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EVIDENCE FOR INEQUALITY OF OPPORTUNITIES. A COHORT ANALYSIS FOR CHILE

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Evidence for Inequality of Opportunities. A Cohort Analysis for Chile.

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Abstract

In this paper we estimate the impact of inequality of opportunity on inequality of income in the Chilean economy. We focus on the distribution of individual labor income. It is found that the share of overall inequality which is due to inequality of opportunities is relatively high in Chile, but the degree of overall inequality is lower than in other countries in the region. It is also found that father's education is the circumstance that contributes the most to inequality of income in Chile. This variable is likely to be highly correlated with parental household income, which is a key determinant in the formation of early human capital through its impact on nutrition, health and education. We also conduct a cohort analysis to study the impact of opportunities on labor income inequality in three groups of workers : those that are 25-34, 35-44 and 45-54 years old. We found that overall inequality increases with the age of the cohort and that the absolute contribution of opportunity in income inequality also increases with the age of the cohort. That the share of opportunity in income inequality is particularly low in the youngest cohort, may be associated to a more even playing field resulting from the introduction of opportunity equalizing policies in the last decades. Further evidence for this latter hypothesis is provided by decomposing the change in inequality across cohorts based on changes on circumstance endowments and returns, based on the methodology introduced by Juhn, Murphy and Pierce (1994).

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1 Introduction

The ideal of equality of opportunity appeals to a broad spectrum of people. A society that achieves equality of opportunity is seen as one that has successfully combined fairness and economic efficiency. In spite of this, monitoring and evaluating the distribution of opportunities has been hindered in the past by a lack of suitable indicators. This situation has begun to change in the recent years. Following the Roemer approach that classifies inputs to socioeconomic outcomes into circumstances and choices, a variety of methodologies have been developed to measure the distribution of opportunities. See, for example, Bourguignon, Ferreira and Menéndez (2007) and Checchi and Peragine (2005). Essentially, it estimates the impact of family background and others circumstance variables on outcome or advantage variables.

A recent study by the World Bank has applied these methodologies to a sample of eight Latin American countries, deriving a set of estimates that allows us to rank these countries according to how equal or unequal opportunities are distributed (World Bank, 2008). This can be done by means of a so-called top down approach, which relates current socioeconomic outcomes to past circumstances, or by a so-called bottom up approach that assesses how opportunities are being distributed among children and young people.

In this paper we estimate the impact of inequality of opportunity on inequality of income in the Chilean economy, using the top down approach. We focus on the distribution of individual labor income. A companion paper deals with the bottom up approach (Contreras, Larrañaga, Puentes and Rau, 2009).

Our first specification uses a sample of individuals between 30 and 49 years old, monthly income data and a set of circumstance variables comprising mother's and father's education, father's occupation, type and region of attended primary school and gender. This specification is similar to the one used in the World Bank study, so that the results for Chile can be put in a regional perspective. We find that the share of overall inequality which is due to inequality of opportunities is relatively high in Chile, but the degree of overall inequality is lower than in other countries in the region. In addition father's education is the circumstance variable that contributes the most to inequality of income in Chile. This variable is likely to be highly correlated with parental household income, which is a key determinant in the formation of early human capital through its impact on nutrition, health and education.

In a more general specification, we study the impact of inequality of opportunity on inequality of labor income, using a larger set of circumstance variables, a larger sample of individuals (25-54 years old), and annual income data, which is a better proxy of permanent income. In this general specification we find that about 25% of inequality of income can be related to circumstances and, as before, the most important contributing variable for inequality of opportunity is father's education.

