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Income Inequality in Chile: 1990-2006

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Abstract

The entrance of Chile to the Organization for the Economic Cooperation and Development, as the first South American country and second after Mexico in Latin America, sets a landmark in the development path that since the beginning of the 1990s decade has seemed to lead this country to a privileged position in the region. Given the reforms taken by the military regime in the 1980s, Chile is one of the most market-oriented countries in Latin America, with Free Trade Agreements and Economical Partnerships with several countries, including Japan, the United States and China.

Nonetheless, Chile's economic success is said to exclusively benefit a few Chileans; this is true, given the deep inequalities in the distribution of wealth.

The income inequality existing in Chile is a long-term phenomenon; it tended to increase from 1974 to 1987 and decrease from 1987. This paper focuses on the evolution of the inequality from 1992 to 2006, and investigates the reasons for the decreasing trend in income inequality. First, we show that monetary transfers focused on low-income households contributed to decreasing inequality in after-tax income. Next, causes for the decrease in inequality in before-tax income are analyzed using log variance decomposition method based on the ageing hypothesis, Skilled biased-technological change and spreading higher education hypothesis. The analysis based on ageing hypothesis shows that the reduction of income inequality between age groups greatly contributed to decreasing in total income inequality. The spreading of higher education did not have the results expected, and surprisingly has a negative effect by increasing inequality; this could be because this popularization of higher education benefits mostly richer sectors of the population. The SBTC theory is also tested, resulting in signs of a possible inverse effect. A possible explanation could be the rise in the demand of unskilled workers through globalization and the Foreign Direct Investment in sectors using unskilled labor force.

Keywords: Income Inequality, Chile, Skilled-biased Technological Change Theory

JEL Codes: D30,D63,O15

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1 Introduction

The study of income inequality has been one of the main focuses of economic research in Chile, the persistence of it and the reasons why Chile presents this inequality have been studied over the years. The study of income distribution in Chile starts in the year 1958 when the Universidad de Chile's started to apply the "Occupation Survey". This survey collects data from annual incomes of households contained in the area of Santiago, capital city of Chile. Givenlack of national representativeness the creation of a national survey became a necessity, and that is how in 1987 the "National Socioeconomic Characterization Survey"- CASEN was first implemented.

This survey has a larger sample size, in 2006 almost 75,000 households[2], and for the 2011 version the addition of another 15,000 is expected, to get a national total of around 90,000 households. CASEN has been applied since 1987 every two or three years. For most of the research done in the field of income distribution in Chile, the CASEN survey is the main data source, although its main objective is to measure the impact of social spending and the prevalence of poverty along the country, information used governmental and non-governmental organizations.

The "Ministry of National Planning and Development", in charge of the survey, corrects for under-reporting in the CASEN survey, this under-reporting often happens when low income families, in order to get more benefit from the state, do not answer the survey correctly. In order to correct for under-reporting of income, the methodology that is used is multiplying each component of the income by a constant factor in order to adjust the levels of income reported in the national accounts. The adjustment factor is constant for all recipients assuming that the under reporting is constant throughout the distribution of the variable. Therefore the data presented in this paper, as well as the data presented on the papers that are used, is data adjusted for national accounts, given that the original, not corrected is not available. This correction anyways, should not have any statistically significant impact on the inequality indicators since the correction is done constantly through all the distribution, the effect is more likely to decrease poverty statistics when reported incomes are lower than the national accounts show.

Here, an important issue must be pointed out. The CASEN survey is under constant improvement and revision, given this process of constant revision some of the values

[2] *Ministry of National Development of Chile,* "CASEN Methodological Report" pp. 31, at http://www.ministeriodesarrollosocial.gob.cl/casen/pdf/metodologia_2009.pdf.

given through the analysis differ from the ones given by other authors, one of the reasons of this is the constant improvement of the data bases.

In the analysis of the database many inequality measures are used, in the following analysis we will use the Gini index and some of the quintile and deciles ratios. The Gini index is based on the Lorenz Curve, which is a cumulated function of the proportion of individuals, starting from the poorest, in the X axis, against the cumulated proportion of income on the Y axis. Then in an ideal perfectly equal scenario the graph will present a 45° straight line, where everyone would have the same amount of income. As the reality differs the curve would be drawn somewhere between this 45° perfect equality line and the X axis. The Gini Index is obtained when dividing the area between the 45° line and the resulting curve by the total area below the 45° line. Then when the Gini Index is closer to 0 it represents a more equal distribution of income. Another way of measuring inequality is based on the comparison between deciles or quintiles. The deciles (quintiles) are defined as the result of ordering the population from the poorest to the richest and dividing them in 10 (5) groups with equal number of people. In this paper we will use the 90/10, Q5/Q1 ratios, in doing so; we can get information about how the extreme points of the population behave during the analyzed period.

The inequality trends will be analyzed through the period from 1992 to 2006. This is because two major reasons, first the availability of data of CASEN survey, starting in 1987, and the second reason is that this period comprehends the return to democracy, the following years of economic boom during the 1990s so it will give us different scenarios to see how inequality responds to them.

Before the analysis of the mentioned period, this paper presents a review of the analysis made to the period before 1990, so the nature of Chilean inequality can be better understood by the reader. It is important to point out that this paper does not intend to give any particular political view; the intention is just to present the data to encourage further research on this topic.

