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Abstract

The aim of this paper is to shed some light on the dynamics of the Chilean labour market over the last thirty years or so. We investigate the relations between wage inequality and the level of segregation which characterise the Chilean society as a whole. We show the presence of high segregation in the labour market, and we argue in favour of the existence of a casual nexus between segregation and wage inequality. We test our hypothesis calculating a segregation index and testing causality, in the Granger sense, with a Gini index over the period 1967 – 1996. We also measure the magnitude of the impact of segregation on inequality through OLS estimations.

JEL classification: I21, J31, O30, O54
Keywords: Chile, Inequality, Segregation.

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1 THE CHILEAN ECONOMY BETWEEN GROWTH AND INEQUALITY

Chilean economic performance has been exceptional in the past decades (especially when compared to other Latin American countries). The fast growth rate achieved during the late 1980s and early 1990s was considered spectacular and was often compared to those of the East Asian Tigers.

Chile has displayed the most successful economy in Latin America since the mid-eighties, with an average growth rate of seven per cent. This growth has been accompanied by a sustained reduction in poverty, but the persistence of extreme inequality (Hojman, 1996, Contreras, 1996, 1999 and 2001). Chile is among the nations with the greatest income inequality, with the richest 20 per cent of the population receiving 17 times more income than the poorest 20 per cent. This compares with figures of 8.9, 10.5, and 5.7 times for the U.S., Peru, and South Korea, respectively (UNPD, 1995).

Despite solid economic growth, a closer look at the economic indicators shows that the reality is far less spectacular. Strong income inequality persists; unemployment remains stubbornly high, and the threat of inflation still remains.

The aim of this paper is to shed some light on the dynamics of the Chilean labour market over the last thirty years or so. The paper takes advantage of a series of household surveys that cover an unusually long time series for a developing country. The Chilean economy has gone through enormous changes during the last three decades. From an import substitution-industrialist strategy, went to a populist economic policy in the early seventies, to a free-market and open economy since then. Thus, it is interesting to examine segregation and wage inequality over a period with significant economic fluctuations, dramatic changes in political regimes and significant economic reforms.

The analysis presented in this paper makes a useful contribution to our understanding of the relation of growth, inequality and segregation, all the more relevant today, given that other countries in the region have begun to implement structural reforms similar to those carried out by Chile 20 years ago.

As means of introduction, we will first survey the most recent findings on income and wage inequality, examining an array of studies, which aim to explain the dynamics of inequality. Then, we shall draw some stylised facts, which will capture the main components of the wage dynamics linking it to the process of urban segregation. We shell present some statistical as well as econometric support for our stylised facts. Finally, we will suggest some possible extension of this research.

2 INCOME AND WAGE INEQUALITY: THE MAGNITUDE OF THE PROBLEM

Inequality in Chile is high both in absolute terms and in relative terms. In 1990, the Gini index calculated by Deininger and Squire (1996) placed Chile at the very bottom of a world list:

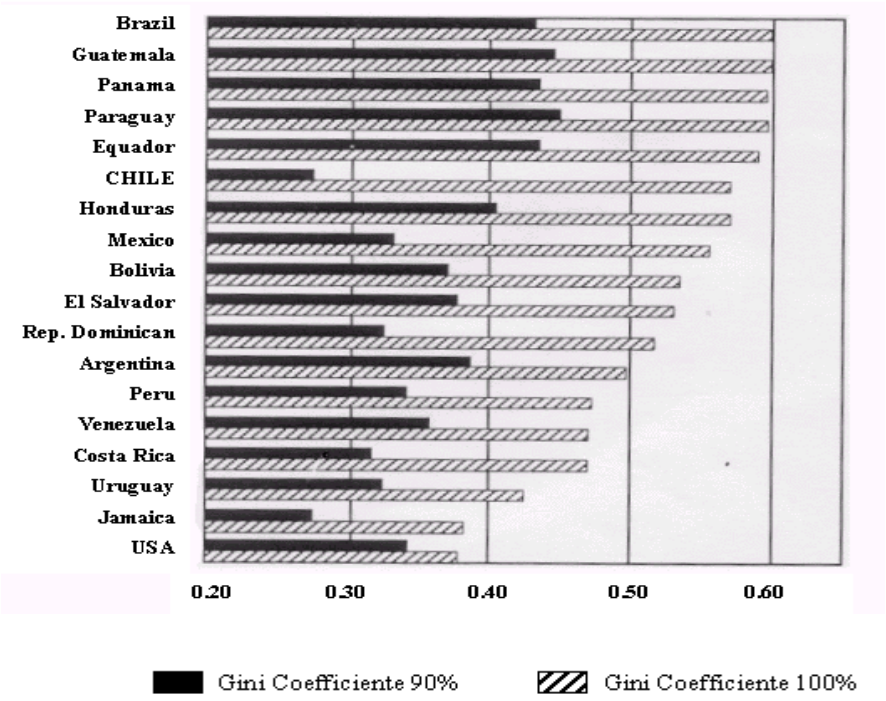
Table 1: Income Inequality, Selected Regions: 1990

		Percentage in national income divided by income quintiles			
Region	Gini	1	2	3&4	5
Sub-Saharan Africa	46.95	5.15	8.94	33.54	52.37
Latin America and the Caribbean	49.31	4.52	8.7	33.84	52.94
East Asia and the Pacific	38.09	6.84	11.3	37.53	44.33
South Asia	31.88	8.76	12.91	38.42	.9.91
Eastern Europe	28.94	8.83	13.36	40.04	37.8
Middle East and North Africa	38.03	6.9	10.91	36.84	45.35
Developed Countries	33.75	6.26	12.15	41.8	39.79
Chile	56.49	3.52	6.62	28.91	60.95

Source: Deininger and Squire, 1996.

The picture becomes even darker if we break down the distribution of income, looking at the Gini index excluding the richest 10% of the population. Surprisingly, in this case, inequality drops substantially both in absolute terms and in relative terms. The new Gini index ranks somewhere between 0.25 and 0.30. This level is much lower than the respective figure calculated for the USA. From this result we can infer that the lower portion of the distribution of income in Chile is not very different from that seen in much more egalitarian countries, whereas the upper part of the distribution displays a significant dispersion [Contreras, 1999 ; Beyer, 2000 #130].