Using the general model we conduct a cohort analysis to study the impact of opportunities on labor income inequality in three categories of workers grouped by age: 25-34, 35-44 and 45-54 years old. We find that overall inequality increases with the age of the cohort, a result that can be traced to the accumulative

effect of income shocks over time (Deaton and Paxson, 1994); that the absolute contribution of opportunity in income inequality also increases with the age of the cohort, a development that can be related to the dynamic nature of skill accumulation over the life cycle (Heckman et al, 2006); and that the share of opportunity in income inequality is particularly low in the youngest cohort, which may be associated to a more even playing field resulting from the introduction of opportunity equalizing policies in the last decades. Further evidence for this latter hypothesis is provided by decomposing the change in inequality across cohorts by changes on circumstance endowments and returns, based on the methodology introduced by Juhn, Murphy and Pierce (1994).

Thus, this paper provides evidence for the impact of past circumstances in current socioeconomic outcomes. One could argue at this point that bygones are bygones and public policies should focus on the distribution of opportunities for new generations. However, justice theories raise the issue for compensating for past injustices. That current income inequalities can be traced to past circumstances is an argument to back redistribution policies, redressing injustices of the past.

The paper is organized in six sections after this introduction. Section two presents the methodology for estimating the impact of inequality of opportunity in socioeconomic outcomes; section 3 presents the data used in this paper; section 4 presents and discusses comparisons with other Latin American countries and shows the general specification; section 5 contains the cohort analysis and section six presents some final remarks

2 Methodology

We follow the methodology proposed by Bourguignon, Ferreira and Menéndez (2007) to measure inequality of opportunities. Roemer (1998) gave the foundations for understanding the role of inequality of opportunities in total inequality. He postulates that advantage variables, e.g. labor earnings, are the result of two type of variables; circumstances and effort. Circumstances are variables that are not under the control of the individual, for instance the educational level of her parents, meanwhile, effort variables are controlled by the individual. Implicitly or explicitly, these approaches are based on a model of advantage such as:

$$y = f\left(C, E, u\right)$$

where y denotes the outcome of interest or advantage; C denotes a vector of circumstance variables; E denotes a vector of effort variables; and u denotes pure luck or random factors.

Following Bourguigon *et al*, we can approximate the model of advantage by following a linear system:

$$\begin{aligned} \ln y &= C\alpha + E\beta + u \\ E &= \lambda C + v \end{aligned}$$

The reduced form of this linear system is

$$\ln y = C\left(\alpha + \beta\lambda\right) + v\beta + u$$

which can be estimated by OLS as:

$$\ln y = C\psi + \varepsilon$$

Under these functional form assumptions, a parametrically standardized distribution $\{\widetilde{y}_i\}$ is estimated by:

$$\widetilde{y}_i = \exp\left(\overline{C}_i\widehat{\psi} + \widehat{\varepsilon}\right)$$

This parametrically standardized distribution is a counterfactual distribution of y when all differences in circumstances are eliminated and only luck and effort remain. A measure of inequality of opportunity follows naturally from these estimates. We define the following

$$\theta_{BFM} = 1 - \left[I\left(\{\widetilde{y}_i\}\right)/I\left(\{y_i\}\right)\right]$$

as the measure of inequality of opportunities.

Unlike non parametric calculations, the Bourguigon *et al* methodology relies on specific functional form assumptions. The main reason why the costs of such a parametric approximation may be worth bearing is that, as the vector of observed circumstances becomes larger and/or the number of categories within each variable increases, sampling variances become very large, making non parametric estimates of inequality of opportunities too imprecise. This places an upper bound in the number of circumstances that can be included and in the number of categories within each circumstance that we can define. On the other hand, a multivariate regression framework uses data more efficiently, allowing a more detailed specification of circumstances and categories. However, this is done at the expense of imposing a given functional form to the relation between variables.