2 Inequality before 1990

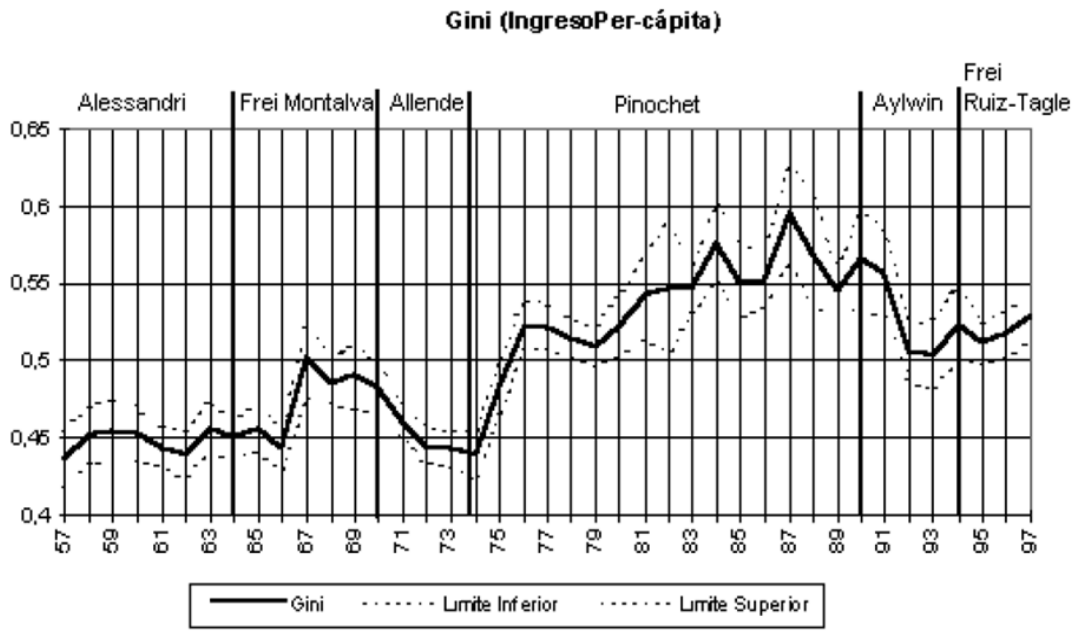
During the last 50 years, Chile has gone through different economic growth regimes, given the influence of external and also internal political circumstances. Through the 1960s Chile, as the rest of Latin America, adopted the “Import Substitution Industrialization” model, following the line of thought proposed by the “United Nations’ Economic Commission for Latin America” (ECLAC)[3]. This model was based on

[3] In Spanish CEPAL (Comisión Económica para América Latina)

the idea that the world was divided into a “central core”, composed by developed countries, and a “periphery”, in where developing countries found their place. The resources flowed from the developing to the developed countries, making the latter even richer and producing certain level of dependence from the peripheral because their lack of industrialization. Then the solution proposed was to start substituting the industrial imports from developed countries with goods produced internally. This produced that the state became strongly involved in the economic activity. This situation changed drastically with the start of the military regime in 1973, the “military junta” led by General Pinochet, with the help of a group of technocrats educated in the United States under the neoliberal model and with the direct influence of Milton Friedman, deregulated the market and reduced the participation of the state in the economy as much as they could. The measures adopted by this group of technocrats helped to open the country to foreign investment and brought economic success, but they also brought an increase in inequality.

The long-term analysis done by Ruiz-Tagle (1998) shows how the inequality in Chile varied over the 1957-1998 period.

Figure 1



Source: Ruiz-Tagle (1998)

Figure 1 presents the variation of the Gini index per capita over the period. We can see that at the end of the 1960s the inequality remains relatively constant until the first half of the 1970s when we see a sharp decrease. This decrease can be attributed to both micro and macroeconomic policies adopted by the government of Salvador Allende[4].

During Allende's period (1970-73) public policies were oriented to eliminate, or at least reduce, the power of national and international monopolies and those of the landowners that concentrate the land possession. Following these objectives, policies like the nationalization of the copper industry and the land reform (although the latter was started in Frei Montalva's government) remain as landmarks of this period. At the same time, the inflation was managed by controlling prices directly. These policies had a deep effect lasting even during the first years after the Coup d'état.

The military period brought a process of openness and restructuration of the state from 1975, this process, as we see, in Figure1 carried a sharp increase in inequality. The beginning of the military regime, in terms of inequality, results in a return to the inequality levels seen at the end of the 1960s, also it will set the start point of a continuous and perseverant trend of rise in the inequality indicators. The reforms introduced in this period change the development pattern of the Chilean economy in 180 degrees, as was mentioned, from an import substitution pattern to free trade of goods, the nonintervention of the state in the market[5]

At the end of the 1970s we can see some stabilization in the Gini index lasting until the beginning of the 1980s when Chile is hit by one of the biggest economic crisis of its history, the "Latin American Debt Crisis". The impact that the crisis had on Chile wasimportant. The high levels of unemployment as a result of the economic crisis and the reforms tending to reduce the size and importance of the state in the economy and reducing the wages in the public sector, can explain the continuous increasing trend shown in Figure 1. Another factor affecting the inequality in this period is the process of privatization that had already started and that resulted in that the ones that already had economic actives could differentiate even more with the ones who did not.

[4] For more detail on Allende's period Economic reforms refer to World Bank (1979) "*Chile an Economy in Transition"*

[5] This was called the Subsidiary Role of the State; this means that the state has to take part wherever the private sector cannot. Examples of this are the Army, Police and justice.

Table 1

Distribution Indicators Occupation Survey

Period	Gini Index	Q5/Q1	Relative Salary
1958-63	0,476	12,1	5,36
1964-69	0,498	13,52	5,66
1970-73	0,467	12,24	4,06
1974-81	0,513	14,93	4,62
1982-86	0,557	19,45	5,5
1987-90	0,57	19,93	6,43

Source: Larrañaga (2001) Occupational Survey data

In Table 1 we can see more clearly how the inequality increased during the 1974-90 period. The 1982-86 period, marked by the Debt Crisis, has a high impact on the distribution with an increase of 4, 3 points in the Gini index. We can see that after the crisis period the inequality continued increasing until the beginning of the 90's decade.

The Q5/Q1 rate also gives us a clear view of how the inequality varied with a special focus of the extremes of the distribution. The proportion of income earned by the richest 20% is more than 10 times the one earned by the poorest 20% at the beginning of the table. With this starting point the ratio becomes worse along the 74-90 period and at the beginning of the 1990s reaches its peak, when the richest 20% income represents almost 20 times the poorest 20% income (Ffrench-Davis, 2008). In the long run we can say that the inequality, measured by this Q5/Q1 rate doubled in the 1958-1990 period.