Figure 1. Gini coefficient calculated excluding the richest 10% of the population.



A similar picture emerges if we look at the standards of living. "The persistence of high levels of unemployment for long periods of time and the severe drop and slow recovery of the real wages led to a deterioration in worker's standards of living" (Raczynski and Romaguera, 1995: 286). This fact can be deducted by several indicators. An effective way to monitor changes in living standards could be looking at changes within the per capita consumption. The two financial crises (1975 and 1982) had of course severe impacts on the consumption. Notably, the 1982 crisis was followed by a long recession, which lasted for 4 years. The recovery phase, which started in 1986, was slow and in 1989 the index still remained at 4 points below the 1981 level. Alongside the decline in overall consumptions, the economy witnessed a further deterioration in the distribution of expenditures across income groups.

Table 2: Household Expenditure, Greater Santiago

Quintiles	1969	1978	1988
1 (lowest)	7.6%	5.2%	4.4%
2	11.8%	9.3%	8.2%
3	15.6%	13.6%	12.7%
4	20.6%	21.0%	20.1%
5 (highest)	44.5%	51.0%	54.6%

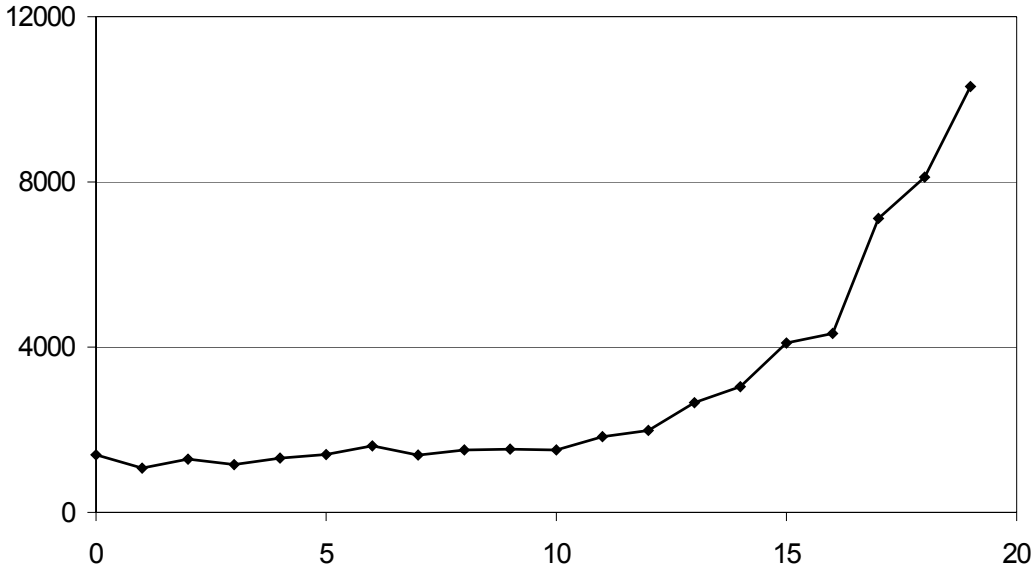
Source: Raczynski and Romaguera, 1995.

The table above shows the clear increase in expenditure concentration: the richest quintile of the Greater Santiago population gained more than 10% of the overall expenditure in less then twenty years. Ricardo Ffrench-Davis observed in 1983 that over the first nine years of military regime "with households divided into five quintiles, […] the poorest reduced their consumption by 31 percent between the two observations, while the second and third quintiles cut back by 20 percent and 12 percent respectively. On the other hand, the highest income quintiles concentrated the counterpart of the deteriorated position of the other groups" (Ffrench-Davis, 1983: 23).

A distinguishing characteristic of this inequality pattern is the fact that it is largely due to inequality in wages. The average Gini index calculated for household income coming exclusively from labour is 0.51, while the index calculated using all sources of household income is only one percentage point higher. This data suggests that the direct source of inter-household inequality is income from work, rather than capital income (Beyer, 2000). Given the dimension of the problem, it is not surprising that in recent years the main focus of inequality studies has been shifted to the labour market, and precisely on trying to understand the driving forces behind wage inequality.

Indeed the Chilean labour market is a very unequal one. Skilled workers which have more than 12 years of education, show a huge comparative advantage with respect to unskilled (uneducated) workers. The figure below shows clearly this phenomenon.

Figure 2. Return to schooling. Metropolitan region of Santiago, 1998.

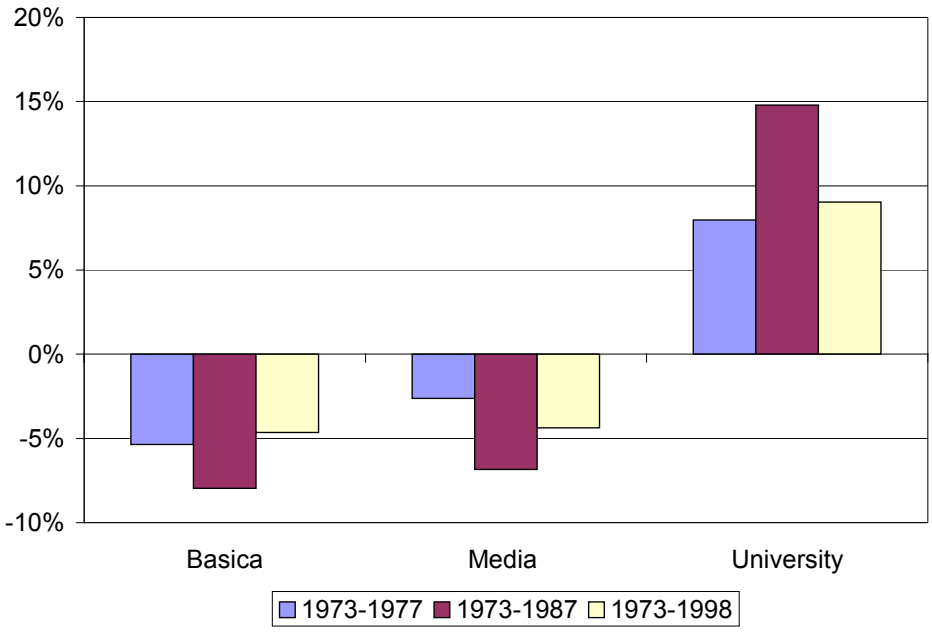


Source: *Encuesta de Ocupación y Desocupación* 1998. Personal calculations

In the figure above we calculate the average wage for each additional year of schooling. The impact of schooling is hardly noticeable among individuals with 12 or less years of schooling: the income curve for this group is practically flat. On the other hand, those workers with more than 12 years of education enjoy an exponential increase in their wage for each additional year of schooling.