The parametric approach permits the estimation of the partial effect of one (or a subset) of the circumstance variables, while controlling for the others, by constructing alternative counterfactual distributions, such as:

$$\widetilde{y}_i^J = \exp\left(\overline{C}_i^J\widehat{\psi}^J + C_i^{j\neq J}\widehat{\psi}^{j\neq J} + \widehat{\varepsilon}\right)$$

This allows one to compute circumstance J-specific inequality shares:

$$\theta^J_{BFM} = 1 - I\left(\{\widetilde{y}^J_i\}\right)/I\left(\{y^k_i\}\right)$$

Turning to the choice of inequality indicators, the literature on inequality measurement shows that only some of the usual inequality indexes can decomposed additively between-group inequality and within-group inequality (defined as the level of inequality of outcome measured within a given sub-group distribution). The best-known family of additively decomposable measures are the generalized entropy measures, among which the mean log deviation (GE(0)) and the Theil entropy (GE(1)) indexes are used in this paper.

3 Data

The data used in this paper is from the Encuesta de Protección Social or EPS (Social Protección Survey) for the year 2004. The EPS follows approximately 20,000 people and it contains information about household composition, including basic data on age, gender, educational level, and labor market variables among others. Additional important variables that EPS includes is information on the parents of the individual, such as education, labor participation and characteristics of the childhood household, which are key for estimating the level of inequality of opportunities.

One of the main advantages of using the EPS instead of other data for Chile is that we can construct yearly labor income, which is a better proxy of permanent income than monthly income which is usually used in the literature. As circumstances we include the following variables: father's and mother's education, father's occupation, gender, region and type (public or private) of the primary school where the individual attended, number of siblings in the parental household and a subjective assessment of the socioeconomic status of the parental household (very poor, poor, good or very good). The region of the primary school serves as a proxy for location of birth and the type of the primary school is a proxy of quality of education. Father's occupation is a dummy variable equal to one if the father was a white collar worker, zero otherwise. Region is south if the region is south of Santiago and north if is north of Santiago, the reference is then Santiago.[1]

4 General Results

In this section we show the relative importance of inequality of opportunities in Chile. We first compare Chile with other Latin American countries, which forces us to reduce the number of circumstances and to

[1] The information on public or private primary school and the distinction between white collar and blue collar are only available if we use the EPS survey.

use monthly income. But in a second step we present the general results with a bigger set of circumstances and with yearly income.

4.1 Latin American Comparison

This section presents and discusses the level of inequality of opportunities in Chile in a Latin American context.[2]To make the results comparable, we have to restrict the number of circumstances, use monthly income as advantage variable and consider individuals between 30 and 49 years old.[3]

Table 1 shows the results for Chile and some Latin American countries. For sake of simplicity the comparative analysis is performed in three indicators, namely the Theil index or GE(1), the within group inequality ratio and the parametric measure of inequality of opportunity.[4]

Table 1: Comparison with other Latin American Countries

Country	GE(1)	Share of Inequality of Opportunity	Absolute contribution
	(1)	(2)	(3)=(1)*(2)
Brazil	0.64	0.29	0.19
Colombia	0.58	0.20	0.12
Ecuador	0.54	0.23	0.12
Guatemala	0.79	0.23	0.18
Mexico	0.63	0.18	0.11
Panama	0.49	0.14	0.07
Chile	0.47	0.28	0.13

Chile shows lower labor income inequality than the rest of the Latin American countries, moreover the share of total inequality that can be traced to circumstances is much larger in Chile. It is the second highest after Brazil in this sample.

One could interpret the above results as Chile showing the lowest labor income inequality but one of the highest inequality of opportunities among this sample of Latin American countries. However, a different interpretation emerges when we look at the absolute incidence of inequality of opportunity. This can be approximated as a product of the share of inequality of opportunity by the level of labor income inequality, as shown in the last column in Table 1. According to this indicator Chile occupies an intermediate position in the ranking of inequality of opportunity, below Brazil and Guatemala, similar to Ecuador, Colombia and Mexico, and definitely above Panama.

[2]Using the information contained in the World Bank report: "Measuring Inequality of Opportunities in Latin America and the Caribbean" (2008).

[3]Some differences still remain betwen the WB report and our estimates. The report uses information on ethnicity and we do not have that information. Access to a primary public education is used in our estimation, but it is not included in the WB report.