The relative salary presented in Table 1 measures the ratio of income level of workers with college level education over the ones with secondary level education. During the 1958-69 period it rose to start falling back on the 1960-81 period. It is just after the debt crisis that we can see an important increase in the ratio, this goes in the same direction that we can see in the other two indicators. Given this analysis we could say that the period in which the inequality increased more drastically was after the 1982 debt crisis.

The perseverant inequality in Chile could be understood as a result of the economic growth model that Chile adopted during the 1980s. In this sense, it is known that certain economic growth models carry greater levels of inequality in early stages. This happens because economies do not growth in a homogenous way and there will

always be some part of the population with some economic advantage over others, and they can use this advantage to receive more benefit from the economic growth.

During the military regime period the so called “trickle-down theory” was used to support this unequally distributed economic growth. The “trickle-down theory” proposed that the concentration of resources by a small part of the population in a first stage will gradually be reduced as this rich class start using this money and by this method the money would start circulating throughout the entire society, resulting in a better condition for everyone. This theory in terms of growth was successful, but in terms of distribution was proved to be false[6].

As a conclusion we could say that the data on long term income inequality show that the Chilean economy present high levels of inequality, persistent over the time, and therefore influence by long term structural factors. In this sense, the starting point of the inequality measurement, this is the when the first “Occupation Survey” took place in 1958, already shown an high inequality level of 0,41 in the Gini index.

Along the analyzed period the inequality goes through different stages, between 1958 and the mid-1960s it remains stable and in a relatively low level, if we compared with what happened the following years. Since the end of the 1960s the inequality indicators show a strong variation as result of structural transformations experimented by the economic system and the different international macroeconomic scenarios. Larrañaga (2001) also mentions different changes in the labour market such as the increase in the rate of woman participation in the market as an influencing factor.

The period of economic reforms initiated in 1974, by the military regime, changed the structure of the Chilean economy by opening it to international market also the intensive use of market mechanisms in the distribution of income and the diminution of the role of the state in the economic activity. These measures are related with a constant increase on the inequality indicators (Ruiz-Tagle, 1998, Larrañaga, 2001). This increase on inequality can also be related with recessive effect of the adjustment and stabilization policies introduced in the mid-1970s and after the debt crisis in 1982[7].

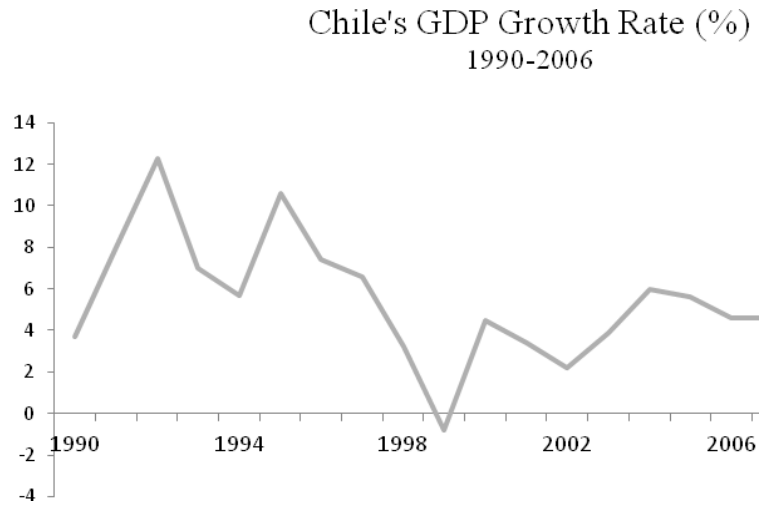
[6] For a more detailed analysis refer to Waissbluth, Mario “Reform of Chilean State 1990-2005” (in Spanish)

[7] For a detailed explanation of these reforms and how their influence on Chilean economic system refer to Ffrench-Davis, Barbara Stallings (2001)

3 Inequality after 1990

Since the return of democracy Chile has had a politically stable scenario, and even though international crises have occurred, the Chilean economy remains strong enough to endure these difficulties. Given this stability, the Chilean economy had constant growth rate during the 1990s, the poverty rate decreased from 40% in 1987 to 15, 1% in 2009[8] and the GDP per capita raised from around 3,000 USD (PPP) in 1982 to 14,600 USD in 2009[9].

Figure 2



Source: IMF Statistics

All of these facts could lead us to think that all the Chileans enjoy a better life given these macroeconomic indicators, but this conclusion is not totally true. Many international statistics define Chile as one of the countries with the worst income distribution in Latin America the most unequal continent in the world.

The following analysis of this paper will focus on the 1990-2006. First we have the 1990-98 period characterized by high economic growth, where the expansion of the GDP reached an annual average of 7.6%, in this sense this fact can help us to understand the relation between growth and income inequality. Secondly, this period marks the transition to democracy, after 17 years of authoritarian rule. The new democratically elected government set the "growth with equity", through the

[8] UNDP, http://www.pnud.cl/areas/ReduccionPobreza/datos-pobreza-en-Chile.asp
[9] Source International Monetary Fund, http://www.imf.org

increase in social spending, as one of the main objectives. For a better understanding of the dynamics in this period, and how the government put into practice this policy of increasing the social spending, this paper will analyze the income before taxes and after taxes separately.

4 Inequality in before-tax income

In the CASEN survey, "the autonomous income" is define as "the income in concept of wage and salary, earnings from independent work, self-provision of good produced within the household, bonuses, rents, interests, including also retirement pensions, pawnshops and transferences among privates"[10] In short, we can say that autonomous income is the income before tax transfers from the state.

Table 2 shows that the autonomous income remained stable between 1990 and 2003, with a high concentration, around 42%, in the richest households belonging to the top 10%. This scenario changes after 2003, when for the first time in 16 years we can see an improvement in the distribution of income.

This improvement, as we can see in table 2, is a result of the increase in the share of the group of deciles situated in the middle of the distribution (II to VIII). The first decile, the poorest 10%, does not present any change in terms of participation in the redistribution, with a fixed 1,2%. The biggest change is presented by the richest 10% which reduces its participation from 42% to 38% in the year 2006.