The gap between skilled workers and unskilled workers appears to be rising all along the second half of the 1970s and the 1980s (i.e. the military regime period). On the contrary the inequality trend is reverted in the 1990s. Over this period the gap is constantly reduced. The figure below shows the percentage changes overtime of the return to education. It clearly emerge that workers with University education improve overtime their relative position with respect to less educated workers. This trend is reverted only in the last period.

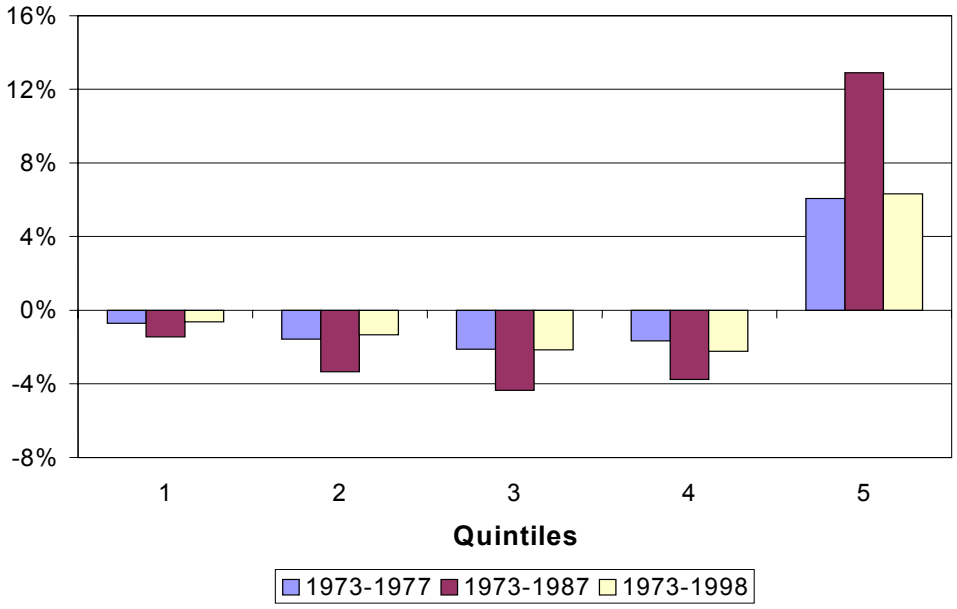
Figure 3. Percentage change in returns to education.



Source: *Encuesta de Ocupación y Desocupación*. Personal calculations

A similar trend is observable in the relative changes of wage distribution by quintiles.

Figure 4. Percentage change in wage inequality by quintiles



Source: *Encuesta de Ocupación y Desocupación*. Personal calculations

2.1 The Focus on the Labour Market

The availability of good data is, of course, a *conditio sine qua non* to develop empirical analysis. Over the last fifty years, the Department of Economics of the University of Chile, and the Chilean government have collected several high quality databases. The availability of these vast array of 'good quality' databases has recently encouraged researchers to investigate the causes of wage inequality in a more thorough way. Three main datasets, based on household surveys, have been used in empirical investigations. These databases are: the *Caracterización Socioeconómica Nacional* (CASEN) jointly conducted by the Department of Economics of the University of Chile and the Chilean Ministry of Planning (MIDEPLAN), the *Encuesta de Ocupación y Desocupación* of the University of Chile, and finally, the *International Adult Literacy Survey* (IALS) also conducted by the University of Chile. Alongside these three household surveys a fourth data source, used to study the wage inequality dynamics, is the *Encuesta Nacional Industrial Anual* (ENIA) conducted by the Chilean National Institute of Statistics.

The most interesting results obtained so far have pointed out two core facts in the determination of wage dynamics: a labour demand shift adverse to the less educated workers occurred in the aftermath of trade liberalisation, and a substantial change in the wage gap trend after the end of the military regime. Authors like Donald Robbins (Robbins, 1994a, Robbins, 1994b) and Nina Pavcnik (Pavcnik, 2000) found that technological change is a major cause of the mentioned labour demand shift. Using semiparametric and parametric approaches Pavcnik reaches the conclusion that "the probability of observing a higher share of skilled workers (skill upgrading) is greater for plants that invest, use imported materials, foreign technical assistance, and patented technology" (Pavcnik, 2000: 10).

Further investigation was conducted by Bravo and Marinovic (Bravo and Marinovic, 1997), who explore the nexus between labour-demand and supply, and the skilled-unskilled wage dynamics over the last forty years. The attention is focused on the impact of schooling on wage dynamics, since this appears to be the most important observable proxy of skills. First, the authors observe "important changes in the distribution of employment by schooling and occupational categories within economic sectors. All of them reduced the share of less educated workers and almost all diminished the percentage of blue-collar workers. On the other hand, the employment of workers with more schooling and higher positions increased in all economic sectors" (Bravo and Marinovic, 1997: 37). Subsequently, they investigate how much of these changes were due to changes in the relative supply of skilled workers as oppose to changes in relative demand. Following the methodology first applied by Katz and Murphy (Katz and Murphy, 1992), the authors reached similar conclusions to those obtained by Robbins. The strong relative wage increase in favour of more educated workers cannot only be explained by the shift in their relative supply. In fact, the demand side of the story provides a far better understanding of the wage dynamics, at least until 1990 (the year in which the wage inequality starts declining). The intensification of the use of skilled workers (in terms of schooling and occupational position) occurred both between and within economic sectors, but, as already pointed out by Robbins, the within sector change was, by far, the most significant.