[4]Conclusions are robust to the choice of indicators; similar results can be shown to arise from the other indicators.

The parametric decomposition allows us to further decompose the index, by considering circumstance variables individually. The results are presented in Table 2,[5] whereas the corresponding OLS estimates are shown in Table A-1 in the Appendix. Differences in father's education contribute 10% to 11% of overall inequality, followed in importance by mother's education, gender and other circumstance variables. The above results must be interpreted as estimates that arise from a reduced form equation, where estimated coefficients summarize all relevant links between each circumstance and the outcome variable. In addition, it must be noted that the decomposition is not additive.

The ranking of circumstance variables according to their contribution to labor income inequality in Chile is somewhat similar to the ranking in other Latin American countries, as reported in World Bank (2008). One difference is that mother's education is the variable that contributes the most to overall inequality in other countries, while in Chile the largest contribution comes from father's education. Also, differences in worker's gender contribute relatively more to labor income inequality in Chile than in other countries in the region. These results suggest that gender issues might of particular relevance to explain socioeconomic outcomes in Chile. This hypothesis may seem at odds with the relatively high position of the country in regional ranking of per capita income, human development and other social dimensions. However, there are other indicators suggesting that Chile lags behind in gender issues, like female labor market participation and the position of the country in the gender equality index (See Larrañaga and Azocar, 2008; UNDP, 2008).

[5] Standard deviations are presented in parentheses and calculated using non-parametric bootstrap with replacement and 200 repetitions.

Table 2: Individual contribution by circumstance to labor income inequality[6]

	GE(0)	GE(1)
Gender	0.056	0.076
	(0.009)	(0.012)
Public Primary	0.040	0.031
	(0.008)	(0.014)
Father's Occupation	0.045	0.041
	(0.008)	(0.015)
Mother's Education	0.078	0.070
	(0.010)	(0.021)
Father's Education	0.096	0.114
	(0.007)	(0.011)
Region	0.011	0.002
	(0.005)	(0.009)

4.2 The general specification

Now we turn to our preferred model, which is based a larger sample of individuals (25 to 54 years old) and circumstance variables and includes annual, not monthly income. Including a more comprehensive set of circumstance variables delivers a better specification of the model of advantage and more reliable estimates of inequality of opportunity.

Table 3 shows the main results, including estimates of overall labor income inequality, the contribution of opportunities and the contribution of each circumstance variable. Corresponding OLS estimates are shown in Table A-2 in the Appendix.

The Theil index or GE(1) is expectedly lower than in the restricted specification (Table 1), as annual income contains less transitory components than monthly income, which make most inequality indicators based on annual income to be lower than those based on monthly.

The share of opportunity in overall inequality is about 25%, which is slightly lower than the estimates reported in Table 1. The current estimate of inequality of opportunity has advantages over the ones presented

[6] Standard error in parentheses.

in Table 1 because of the larger set of circumstances variables and the utilization of a better proxy of permanent income. As such, it represents our preferred estimate of inequality of opportunity.

The greatest contribution to inequality of opportunity originates in father's education, which accounts for about 10% of overall labor income inequality. This variable is likely to be highly correlated with parental household income, which is a key determinant in the formation of early human capital through its impact on nutrition, health and education.[7]

The drop in impact of the gender, public primary, father's occupation and mother's education circumstances, with respect to Table 2, seems to be related to the inclusion of new age groups and not to the inclusion of new variables as we show in the next section.

[7] Nuñez and Tartakowsky (2009) use CASEN and follow Bourguignon *et. al.* They calculate that 15% of total inequality is due to inequality of circumstances. They use monthly income, a different age range and a set of different circumstance variables, but conclude that parent's education is the largest contributor to inequality of opportunity.