Table 2

Evolution of the Distribution of the Autonomous income by decile (%)

1990-2006

Decile	1990	1992	1994	1996	1998	2000	2003	2006
I	1,4	1,5	1,4	1,3	1,2	1,3	1,2	1,2
II	2,7	2,8	2,7	2,6	2,6	2,7	2,7	2,9
III	3,6	3,7	3,5	3,5	3,5	3,6	3,6	3,9
IV	4,5	4,7	4,5	4,5	4,5	4,5	4,7	4,9
V	5,4	5,6	5,6	5,4	5,3	5,7	5,4	5,6
VI	6,9	6,6	6,4	6,3	6,4	6,2	6,6	7,0
VII	7,7	8,1	8,1	8,2	8,3	7,9	8,2	8,7
VIII	10,4	10,5	10,6	11,1	11,0	10,4	10,7	11,1
IX	15,2	14,8	15,4	15,4	16,0	15,1	15,3	16,0
X	42,2	41,8	41,8	41,8	41,4	42,7	41,5	38,6
Total	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

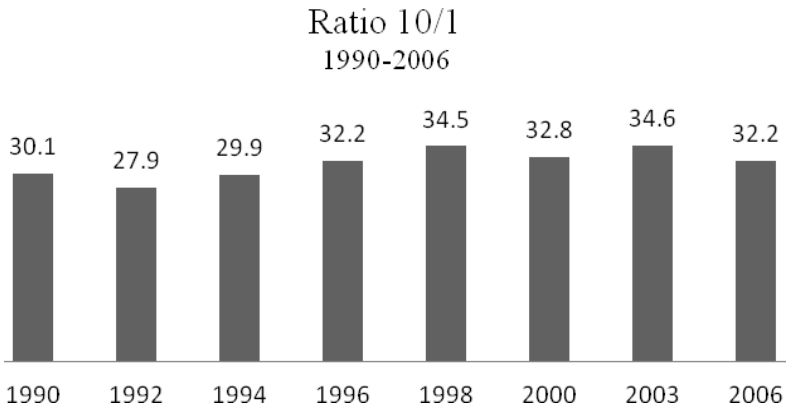
Source: CASEN survey

[10] Ministry of National Development of Chile , CASEN "Users' Manual", at http://www.casen.cl

Figure 3 give us the ratio of the income share of the tenth decile divided by the income share of the first decile. It is seen a first moment of diminution of inequality at the beginning of the decade with the lowest value in 1992, but then the inequality start rising again reaching its peak in 2003 when the income of richest 10% represented 34,6 times the income of the poorest 10%.

The richest 10% is clearly in a prominent position over the distribution, but if we deepen our analysys we can see that the richest 10% is the most unequal of the deciles. In table 3 the Gini for each decile of autonomous income was calculated.

Figure 3



Source: Table 2

As we can see the two extreme deciles are the most unequal ones, but the inequality in the richest decile is far greater than any other. This reveals another of the characteristic of the Chilean inequality, this is, people in the 10th decile are not necessary rich people, but given the inequality they are defined as “rich”.

Table 3

10th Decile Analysis

Year 2006 (2006 USD)

Autonomous Decil	Gini Index	Average Income	Minium	Maximum
I	0.24159	31.8	-	62.0
II	0.09310	78.2	62.1	93.4
III	0.06435	108.2	93.4	124.1
IV	0.05028	140.8	124.1	158.1
V	0.04181	176.2	158.1	194.6
VI	0.04327	218.7	194.7	247.0
VII	0.04590	280.6	247.0	320.9
VIII	0.05508	376.3	320.9	447.1
IX	0.08339	569.5	447.1	744.7
X	0.33786	1,672.9	744.9	60,652.2

Source: Casen 2006

Also, Table 3 gives us the maximum, minimum and average income of each decile. This enables us to understand the immense gap existing within the 10^{th} decile, with a minimum 60 times smaller than the maximum.

As conclusion of the analysis of the autonomous income we can say that, although the distribution is unequal this inequality has been decreasing over the last period. Also it can be concluded that, the decile with the greatest inequality is the 10^{th} decile, with a Gini index considerably greater than the other deciles, this fact shows the highly concentration at the end of the distribution. To make this even clearer, table 4 show us the Gini index for the percentile 90 to 100, this is the same that dividing the last decile in ten sub groups. Then we can see that most of the inequality reflected in table 3 is influenced by the inequality in the last percentile.

Table 4

Gini Index 90-100 percentile

Percentile	Gini Index
90	0,01
91	0,01
92	0,01
93	0,02
94	0,01
95	0,02
96	0,02
97	0,03
98	0,04
99	0,06
100	0,30

Source: CASEN 2006

5 Inequality in after-tax income

In the CASEN survey, “monetary income” is defined as “the sum of autonomous income that a given household generates, and the monetary subsidies transferred by the state”. Therefore, after-tax income equals disposable income. As we said in the analysis of the inequality before 1990, the subsidies received by households decreased during the military regime being replaced by market-based mechanisms.

The new democratic government, when took office, found an ordered and efficient economic system but with a poverty level of around 40% and a high inequality. Then the necessity to improve the social protection system and the transfer of resources to the poorest people became one of the most important objectives. Thus, the social spending increased sharply since the early 1990s, rising 2,5 times during the period from 1990 to 2006.

Table 5

Public Social Spending in Chile

1990-2006

	1990	1996	2000	2006(*)
As % of GDP				
Education	2,3	2,4	3,7	3,1
Health Care	1,9	2,4	2,8	2,8
Social Protection	8,1	7,3	7,9	5,9
Total	12,3	12,1	14,4	11,8
1990 as 100				
Education	100,0	195,1	278,9	367,3
Health Care	100,0	203,1	266,0	401,1
Social Protection	100,0	131,7	155,6	184,2
Total	100,0	153,3	193,5	248,2

(*) The nominal GDP was significantly affected by an increase in export values, which explains the drop in social spending as a percentage of GDP

Source: Larrañaga, 2009

The education spending was one of the main strategies of the new government, by investing in education the government expected to decrease poverty and increase equity. Owing to the economic growth period in which these policies took place, it was possible to increase spending while maintaining balanced public finances. The increase in share of the education spending in GDP was of 2,1 % point, from 1990 to 2000. When comparing these numbers with those in developed countries, within the OECD, the average amount of spending in social programs in Chile is still low. According to Pontusson (2005) typology analysis, based on the Chilean percentage of GDP invested in social policy (14,4% in 2004), Chile would classify as a Liberal Market Economy, as the United States, United Kingdom and so on. These Liberal Market Economies are characterized by high inequality in contrast with, what Pontusson calls, Social Market Economies, where the equity is higher and so is the spending in social policy (around 25% of the GDP).