One of the most interesting result, which emerges from this study, is the change in the wage and educational pattern after 1990. This point was subject to further investigation carried out by Bravo, Contreras and Rau (Bravo, et al., 1999). The authors accomplish a non-parametric analysis to understand the internal wage dynamics which occurred among different groups

during the last decade. The analysis is based on the CASEN surveys for the years 1990, 1992, 1994, and 1996. Following Katz and Murphy's (1992) methodology, the authors divide the sample into demographic groups according to four criteria: gender, geographic area, educational level, and potential experience. They then decompose the changes in supply and demand for workers in different demographic groups. This methodology is very helpful in understanding the changes between and within different demographic groups in a period of an overall wage stability. A particularly interesting result is the behaviour of the relative demand of university-graduated workers. The authors show that despite the stability of relative wage observed over the period, the demand for skilled workers (i.e. university-graduated) has increased steadily. A plausible explanation for apparently such a contradictory phenomenon could be the presence of *political* components in the relative wage determination. The minimum wage dynamics, which increased sharply since the end of the military regime, is a clear example of such *political* interferences.

In line with what observed in the previous paragraph, a common result of the three works discussed above is the increasing importance of high educational attainments in determining wage dynamics. The data presented in figure 1 show that an additional year of schooling begins to have a significant impact on a person's income only at high educational levels. Estimating a simple wage equation for different levels of education we get extremely interesting results: in 1998 an additional year of schooling for people with just elementary education have a marginal effect on wage of less than 4%; the corresponding return to secondary education is approximately 8%. In higher education, however, it soars to more than 20%. Beyer (2000) argues that this relative structure did not always exist in the country: in 1960, marginal private returns to elementary and secondary education were around 10% and 20% respectively, while the return to university education was 13%. In 1970 return to elementary and secondary education held steadily, whereas returns to higher educations reached 20%. During the 1980s, the gap in returns to education increased sharply, and in 1990 the distance in the return to secondary and university education was approximately 12 percentage points. These results are interestingly different from those usually obtained for developed countries, where the return to education has usually a constant if not a decreasing relative structure.

A further insight into the Chilean labour market can be obtained observing the changes in the education level of labour force over the period 1960-1998. The data reported in Table 3 below refer to full time workers operating in the metropolitan area of Santiago:

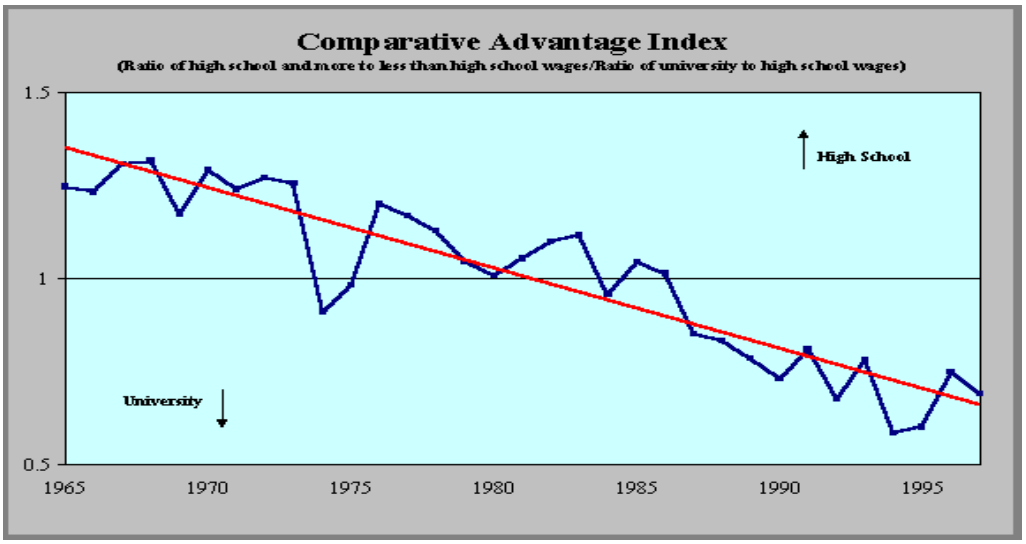
Table 5. Distribution of years of schooling among Full-Time Workers

Level of education	1960	1970	1980	1990	1998
Incomplete basic education or less	26.00%	25.04%	22.17%	17.71%	9.84%
Incomplete secondary education or less	70.26%	65.45%	55.46%	42.39%	32.33%
Incomplete tertiary education or less	98.16%	97.08%	96.21%	93.83%	79.81%
Basic education	22.97%	22.01%	17.57%	10.04%	6.65%
Secondary education	2.44%	4.08%	3.41%	6.50%	33.85%
Tertiary education or more	1.84%	2.92%	3.79%	6.17%	20.19%

Source: Encuesta de Ocupación y Desocupación. Personal calculations

In 1960 more than 70% of the full-time employees had less than 12 years of education, forty years later this percentage dropped to 32%. The number of people with university education has also increased substantially over the same period. In 1960 only 1.84% percent of the population had completed tertiary education. In 1998 this percentage was higher then 20%. In spite of the substantial increase of the average level of education, the difference in the return to schooling between workers with incomplete primary education, complete primary education, and incomplete secondary education has disappeared over time, generating an increasing gap between highly skilled workers and the rest of the working class.

The skill comparative advantage has been shifted, over the last thirty years or so, from workers with high school education to workers with university degree. In the figure reported below we present a *Comparative Advantage Index* build using the ratio of the wages of high school educated workers (and more) to less than high school educated workers, and the that of university educated workers to high school educated workers.



Source: *Encuesta de Ocupación y Desocupación*. Personal calculations

The trend is indeed pointing out the occurrence of a shift from high school education to university education, which took place in the first years of the 1980s. In light of these results a possible cure to the stubborn wage inequality would be to boost the supply of university-educated workers. In this way the dispersion at the top of the earning scale might be controlled. Looking in retrospective, this is probably what happened in the late 1990s when the wage gap stopped rising and the number of university-graduates almost doubled compared to the levels of the 1970s or early 1980s.

3 COMMUNICATION INTERACTION AND THE OCCURRENCE OF SEGREGATION

A major conclusion common to most of the works reviewed above is that a plausible cause of wage inequality might arise in the asymmetrical distribution of knowledge, coupled with the kinds of increasing returns to education observable in the Chilean labour market.