Table 3: Inequality of opportunity in the extended model for labor income[8]

	GE(0)	GE(1)
Overall Inequality	0.398	0.395
	(0.010)	(0.013)
Parametric Estimates		
θ_{BFM}	0.237	0.250
	(0.012)	(0.016)
Public Primary	0.022	0.023
	(0.003)	(0.005)
Father's Occupation	0.021	0.025
	(0.003)	(0.004)
Mother's Education	0.063	0.064
	(0.004)	(0.007)
Father's Education	0.103	0.114
	(0.005)	(0.007)
Region	0.010	0.006
	(0.003)	(0.005)
HH Characteristics	0.019	0.015
	(0.003)	(0.005)
Number of Siblings	0.023	0.019
	(0.003)	(0.004)
Gender	0.026	0.018
	(0.008)	(0.012)

[8] Standard error in parentheses.

5 Cohort Analysis

In this section we analyze the changes in inequality of opportunity by cohorts or generations. Three cohorts are considered: 25-34 (younger cohort), 35-44 (middle cohort) and 45-54 years old (older cohort). Changes in inequality across cohorts can reflect life cycles and/or cohort effects. The former relate to developments that depend on the age of individuals, such as the accumulation of human capital on jobs; the latter are cohort specific, such as average quality of education in some period of time.

The EPS data does not allow us to disentangle life cycle from cohort effects. For this purpose we would need longer longitudinal data or repeated cross section data (Deaton, 1997).[9] However the data at hand allows for the computation of inequality for different cohorts at one point in time, from which only a preliminary interpretation of the results in terms of life cycle and cohort effects can be offered.[10]

The cohort analysis is developed in the extended model with annual income data, so that the share of opportunity is estimated using the parametric approach due to the large number of circumstance variables involved. Inequality of opportunity is analyzed in its relation to labor income.

A first important result in our analysis is that inequality in labor income increases sharply with the age of the cohort. Table 4 shows that GE(0) rises from 0.33 in the younger cohort to 0.49 in the middle cohort, whereas GE(1) increases from 0.31 to 0.51 in the same cohorts. This substantial increase in labor income inequality reflects both life cycle and cohort effects. In a recent paper about trends in income inequality in Chile, Engel and Elberhert (2008) show that inequality within cohort increases with the age of the cohort, a result that can be related to the accumulative effect of income shocks over time (Deaton and Paxson, 1994). On the other hand, inequality in the youngest cohorts declines because of a decreasing wage premia, which follows from the large increase in the supply of educated workers since 1990.

A second important result is that inequality of opportunity increases in absolute terms with the age of the cohort, for the younger cohort this amounts to 0.063, for the middle cohort is 0.114 point and for the older cohort is 0.122 (all differences are statistically significant). A similar pattern can be derived for the GE (1) measure.

How to reconcile this result with circumstances that are determined at an early stage and remain fixed over the life cycle of individuals? The answer to this question relies on the dynamic nature of human capital accumulation. As established in Heckman *et al* (2006): "Skill formation is a life cycle process that exhibits both self productivity and complementary. Skill attainment at one stage of the life cycle raises skill attainment at a later stage (self productivity). Early investments facilitate the productivity of later investments (complementarity)". Thus, the effect of early circumstances on child development has long lasting effects, increasing the returns of on the job training and other late human capital investments.

[9] We have information on labor earnings only for the the 2002-2006 period.

[10] We are controlling for age, which allow us to partly remove age effects, however if age enters multiplicative with some circumstances variables, or some heterokedasticity is linked to age, we still have age effects that are not control for.

Third, the relative contribution of opportunities to inequality is much lower in the youngest cohort, accounting for 19% of overall income inequality. This result can be related to policy developments aimed at reducing the inequality of opportunity. Particularly, there were important educational reforms which were accompanied by a massive increase of 257% in public spending in education between 1990 and 2006. As a result there have been substantial increases in educational inputs and improvements in curricula and schooling processes. In addition, significant increases in student financial aid have allowed the expansion of tertiary education. Enrollment in universities and other postsecondary institutions grew from 245,000 students in 1990 to 725,000 in 2006, and has been one of the main driving forces behind the reduction of wage premia as reported in Engel and Elberhert (2008), Larrañaga and Herrera (2008) and Sapelli (2009).

