to obtain a bigger mobility when it occurs. Higher mobility according to this second indicator is related in the case of Nicaragua with workers' past experienced of having or resigning secondary jobs. And is negatively related to the fact

workers are self-employed or have experienced movements in and out from self employment. Finally, the only sector that seems to have an impact (negative) on the magnitude of change in worker's ranking is the financial and real state sector.

Table 7 (continuation): Estimations results, Nicaragua 1998 - 2005

| <i>Stayed in same economic sector</i> | | | | |
|--|---------------------|---------------------|-----------------------|-----------------------|
| Agriculture | 388.13 (319.36) | 375.24 (322.72) | -93.95 (164.49) | -90.27 (170.31) |
| Manufacturing | 317.03 (320.84) | 322.10 (324.10) | -179.08 (166.53) | -182.89 (172.25) |
| Services | 337.73 (319.99) | 345.35 (323.29) | -161.83 (165.08) | -169.10 (170.90) |
| Commerce | 367.92 (319.40) | 371.35 (322.76) | -134.78 (164.63) | -137.64 (170.48) |
| Education | 287.61 (329.47) | 296.62 (333.04) | -77.66 (176.33) | -92.64 (182.19) |
| Public Sector | 304.73 (319.81) | 311.25 (323.21) | -182.96 (164.93) | -197.60 (170.81) |
| Transportation | 392.03 (325.55) | 400.68 (328.91) | -157.52 (171.53) | -158.38 (177.26) |
| Construction | 212.40 (325.46) | 218.62 (328.87) | -163.15 (171.46) | -162.85 (177.12) |
| Financial and real state | 384.19 (319.71) | 392.97 (323.42) | -278.26 * (165.14) | -296.31 * (171.09) |
| Entrepreneurial activities | 268.43 (342.40) | 274.30 (344.84) | -189.00 (178.51) | -195.30 (184.25) |
| Other | 531.37 (348.83) | 544.77 (353.84) | -150.74 (211.63) | -153.54 (215.60) |
| Changed of economic sector | 320.11 (318.72) | | -87.55 (164.01) | |
| <i>Changed to this economic sector</i> | | | | |
| Agriculture | | 174.43 (323.81) | | -63.88 (171.86) |
| Manufacturing | | 324.48 (327.89) | | -68.21 (174.42) |
| Services | | 370.88 (325.10) | | -88.71 (172.04) |
| Commerce | | 412.73 (323.69) | | -109.32 (171.08) |
| Education | | 335.62 (326.59) | | -150.45 (176.48) |
| Public Sector | | 313.28 (326.60) | | -144.80 (173.67) |
| Transportation | | 369.88 (329.00) | | -106.71 (173.98) |
| Construction | | 14.42 (354.70) | | -29.92 (236.27) |
| Mining | | 505.21 (329.57) | | -73.89 (175.40) |
| Financial and real state | | 354.04 (377.96) | | 38.24 (198.81) |
| Entrepreneurial activities | | 278.00 (328.79) | | -121.01 (178.01) |
| Other | | 408.95 (341.92) | | -126.09 (185.63) |
| Constant | -291.74 (326.39) | -336.42 (329.66) | 412.77 ** (170.56) | 411.56 ** (176.50) |
| N | 1254 | 1254 | 1254 | 1254 |
| R-squared | 0.103 | 0.1287 | 0.0818 | 0.0874 |

Note: * significant at 1%, ** significant at 5%, *** significant at 10%

The regression analysis performed for both countries shows some interesting similarities and differences in the degree of mobility and its directionality. We have found evidence of some similar patterns on the importance of household composition (basically referred to the number of economically dependant members) and worker's age on reaching higher rankings. On the labor market side, in both countries workers who are employers or have more hours of work and secondary jobs, have better option to improve their welfare. The latter variable is also important in both countries to determine the magnitude of the ranking change, increasing the options of a bigger displacement.