Still, this finding leave unexplained the actual mechanism which generate the exponential growth in labour productivity, once passed the threshold of complete secondary education. The question that has to be answered is what is causing the jump in productivity after twelve years of education.

An attempt to address this question has been made by Bravo, Contreras, and Medrano (1999), in a recent work on the impact of computers on labour productivity. The authors point out that the return to computer use in Chile is extremely high in comparison to those earlier observed by Krueger (1993) for the USA. Using the *Encuesta de Ocupación y Desocupación* of the University of Chile and the *International Adult Literacy Survey* (IALS) for the year 1998, the authors estimate a wage equation to calculate the magnitude of the return to computer. The results[1] obtained undoubtedly suggest that returns to computer are extremely high, ranking between 28% and 32%. These figures are approximately one third bigger than those estimated

[1] The authors use a comprehensive list of control variables which include: education, potential and effective experience, economic sectors, level of education of the father, quality of education, a set of proxies to account for the ability (e.g. number of repeated school years), and biomass (calculated as [kg/(m^2)]).

for developed countries. This difference can be explained by the larger number of people who have access to computers in developed countries compared to Chile, and justify the jump in productivity observed after the twelfth year of schooling.

A further step in the direction of explaining the exponential pattern of labour productivity, has been recently made by Morone (Morone, 2001). The author develops a model which combines returns to schooling, return to computer use, and returns to personal interaction with the increasing wage gap through the occurrence of a poverty trap. The core idea of the model is that knowledge is a function of individual learning (corresponding to schooling) and interactive learning. Interactive learning is defined as the process of acquiring knowledge throughout face-to-face communication.

Along the lines of the model proposed by Cohen and Levinthal (1990), the author formally define a single equation to describe the level of *knowledge* (human capital) of each agent:

$$K_i = E_i + I_i\left(\psi_i,\ \theta_n,\ \frac{\sum_{j\in n} E_j}{N-1}\right) \tag{1}$$

where E_i is the level of education obtained by individual i through a formal process of individual learning, and I_i is the level of education of individual i obtained through the process of informal interactive learning. The latter process of learning is function of three variables: agent i's absorptive capacity (ψ_i); the degree of connectivity of the network (n) within which agents interact (θ_n); and the average level of education of other agents $\left(\frac{\sum_{j\in n} E_j}{N-1}\right)$. It is important to note that in this model the absorptive capacity is a function of E_i with positive first derivative and negative second derivative (i.e. individual learning increases absorptive capacity at a decreasing rate).

According to Morone achieving high levels of education through individual learning facilitates the second phase of the learning process (interactive learning). This fact is captured in the knowledge equation above by the parameter ψ_i – absorptive capacity. Furthermore, following the line of reasoning of Nelson and Phelps (1966), he assumes that interactive learning is more productive the more advanced and connected is the neighbourhood within which agents interact. These two elements are captured in the knowledge equation by θ_n and $\frac{\sum_{j\in n} E_j}{N-1}$, respectively the degree of connectivity of the agent (within a particular network) and the average level of education of other agents. By investing in individual learning, each person will become more educated but will also *learn how to learn*, becoming more able to exploit the opportunities provided by the surrounding environment. In the words of Cohen and Levinthal, each individual will augment her/his absorptive capacity. This implies that investment in knowledge will display increasing returns. The presence of increasing returns might then generate a situation similar to that described above as a *poverty trap*: those people who have initially invested little in individual learning (i.e. with an initially low level of education) will probably be unable to exploit the increasing returns, being trapped in a lower

equilibrium. On the other hand, if a person could initially invest in individual learning and break out of the trap, she/he will continue to learn indefinitely.

The authors find empirical support to his theory on a case study of the Chilean labour market. Using three independent data sources (the *Caracterización Socioeconómica Nacional*, the *Encuesta de Ocupación y Desocupación*, and the *International Adult Literacy Survey*) he estimated a linear regression model which decomposes the return to knowledge into three major effects: individual learning, environmental condition (i.e. average level of knowledge of the surrounding environment of each agent), and degree of connectivity (i.e. the average level of computer users in each neighbourhood):

$$\ln W_i = \alpha + \beta E_i + \beta_1 \frac{\sum_{j \in n} E_j}{N - 1} + \beta_2 D_n + \varepsilon \qquad (2)$$

The results of several sets of estimations show that the neighbourhood level of education, and the neighbourhood average level of access to computers or telephone lines affect positively the individual level of wage. This result confirms the importance of interactive learning in determining wage dynamics. Moreover, he observes that higher level of individual learning generates higher returns from interactive learning. These results confirm the hypothesis of cumulative effects between individual learning and interactive learning, suggesting that those people who have high level of schooling will be able to gain the most from interactive learning. Putting it in other words, this result confirms the assumption that a *poverty trap* takes place.

In the following section we will argue that the occurrence of the poverty trap coincide with the presence of geographical segregation: rich neighbourhoods are also those with the highest average level of education and computer literacy, as well as poor neighbourhoods enjoy a low average level of education and highly diffused computer illiteracy. The concomitance of these three elements together is what we call segregation which is at the base of the poverty trap as defined in Morone (2001).