Table 4: Inequality of opportunity in the extended model; cohorts in the labor market[11]

	Younger Cohort		Middle Cohort		Older Cohort	
	GE(0)	GE(1)	GE(0)	GE(1)	GE(0)	GE(1)
	0.335	0.308	0.393	0.379	0.494	0.514
	(0.016)	(0.021)	(0.016)	(0.017)	(0.024)	(0.028)
θ_{BFM}	0.189	0.208	0.290	0.319	0.247	0.274
	(0.019)	(0.024)	(0.020)	(0.026)	(0.021)	(0.029)
Level	0.063	0.064	0.114	0.121	0.122	0.141
	(0.008)	(0.010)	(0.010)	(0.013)	(0.013)	(0.018)

The decomposition of the inequality indexes is presented in Table 5. The analysis at the cohort level shows some interesting departures from the aggregate results. In particular, the contribution of father's education to income inequality increases with the age of the cohort, from 6%-8% in the youngest cohort to 15%-17% in the oldest cohort. In the case of mother's education, an inverse trend is found, as the share increases for the youngest cohorts. For the young and middle cohorts father's education is the most significant circumstance behind labor income inequality, whereas mother's education is the most important contributor in the youngest cohort, where it accounts for 7%-9% of inequality of labor income.

We found in the previous sections that the shares of gender, public primary, father's occupation and mother's education decreased with the inclusion of more circumstances and different age groups. Table 5 shows that the older cohort has the lowest shares for those circumstances, which implies that the aggregate decreased we observed was mostly due to the inclusion of new age groups and not to the inclusion of new circumstances.

[11] Standard error in parentheses.

Table 5: Contribution of circumstances to inequality of labor income by cohorts[12]

	Younger Cohort		Middle Cohort 2		Older Cohort 3	
	GE(0)	GE(1)	GE(0)	GE(1)	GE(0)	GE(1)
Public Primary	0.033	0.047	0.032	0.034	0.000	0.005
	(0.005)	(0.009)	(0.007)	(0.011)	(0.009)	(0.012)
Father's Occupation	0.026	0.041	0.033	0.042	0.008	0.010
	(0.005)	(0.008)	(0.006)	(0.009)	(0.009)	(0.013)
Mother's Education	0.076	0.089	0.058	0.064	0.037	0.046
	(0.007)	(0.010)	(0.007)	(0.010)	(0.011)	(0.015)
Father's Education	0.058	0.079	0.123	0.139	0.150	0.166
	(0.007)	(0.009)	(0.009)	(0.014)	(0.014)	(0.021)
Region	0.027	0.037	0.016	0.017	-0.013	-0.015
	(0.0070	(0.011)	(0.006)	(0.009)	(0.011)	(0.0160
HH Characteristics	0.026	0.032	0.024	0.026	0.004	0.004
	(0.006)	(0.009)	(0.006)	(0.008)	(0.010)	(0.013)
Number of Siblings	0.022	0.031	0.023	0.027	0.013	0.016
	(0.003)	(0.004)	(0.005)	(0.007)	(0.010)	(0.014)
Gender	0.034	0.025	0.029	0.019	0.010	0.017
	(0.016)	(0.024)	(0.017)	(0.024)	(0.017)	(0.022)

5.1 An application of Juhn-Murphy-Pierce decomposition

Further insight into the role of cohorts can be provided by applying the decomposition introduced by Juhn, Murphy and Pierce (1993). This methodology can be adapted to analyze changes in inequality across cohorts, and to explain these changes by using changes in circumstances endowments and circumstances returns. The former refers to the distribution of the characteristic in the population of individuals; the latter

[12] Standard error in parentheses.

to the coefficient that relates each characteristic to labor income.[13]

Table 8 presents the decomposition for the two inequality indexes. As before, standard deviations are presented in parentheses and calculated using non-parametric bootstrap with replacement and 200 repetitions.