Table 6 shows the evolution of the distribution of monetary subsidies by the government over time. It can be seen a process of focalization on the lower percentiles over the time. The subsidies for the richest 10% at the beginning representing 4% of the total subsidies decrease over time to end resulting in a 0,8%, in contrast the subsidies for the poorest 10% rose from 19% to 30%.

This focalization was possible partly because of the reduction on the necessity of subsidies, given the development of the economy, allowing the government to focus on the portion of the population with more needs.

Table 6

Change in distribution of monetary subsidies by decile of autonomous income per capita

1990-2006

Percentile	1990	1992	1994	1996	1998	2000	2003	2006
I	19,4	20,8	22,2	20,4	28,2	19,9	28,9	30,1
II	14,3	15,7	16,5	15,8	18,1	17,2	17,8	17,8
III	12,0	13,7	14,4	15,0	15,2	14,5	14,2	14,2
IV	11,8	12,6	11,7	12,7	11,3	12,7	11,5	11,4
V	9,8	10,0	10,0	11,5	8,9	10,4	8,8	7,9
VI	8,7	7,7	7,3	8,9	7,1	9,0	6,9	6,9
VII	7,5	7,1	7,1	6,6	5,1	7,7	5,1	5,0
VIII	6,4	5,0	5,0	4,9	3,4	5,6	3,7	3,6
IX	5,5	4,0	4,0	2,7	2,1	2,2	1,9	3,4
X	4,7	1,8	1,8	1,4	0,8	0,7	1,3	0,8
Total	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

Source: MIDEPLAN, 2007

In developed countries income transfers are greater than those in Chile, so they can absorb the bulk of social spending resources and they are financed by means of high taxes and social security contributions. These income transfers greatly modify household income in developed countries and represent an important determinant of the income distribution (Pontusson, 2005). In the European Union, the average Gini coefficient drops from 47% for the household primary income distribution to 33% for the disposable income distribution; this is explained essentially by the effect of monetary transfers by the government (Perry et al, 2005, Pontusson, 2005).

In Chile this redistribution impact is considerably lower. This is because, although most of the transfers are focused on the two lowest income quintiles, these transfers represent only a 1,2% of the total monetary income of households (Larrañaga, 2009). Another possible explanation is the existence of regressive taxes, being the most important the “Value Added tax” (19%), which represents 42% of the tax revenue

gathered by the government[11]. The redistribution produced by these transfers change the Gini index in less than one point, less than one-twentieth of the inequality gap between Chile and the European Union. Table 7 shows the Gini Index before and after monetary transfers.

Table 7

Gini Index After and Before Monetary Transfer

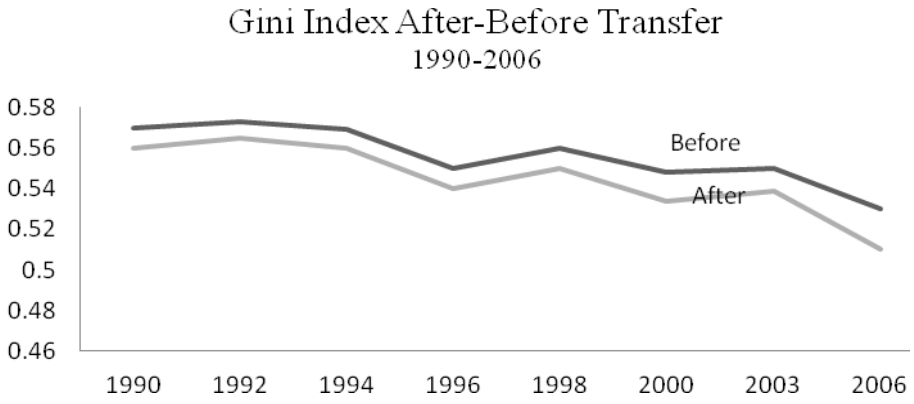
1990-2006

	1990	1992	1994	1996	1998	2000	2003	2006
Before	0,57	0,573	0,569	0,55	0,56	0,548	0,55	0,53
After	0,555	0,558	0,56	0,55	0,56	0,53	0,539	0,51

Source: CASEN, 2006

As table 7 and figure 4 show the redistributive effect of transfers is very low but it has been growing over time, and in this sense, the last two years show an important decrease in the Gini index and also an increase in the redistributive effect reaching 0,02 Gini points in 2006.

Figure 4



Source: CASEN, 1990-2006

[11] For a deeper analysis on the influence of the VAT on inequality indicators refer to Engel, Eduardo et al, *Taxes and income distribution in Chile: some unpleasant redistributive arithmetic*, 1999, Journal of Development Economics.

6 Causes for the change in before-tax income inequality

In this section, we investigate causes for the decrease in inequality in before-tax income, using log variance decomposition method based on the ageing hypothesis, the skill biased-technological hypothesis and spreading higher education hypothesis.

The first possible explanation for the evolution on inequality is the ageing hypothesis. The theory has been proposed for the Japanese case by Ohtake (2005); he proposed that population ageing brought about the increase in income inequality because that inequality within older groups is larger than that in younger groups.