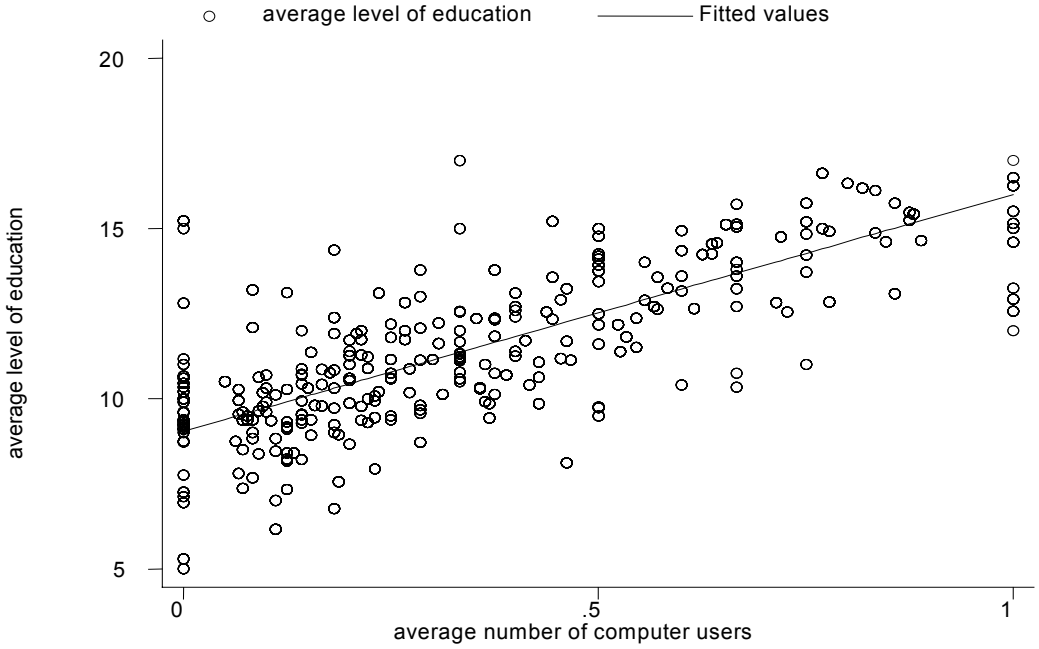
4 MEASURING SEGREGATION AND ITS IMPACT ON INEQUALITY

From the literacy review presented above (Beyer, 2000) (Bravo and Marinovic, 1997) the presence of a cumulative effect between the level of education and the level of computer literacy emerges. This effect is strengthened by the impact of interactive learning which takes place within the neighbourhood (Morone, 2001). This last observation introduces a spatial dimension to the cumulative effect which is at the base of our segregation hypothesis.

Using the database for the Great Santiago Area (*Encuesta de Ocupación y Desocupación*) as well as the data for the whole country (CASEN) we will now study the level of homogeneity of the geographical entity called *segmentos* that are defined as a block of buildings not interrupted by a street.

First, it is interesting to notice the strong correlation between years of schooling (as an average of the *segmento*) and the number of computer users (again, as an average of the *segmento*). In figure 6 we plot the regression line obtained from the regression of average number of computer users against the average level of education at the *segmento* level.

Figure 6. Use of Computers and Years of Schooling at *segmento* Level
(Full time Workers and Employees aged between 14 and 65)

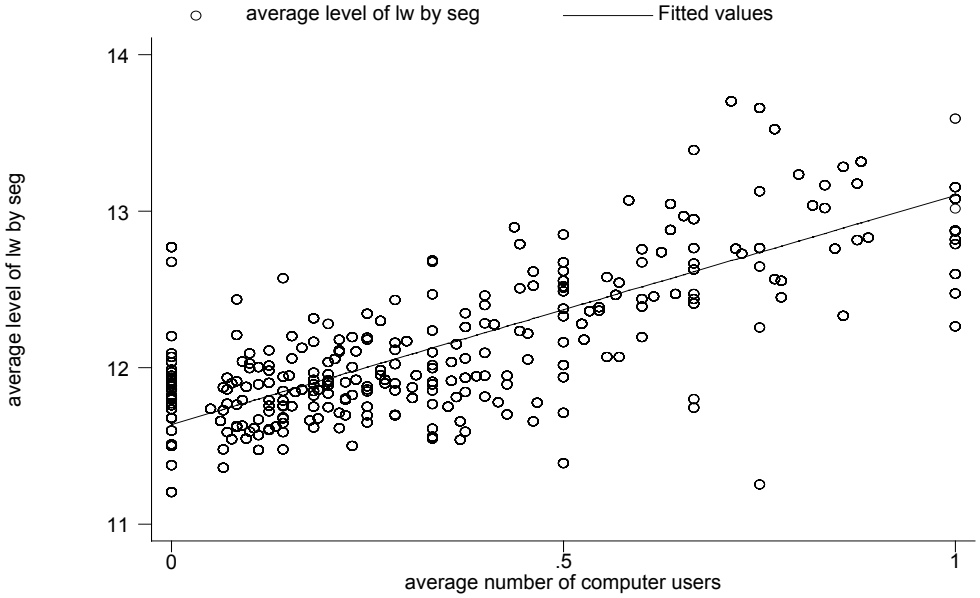


As anticipated we observe a strong correlation (the correlation coefficient is almost 0.80)[2] which suggests the presence of a reinforcing effect, at the *segmento* level, between the use of computers and the level of education: high skilled workers (here the term skilled is used as a synonym of educated) are more likely to use computers at work and as a consequence their wage is more likely to be comparatively higher than those of less skilled workers.

This first result is corroborated by the fact that the correlation between wage (log of wage) and use of computer at *segmento* level is also very high, reaching an approximated level of 0.75. This high correlation is also reflected in the plot between the two variables reported below in figure 7.

[2] Correlation between use of computers and level of education drops below 0.5 if calculated at individual level.

Figure 7. Use of Computers and Log of Wages at *segmento* Level
(Full time Workers and Employees aged between 14 and 65)



The most obvious interpretation of these figures is that *segmentos* are particularly homogeneous environments: rich neighbourhoods are also those with the highest number of computer users and with the highest average level of education. We can further strengthen our hypothesis through a parametric study. We shall study how well the average wage of each neighbourhood is explained by the average level of education and the average number of computer users. We will do it first for the grater Santiago Area using the data on the *Encuesta de Ocupación y Desocupación* of the University of Chile (restricted to workers and employees aged between 14 and 65). We will then compare these results with those obtained for the whole country.

In the table below we report the results of this regression. As expected, the coefficients are statistically significant and positive signed. The R-squared is particularly high as it explains more than 70% of the neighbourhood wage dynamics.

Table 3. Estimating the segregation index

Regression with robust standard errors				
Log of wage (by segmentos)	Coeficients	Robust Std. Err.	t	P > |t|
Schooling (by segmentos)	0.1158	0.0144	8.03	0.00
Computer (by segmentos)	0.6587	0.1302	5.06	0.00
Constant	10.5896	0.1318	80.29	0.00
Number of clusters (*segmento*) = 285				
R-squared = 0.7186		Number of obs = 3882		
F(2, 284) = 200.11		Prob > F = 0.0000		

A very similar picture is obtained when looking at the whole country. The data obtained from the survey CASEN 1998 (restricted to workers and employees aged between 14 and 65) suggests, again, a very high level of correlation between wages, level of education, and number of telephone lines (in this survey we have no information about computer use, but we have data on telephone connections and we use it a s a proxy of access to ICT) at *segmento* level (the correlation indexes ranking between 0.6 and 0.75).