Table 6: Decomposition of changes in inequality between cohorts[14]

	Middle Cohort - Younger Cohort		Older Cohort- Middle Cohort		Older Cohort - Younger Cohort	
	GE(0)	GE(1)	GE(0)	GE(1)	GE(0)	GE(1)
Inequality	0.057	0.069	0.101	0.135	0.158	0.204
	(0.021)	(0.024)	(0.030)	(0.033)	(0.029)	(0.0340
Endowments	-0.011	-0.014	0.026	0.038	0.025	0.039
	(0.022)	(0.025)	(0.033)	(0.037)	(0.032)	(0.039)
Returns	0.050	0.051	0.007	0.018	0.061	0.073
	(0.021)	(0.024)	(0.033)	(0.037)	(0.032)	(0.039)
Residuals	0.018	0.032	0.069	0.079	0.073	0.092
	(0.022)	(0.025)	(0.037)	(0.042)	(0.036)	(0.045)

All changes in total inequality are statistically significant. Also, all changes in characteristics, parameter and residuals are statistically different from zero.

Changes in inequality for the younger cohort are mostly due to changes in returns or residuals, this result is in line with the hypothesis of a leveling in the playing field in recent years since the distribution of labor income of the younger cohort is less dependent on circumstances in the parental household than older cohorts. There is also a small reduction in the variance of endowments for the younger cohort, as shown by a negative sign in the respective coefficient in Table 6. Together, these results imply that the distribution of circumstance variables in the younger cohort is not very different from the middle cohort, but differences in circumstances matter a lot less in the income distribution of the younger cohort. This is precisely, what a more equal distribution of opportunity is about.

The results for changes between the middle cohort and the older cohort suggests that changes in circumstance endowments or returns did not play a significant role in the increase of labor income inequality, however this is not the same as saying that circumstances do not matter in income distribution. Our previ-

[13] The JMP decomposition separated inequality changes via changes in coefficientes, endowments and residuals. The decomposition is presented in the appendix.

[14] Standard error in parentheses.

ous results have shown than the distribution of opportunity is a relevant determinant in the distribution of income. The current result merely shows that there were no changes in circumstances relevant to changes in income distribution between the intermediate age cohorts.

6 Final Remarks

This paper shows that circumstances in individuals' early life have an impact on their adult socioeconomic outcomes. We found that at least 25% of labor income and household income inequality can be related to circumstances in the parental household and that father's education is the individual circumstance that contributes the most to income inequality. The results also suggest that early circumstances have a lasting impact on adult outcomes and that recent educational policies may have been produced a more even playing field that benefits the youngest cohort.

What about policy implications? Can we draw policy recommendations from an issue that is determined in the past, as the case of early life circumstances of the current adult population? Most of the implications about opportunity policies relate to the current and future children, an issue that is addressed in a companion paper (Contreras, Larrañaga, Puentes and Rau, 2009). However, there is one important policy implication regarding adults and their past opportunities, issue of redressing.

Redressing has been explored in political philosophy writings. John Rawls in his famous *Theory of Justice* claims that a just society is one where institutions maximize the prospects of life for the most disadvantaged groups. In doing so, society has to level the socioeconomic playing field, so to ensure that individuals can develop fully their talents. In addition, individuals who were not favored with talents by nature should be allocated income from redistribution, financed out of taxation. On the other hand, Nozick in his response to Rawls explicitly advocates the redressing of past injustices, which constitutes the main exception in his postulates that the State should confine itself to the protection of individual rights, and not to intervene in the allocation of income by market forces.

In the context of our discussion redressing provides a foundation for redistributing current income. To the extent that some fraction of income inequality can be traced to the distribution of circumstances in early life, then it can be argued that justice requires compensating those individuals who were harmed by past inequities. Note that not every low income individual qualifies for redressing, only those who experienced unfavorable early circumstances.