A remarkable difference is the role played by education in both countries. In Chile, workers' with more education increase their option to change in ranking, whereas in Nicaragua, workers' education softens the magnitude of change in rankings. From an institutional point of view, it is possible to see that Nicaraguan workers' who are involved in less informal labor markets (where contributions to the pension system are higher) face better options to improve their welfare. Another difference from the institutional side of the labor market is the different impact of being a self-employed worker on both indicators. In Chile, being a self-employed worker reduces the option of improvement in ranking and the opposite occur in Nicaragua. In Chile being a self-employed worker increases the magnitude of ranking change, which might be associated to higher risk and volatility, while in Nicaragua being a self-employed worker reduces the magnitude of change in ranking, which might be interpreted as a more flexible labor market in this country.

6. Conclusions

At the beginning of this paper we presented some questions that mobility analysis seeks to answers: are the workers with lower earnings the same workers with poor earnings ten years after? Are actual high earnings workers the same as ten years before? Do workers with middle earnings stay in the same position? Are these dynamics similar between countries which economies experienced more periods of growth than periods of contraction? Along this paper we have tried to give an answer to these questions.

In this study we analyze changes on individuals' earnings using longitudinal datasets for Chile and Nicaragua, countries who have experienced different macroeconomic performances on the decade starting at the middle of 1990's. This paper suggested an alternative way to measure earnings mobility. It consists in estimating individual's positional movements or changes in ranking based on individual's earnings information both unconditionally and conditionally on a set of individual, household and labor market characteristics.

The main reason of studying earnings mobility in Chile and Nicaragua is that these two countries represent nearly opposite extremes of economic performance in the region. Additionally, the availability of data for both countries makes possible to compare measures of the changes in real earnings over a decade, in which exposure a different macroeconomic

conditions occurred. The data used in this study came from the National Characterization Socio-economic Survey (CASEN) of Chile, panel dataset for the years 1996, 2001 and 2006 and from the Nicaraguan Living Standards Measurement Survey (LSMS) surveys for the years 1998, 2001 and 2005.

After reviewing the literature about mobility and empirical evidence of mobility in the Latin American region, we started analyzing the data within each country with the objective of seeing trends in the main variable used on the study. After this, we compared between countries some of the main variables used on the regression analysis. Then, using *transition mobility matrices* for each country we made a first approximation to the dynamics of workers' earnings over the period of study. Finally, we estimate some specifications for equations (1) and (2) described in Section 4.1. Thus, we estimate changes in rankings and the absolute value of changes in ranking as function of worker, household, job and economy's characteristics.

The empirical evidence found in the first section reflects differences in the individual and institutional environment that workers faced in both countries. Workers in Nicaragua in comparison to the counterparts in Chile, face a mix of individual (lower education, higher economical dependency in the household) and institutional (higher informality in the labor market, losses of hours of work) situations that might decrease their opportunities to improve their welfare. The analysis of the *transition mobility matrices* for Chile and Nicaragua showed some differences and similarities on workers' mobility patterns based on earnings. While Nicaragua seems to have a broader group of middle-earnings workers moving to others quintiles, Chile has more mobility for the specific group of workers in quintile 3. In addition, workers located in both extremes of the earnings distribution in Chile show less mobility than their counterparts in Nicaragua. At the other hand, the transition matrices for Chile and Nicaragua show that vulnerability of becoming poor is a major issue presented basically in middle-earning quintiles.

The regression analysis performed for both countries shows some interesting similarities and differences in the degree of mobility and its directionality. We have found evidence of some similar patterns on the importance of household composition and worker's age on reaching higher rankings. On the labor market side, in both countries workers who are employers or have more hours of work and secondary jobs, have better option to improve their welfare. A remarkable difference is the role played by education in both countries. In Chile, workers' with more education increase their option to change in ranking, whereas in Nicaragua, workers' education softens the magnitude of change in rankings. From an institutional point of view, it is possible to see that Nicaraguan workers, who are involved in less informal labor markets, face better options to improve their welfare. Another difference from the institutional side of the labor market is the different impact of being a self-employed worker on both indicators. In Chile, being a self-employed worker reduces the option of improvement in ranking and the opposite occur in Nicaragua.

The different analyses performed have contributed to identify differences in the degree of mobility in these two countries and to identify some mechanism leading to earnings mobility and welfare improvements. This responds to our main goal of contributing to the correct design of social policies. Based on the empirical evidence, our main policy recommendations consider that is of main importance the investment on education to boost worker's ability to reach higher levels of welfare. Second, we consider that is extremely important the reinforcement of the institutional framework for labor markets operating under informal conditions.

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