Running a similar regression to those presented above we get consistent and robust results:

Table 4. Estimating the segregation index

Regression with robust standard errors				
Log of wage (by segmentos)	Coeficients	Robust Std. Err.	t	P > | t |
Schooling (by segmentos)	0.1086	0.0017	61.55	0.00
Computer (by segmentos)	0.323	0.0119	27.07	0.00
Constant	10.5107	0.016	654.04	0.00
Number of clusters (*segmento*) = 7580				
R-squared = 0.6071		Number of obs = 42642		
F(2, 7579) = 3734.46		Prob > F = 0.0000		

Both the R-squared and the correlation index mentioned above are suitable indexes for measuring segregation. We will now calculate both indexes for the period going from 1967 to 1994 in order to study the dynamics of segregation overtime. We will then use these indexes to explain wage inequality.

Indeed the two measures of segregation are very similar (see fig. 8 and fig. 9) and display a common trend. This trend can be related to the policy decisions undertaken by the military regime. In fact, during the late seventies and the eighties an active policy of segregation took place. It was carried out through the physical isolation of the poorest layers of the society in neighbourhoods located in the most indigent outskirts of Santiago (the so called poblaciones). The impact of this policy can be clearly observed in the constant increase in the segregation indexes observable almost over the whole military regime. The segregation index decreases considerably only in three years (1979-1980-1981), which correspond to a period of sustained high growth and substantial flattening of the inequality index.

Fig 8. First Index of Segregation: 1967-94

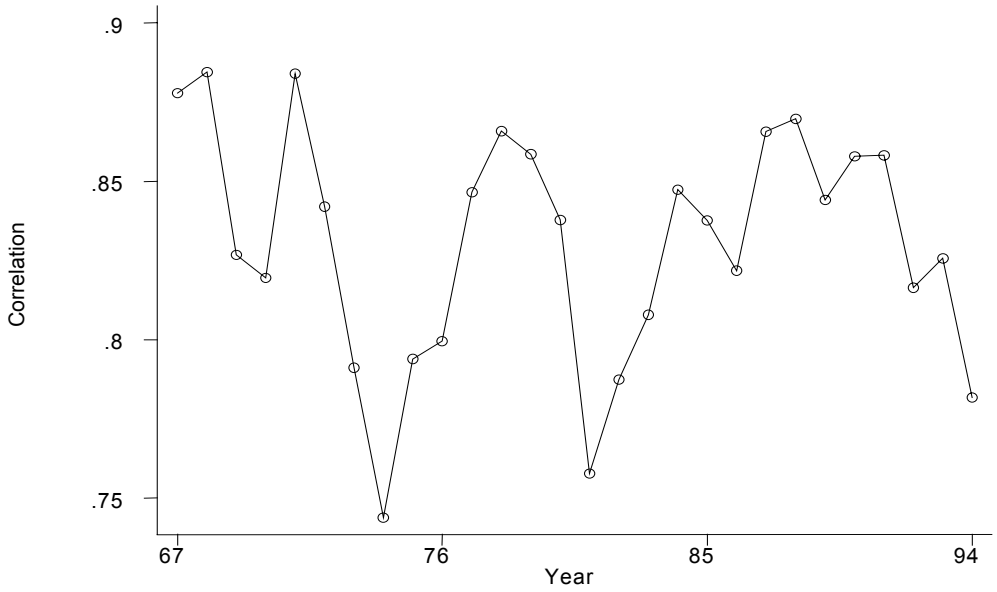
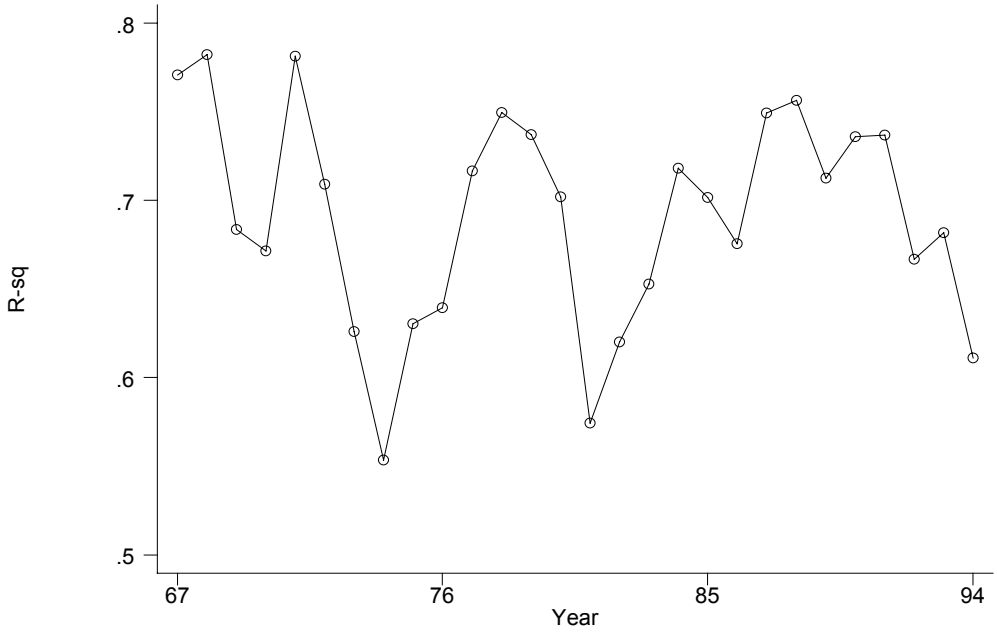
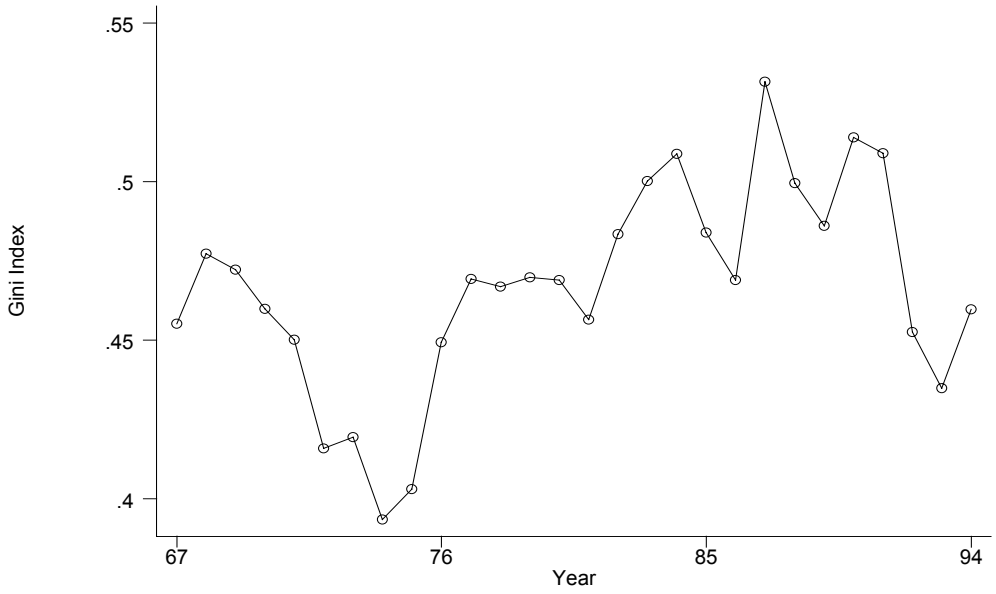