This argument is made at the conceptual level. Its implementation in the public policy arena requires taking into account other considerations, such as the role of information, incentives and targeting. For example, it can be discussed whether a high income individual should be compensated if he/she experienced early disadvantages in life.

From a more pragmatic point of view, some initiatives that have been advanced to improve the income

distribution in the country, like those that originated in the Consejo de Trabajo y Equidad,[15] can be related to the issues of compensation and redressing, in addition to more traditional arguments

[15] This is a council called by President Bachelet to study inequality in Chile and to propose policies that could improve income distribution.

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8 Appendix

The OLS results for the regression on labor income are shown in table 3.

Table A-1: OLS Results for Labor Earnings (Monthly)

Gender	-0.40
	(0.03)**
Public Primary Education	-0.27
	(0.04)**
Father White Collar	0.27
	(0.04)**
Mother 5 or less years of education	-0.32
	(0.04)**
Mother 6 to 11 Yrs. of Education	-0.09
	(0.04)*
Father 5 or less Yrs. of Education	-0.33
	(0.04)**
Father 6 to 11 Yrs. of Education	-0.21
	(0.04)**
Region South	-0.17
	(0.03)**
Region North	-0.13
	(0.03)**
Constant	13.06
	(0.05)
Observations	3230
R-Squared	0.22

Standard errors in parentheses

* significant at 5%; ** significant at 1%

Table A-2: OLS Results for Labor Earnings

Public Primary Education	-0.16
	(0.03)**
Father White Collar	0.16
	(0.04)**
Father's Years of Schooling	0.03
	(0.00)**
Mother's Years of Schooling	0.04
	(0.00)**
Region South	-0.13
	(0.03)**
Region North	-0.17
	(0.03)**
Born In Very Poor	-0.28
	(0.10)**
Born in Poor	-0.06
	(0.08)
Born in Good	0.06
	(0.08)
Number of Siblings	-0.03
	(0.00)**
Gender	-0.50
	(0.02)**
Constant	12.73
	(0.09)**
Observations	4963
R-Squared	0.22

Standard errors in parentheses

* significant at 5%; ** significant at 1%

JMP decomposition

The decomposition assumes that an outcome variable can be written in the following way:

$$Y_{ic} = X_{it}\beta_c + u_{ic}$$

where i identifies an individual and c to a cohort. In our case, Y_{ic} are labor earnings and per capita household income, and the $X's$ are the circumstances.

The decomposition uses the fact the residual, u_{ic}, can be written in term of the percentile in the residual distribution θ_{ic} and the distribution function of the residuals $F_c()$. So, we have:

$$u_{ic} = F_c^{-1}(\theta_{ic}|X_{ic})$$

where $F_c^{-1}(\theta_{ic}|X_{ic})$ is the inverse of the cumulative residual distribution for individuals with characteristics X_{ic}.

We write the outcome equation in the following way:

$$Y_{ic} = X_{ic}\overline{\beta} + X_{ic}\left(\beta_c - \overline{\beta}\right) + F^{-1}(\theta_{ic}|X_{ic}) + \left[F_c^{-1}(\theta_{ic}|X_{ic}) - F^{-1}(\theta_{ic}|X_{ic})\right]$$

Then, any inequality index calculated over Y_{ic} can be decomposed into three components. First, we can fixed the β_c and the residuals, then the outcome can be written as:

$$Y_{ic}^1 = X_{ic}\overline{\beta} + F^{-1}(\theta_{ic}|X_{ic})$$

Any difference in inequality for Y_{ic}^1 can be attributed to changes in circumstances.

Second, we can allow the β_c and circumstances to change, and write:

$$Y_{ic}^2 = X_{ic}\beta_c + F^{-1}(\theta_{ic}|X_{ic})$$

and any change between inequality indexes using Y_{ic}^2 can be attributed to changes in β_c, and any change left can be attributed to changes in the residuals.