Table 8

Gini Index per Age Group

Group	1992[12]	2006
25-29	0.45	0.44
30-39	0.55	0.50
40-49	0.57	0.53
50-59	0.58	0.57
60-69	0.59	0.58

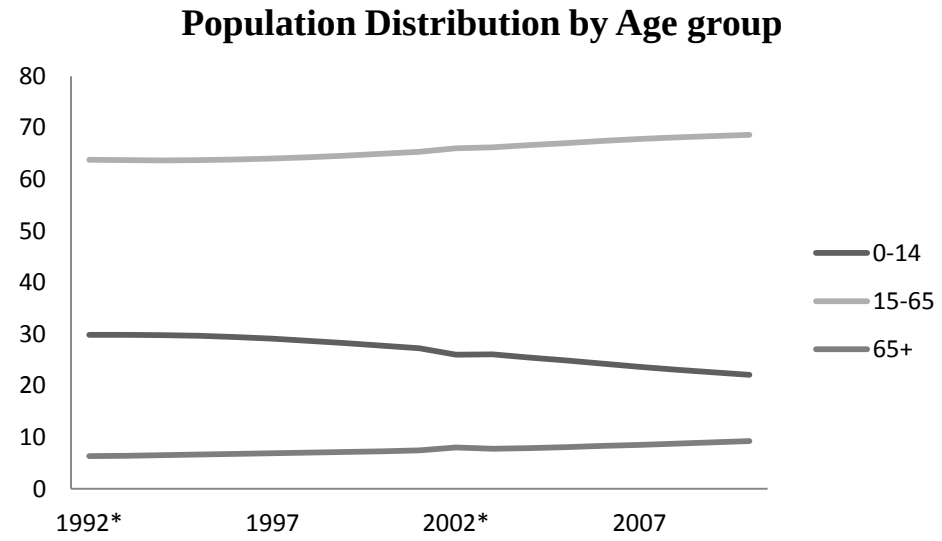
Source: CASEN 1992, 2006

Table 8 presents the correspondent Gini index per age group in Chile. As we can see Ohtake's proposition is also true for the Chilean case. Figure 5 shows the population composition by age group[13]. From 2000 we can see slow ageing of population, although for the Chilean case the population aging process is not as advanced as in Japan.

[12] In the original calculus the 1990 CASEN was used, but given a discordance between international data on occupation and the data shown in the CASEN 1990 survey calculations of the Log variance decomposition were done with the 1992 CASEN survey. The results were similar in all tables but in the occupation log variance decomposition table.

[13] Source INE, Population and Society, 2008. This includes 1982, 1992 and 2002 census.

Figure 5



*National Census

Source: National Institute of Statistics, and World Bank

In order to measure impacts of population ageing on income inequality, we use the log variance decomposition method[14]. First, we calculate the log variance of the before-tax income of economically active individuals over 20 years old. Log variance is a measure of inequality which gives higher numbers to higher levels of inequality. Next, we calculate its change between 1992 and 2006. This change in the log variance decompose into three factors, within-age group effects (effects of income disequalisation within each age group), between-age group effects (effects of income disequalisation between different age groups) and the effects of changes in age structure (effects of population ageing). Results of the decomposition are shown in Table 9.

[14] For details of this method, see Uni (2008)

Table 9

Decomposition in the Annual Wage Inequality Regarding Age

Change in Log Variance	**-0.00985**
Within-Age Effects	-0.02455
Between-Age Effects	-0.01969
Effects of changes in Age structure	0.03438

Note: Age Groups are divided in the following groups, 20-29, 30-39, 40-49, 50-60.
Source: CASEN, 1992, 2006

Table 10 Income gaps between age groups (Average of before-tax income of the 50-60 age group = 100)

Table 10

Gini Index by Age Group

Age group	1992	2006
25-29	61.1	63,5
30-39	88.1	87,1
40-49	104.6	95,7
50-60	100,0	100,0

Source: CASEN, 1992, 2006

Table 10 shows clearly that population ageing contributed increasing inequality. An important finding is that the "between-age group effects" greatly contributed to decreasing inequality. Namely, income gaps between age groups decreased greatly from 1992 to 2006, as shown in Table 9. This phenomenon is not observed in the Japanese case. Therefore, we have to investigate reasons for decreasing income gaps between age groups.

The period from 1990 to 2006 brought about many chances in the way the government influenced the economic system, as government assumed a central role in the redistribution of income. One of the most provable explanations when trying to explain this phenomenon is the effect of education, as mentioned before, educational sector received an important amount of investment.

In the following analysis, we clarify the impact that social investment in education had over the period from 1992 to 2006, using the log variance decomposition

method. In order to do so, we will decompose the change in the log variance of the before-tax income into three factors, within education effects (effects of income disequalisation within each education background group), between education effects (effects of income disequalisation between different educational backgrounds groups) and the effects of the change in households' composition by educational backgrounds (effects of the popularization of higher education).

Table 11

Decomposition in the Annual Wage Inequality Regarding Education

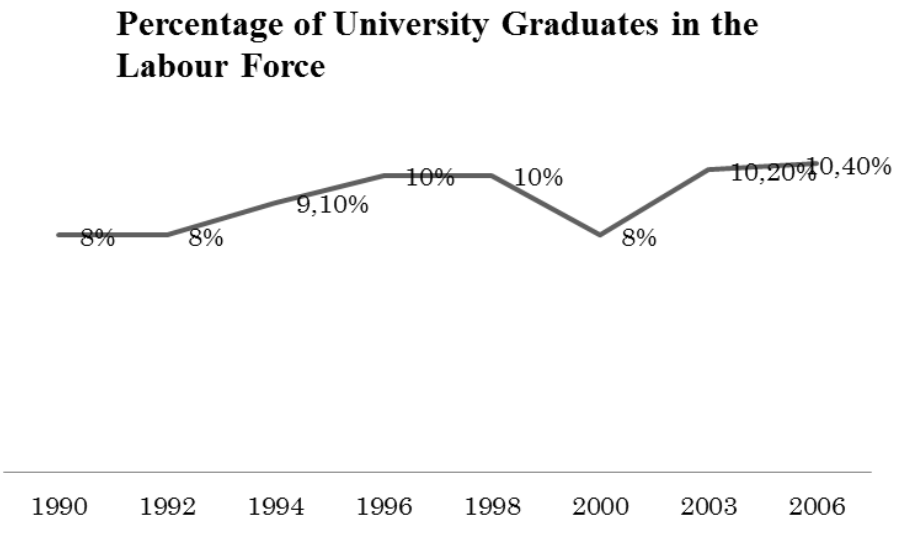
Change in Log Variance	**-0.00985**
Within-Education Effects	-0.01474
Between-Education Effects	-0.01836
Effects of changes in Education structure	0.02326

Note: Education groups are divided between, Basic Education, Highschool Education and University Education

Source: CASEN, 1992, 2006

Table 11 shows the result of the decomposition regarding education. As we can see in this table, the "within-education effect" as well as "between-education effect" shows to be decisive in determining the change in the log variance. On the other hand, the effect of the change in education structure shows to be increasing the inequality.