Fig 9. Second Index of Segregation: 1967-94



We will now look more closely at the inequality trend comparing the segregation index trend with wage inequality calculated through the Gini index:

Fig 10. Wage Inequality: 1967-94



Overall, the dynamic of inequality and the dynamic of the segregation indexes have a common pattern. Intensifications of the segregation are generally followed by increases in wage inequality. Moreover reductions in the indexes of segregation are followed by reductions in the Gini index. With the exception of the period 1977-1981, in which the inequality index is substantially stable while the level of segregation appears to diminish quite considerably, in all periods the changes in inequality and segregation have always had the same sign.

From this preliminary analysis it follows that the level of segregation is an important determinant of the inequality pattern. In order to strengthen these results we will perform a Granger causality test. Testing causality, in the Granger sense, involves testing whether lagged information on segregation provides any statistically significant information about inequality, in the presence of lagged inequality. If not, then segregation *does not Granger-cause* inequality. Moreover, to clearly determine the magnitude of the causal link between these two variables we will regress the inequality index over the segregation index and we will look at the R-square of the regression.

Table 5. Bivariate Granger Causality Test

	F	χ^2
Segregation Index R-squared	1.4440	5.2738
Gini Index	(0.257)	(0.0716)
Segregation Index Correlation	1.4571	5.3218
Gini Index	(0.254)	(0.0699)

The results obtained from the Granger-causality test are ambiguous: if we look at the F-test we cannot reject the null hypothesis of non-causality, but if we consider the χ^2 then we can reject the hypothesis of non-causality at 10% level of significances.

Table 6. Inequality explained by segregation

Regression with robust standard errors				
Gini Index	Coeficients	Robust Std. Err.	t	P > | t |
Segregation Index R-squared	0.2748	0.0995	2.76	0.01
Constant	0.2765	0.0689	4.01	0.00
R-squared = **0.2547**		Number of obs = 28		
F(2, 26) = 7.63		Prob > F = 0.0104		

Table 7. Inequality explained by segregation

Regression with robust standard errors				
Gini Index	Coeficients	Robust Std. Err.	t	P > | t |
Segregation Index Correlation	0.4551	0.1616	2.82	0.00
Constant	1342	0.1342	0.6	0.52
R-squared = **0.2547**		Number of obs = 28		
F(2, 26) = 7.63		Prob > F = 0.0104		

From the two tables above we can infer that the segregation dynamic explain roughly 25% of the inequality pattern. This result is a strong confirmation of our hypothesis that the Chilean society is heavily affected by segregation and that the segregation reality represents a serious constrain to equal development.

5 SUMMARY AND CONCLUSIONS

This paper contributes to our understanding of the relation of growth, inequality and segregation. Chilean economic performance in the past decades has been exceptional in many ways. Though growth markedly reduced poverty no inroads have been made on Chiles's acute inequality of income. We investigate the relation between segregation and wage inequality over the last three decades, when the economy underwent strong business cycles, dramatic changes in political regimes and significant economic reforms.

Following Morone (2001) we estimate segregation indexes using a measure of the impact of interactive learning which takes place within the neighbourhood. Two segregation indexes are

estimates for the period from 1967 to 1994 in order to study the dynamics of segregation overtime. We then use these indexes to explain wage inequality.

The two measures of segregation are very similar and display a common trend. This trend can be related to the policy decisions undertaken by the military regime. In fact, during the late seventies and the eighties an active policy of segregation took place. It was carried out through the physical isolation of the poorest layers of the society in neighbourhoods located in the most indigent outskirts of Santiago (the so called poblaciones). The impact of this policy can be clearly observed in the constant increase in the segregation indexes observable almost over the whole military regime. The segregation index decreases considerably only in three years (1979-1980-1981), which correspond to a period of sustained high growth and substantial flattening of the inequality index.

On the other hand, the evidence indicates that the dynamics of inequality and segregation have a common pattern. Sharper segregation is generally followed by increased wage inequality. In order to test this hypothesis we use the Granger causality test. We also measure the magnitude of segregation impact on inequality through OLS estimations.

The evidence shows that the level of segregation is an important determinant of the pattern of inequality. The Granger causality test indicates the existence of a casual nexus between segregation and wage inequality.

Finally, we can infer that segregation dynamics explain roughly 25% of the inequality pattern. This result is a strong confirmation of our hypothesis that Chilean society is heavily affected by segregation, and this acts as a serious constraint on a better-shared pattern of development.

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