Figure 6



Source: CASEN 1990-2006

Table 12

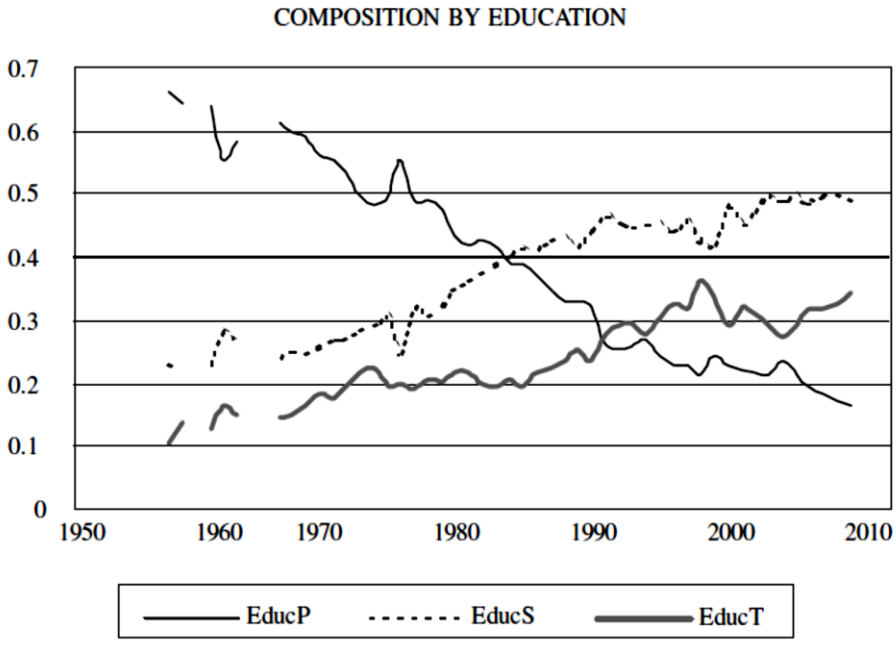
Share of households with higher education within each age group

Age group	1992	2006
20-29	8.4	12.5
30-39	12.5	14.5
40-49	13.3	12.7
50-60	12	14.8

1[1] Information for 1990 is not available

Source: CASEN Survey 1992, 2006

Figure 6b



EducP= Primary Education, EducS= Secondary Education, EducT= Higher Education

Figure 6 shows the evolution of education structure in Chile. Using the Occupation Survey Ruiz-Tagle (2007) we also present the composition of the labor force for the Santiago case in Figure 6b. The share of university graduated workers continuously increased from 8% in 1990 to 10,4 % in 2006, according to the CASEN survey. As shown in Table 13, the share of households with higher education especially

increased within younger age groups. Although when dividing this increase in the access to higher education by quintiles, the reality shows that this improvement strongly benefits the richest quintiles. This could explain the effect on inequality that the popularization of education has had.

Table 13

% Household with higher education by quintile 1992-2006

Year	I	II	III	IV	V
1992	1.46	3.49	7.70	14.12	36.20
2006	1.69	4.34	9.01	19.65	41.94
Increase	0.22	0.85	1.31	5.54	5.74

Source: CASEN Survey 1992, 2006

The last possible explanation is the Skill-biased technological change theory (SBTC) which attributes the increase in inequality to an increase in the demands for skilled workers. Table 14 shows the log variance decomposition regarding occupation.

Table 14

Decomposition in the Annual Wage Inequality Regarding Occupation

Change in Log Variance	**-0.00983**
Within-Occupation Effects	0.02355
Between-Occupation Effects	-0.07267
Effects of changes in Occupation structure	0.03928

Note: The sample is divided into skilled and unskilled workers

Source: CASEN, 1992, 2006

The results shown in table 14 would support the SBTC theory, given the increase in the within and between occupation effects, but the significance of the changes in occupation structure make it difficult to give a clear answer.

In order to clarify we will give a deeper look to the evolution of the labor force during the period 1992-2006.

Table 15

Change in Workforce by Occupation

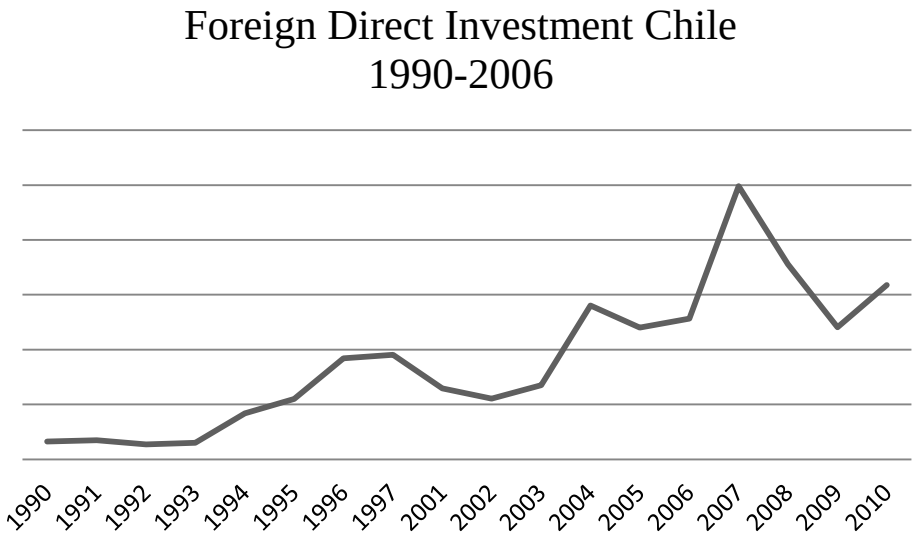
	Salary (Skilled=100)		Gini		Share in the Workforce	
Year	**1992**	**2006**	**1992**	**2006**	**1992**	**2006**
Skilled	100	100	0.58	0.55	15.66	14.51
Unskilled	26.79	32.17	0.44	0.47	84.34	85.5

Source: CASEN 1992,2006

Table 15 shows the evolution of salary, Gini index and the share in the workforce by occupation. The information given in table 15 could make us think of a reversal SBTC effect, in which due globalization there has been an increase in the demand for unskilled workers. Table 15 shows a decrease in the skilled labor force in relation with the unskilled workers, also the increase in wage for the unskilled workers was higher than that for the skilled ones. If we take what was said before about the popularization of higher education we could still think that this popularization affected the structure of labor force not through tertiary education but through the popularization of secondary education, which since 1999 is mandatory (Bellei, 2006).

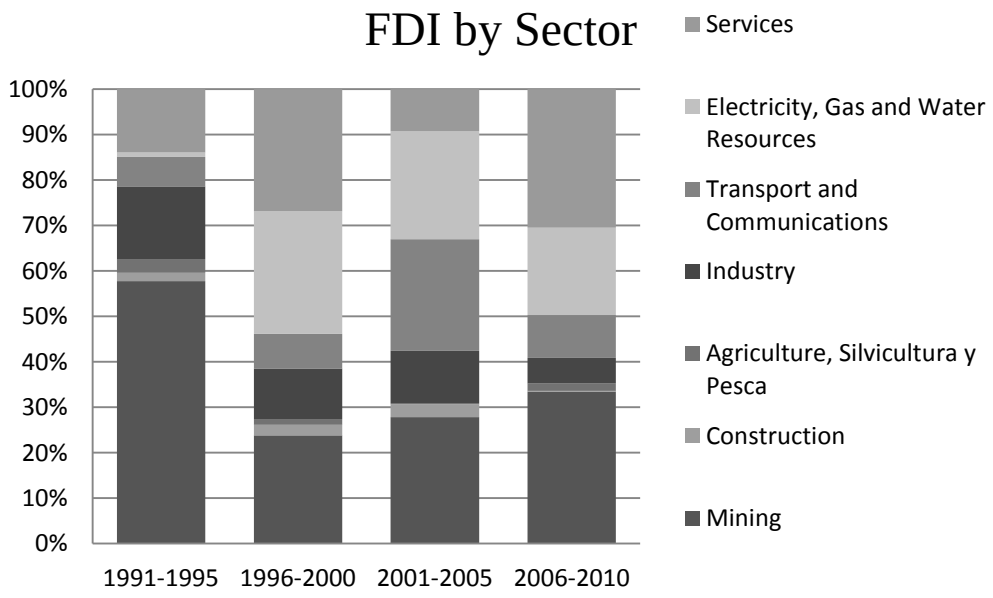
Examining the possible reasons for the increase demand of unskilled workers the increase of Foreign Direct Investment could be an answer. In order to clarify the possible explanation figure 7 shows the changed in FDI inflows for the 1990-1992 period.

Figure 7



Source: World Bank

Figure 8



Source: Comisión Inversion Extranjera, 2011

Figure 8 shows the evolution of FDI by sector, and we can see that the sectors with needs for unskilled labor force are still the prevalent, and they have seen an increase especially those related with mining activities. If we do not take into account the fall

after 1995, mining investment growths reaching 33% of the total FDI for the 2006-2010 period.

At last, and as an institutional fact, the increase of the minimum salary could also explain the decrease in inequality for the 1990-2006 period. Every year the minimum salary is adjusted by the Ministry of Labour after a process of negotiation with other ministries and with labor unions. In the period 1990-2006 the minimum salary increased more than ten times, as shown in table 16, this affects especially the unskilled workers because they are the ones that earn the minimum salary. The increase in the minimum salary is one of the factors explaining the decrease in inequality between groups shown in table 15.

Table 16

Evolution of Minimmum Salary 1990=100

1990	100
1995	327
2000	556
2005	706
2010	956
2011	1,011

Source: INE

7 Conclusion

Inequality of income is a persistent reality in Chile. From the first measurement, Chile has shown to be an unequal society. Along the 20th century inequality fluctuated over the years but always maintaining a high level. Many structural economic changes over the 20th century influenced the inequality levels, from the "Import substitution" model, through the land reform and the communist government in the beginning of the 70's decade. This period showed a decrease in the inequality levels. With the military regime and its deregulation policies the inequality would raise again, reaching its peak in 1987, still resenting the effects of the 1982 debt crisis.

With the return of democracy the new government set a goal of reducing the inequality by increasing social spending, and given the economic bonanza of the 1990s decade the balance in the public accounts permitted to invest safely. The main focus was put on education.

The 2000 decade brought a break point when, in 2006, equality measurements started to improve; the Gini index for the year fell along with the proportion of deciles.

When analyzing the causes of the decreasing on inequality the decrease on the inequality between age groups is significant, but the ageing phenomenon seems to gain importance as the projections on population growth show that Chile is undergoing an ageing process.

When analyzing educational effects, both within and between educational effects are presented as reducing inequality, but surprisingly structural changes, this is the popularization of higher education, is shown as increasing inequality. One possible cause could be that this popularization process has benefited mainly the richer sectors of the population.

Finally when testing SBTC theory, an inverse effect of the SBTC, in which the increase in demand for unskilled workers reduces the inequality levels between both groups seems to be plausible. Given the decrease in the ratio of salaries among these groups and also the decrease in demand for skilled workers, in relation with the unskilled ones, the inverse effect of the SBTC theory could explain the results of the decomposition of the log variance by occupation. The increase in FDI in sectors with demand for unskilled workers is also shown as a possible explanation, especially in the mining sector. At lasts the increase in the minimum salary shows to be an important factor given the ratio of increase, of about ten times in the period 1990-2006. This institutional factor affects directly the unskilled workers given the type of jobs that they have, and where the minimum salary is often paid.

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