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Residential Segregation Effects on Poor's Opportunities in Chile

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1. Introduction

Chile has been on a steady path of economic growth for the last 15 years. However, income inequality indicators are among the highest in the region and have not shown improvement during the growth process. A related problem is the concentration of poor families in geographically adjacent areas within cities, a natural outcome of the operation of demand and supply factors in the land market which has probably been reinforced by the social housing policy. The latter has been successful in reducing the housing deficit by building large conglomerate of dwellings in peripherical areas of the cities taking advantaged of the lower price of the land. This policy responds to cost effectiveness criterion based on market prices, but it has not taken into account eventual costs arising from residential segregation on the opportunities of the poor population since there are no available estimations.

Residential segregation can be understood as the concentration of particular population groups in determined geographical areas within cities. The concentration may run through racial, ethnic, religious or economic lines. In this paper we focus on the segregation along economic lines. More specifically, we divide the population in two groups, poor and non poor, and then we study the impact of segregation on the opportunities of the poor population. The choice of the variable responds to the importance of the economic dimension in the structure of inequality in Chile.[1]

Residential segregation represents a relevant policy issue only if it affects the opportunities or the welfare of the population. Otherwise, it is just another characteristic of poverty without having independent effect on variables such as income, education, health and other related. In addition, the empirical identification of the effects of residential segregation on opportunities is of academic interest as it expands the knowledge about the social ordering.

The empirical evidence which is available for other countries indicates that there are negative effects of segregation. The minority populations that live in areas of segregated areas of the cities face additional disadvantages to likewise population who live in less segregated neighborhoods. Segregation affects particularly children and young. Thus, children that grow in segregated neighborhoods present disadvantages on educational achievements and on health compared to children that grow up in non segregated neighborhoods, after controlling for relevant socioeconomic factors. Similarly, youths who live in more segregated areas present greater

[1] Ethnicity is another variable that could be relevant in this context. However, according to the 2002 population census only 4.5% of the population self reported as belonging to an original ethnic.

problems in school drop out, criminality, drugs and teenager pregnancy, in relation to control groups who live in less segregated areas.

The objective of the paper is to statistically identify whether the spatial concentration of poverty – also called residential segregation- affect the opportunities of the poor in Chile. The dimensions of opportunities are basically two: factors related to the formation of human capital and factors that facilitate the insertion in the labor market. Specifically we study the effect of residential segregation in the following variables: preschool education attendance, school drop out, school performance proxied by lagging behind grades, teenager pregnancy, single motherhood, labor inactivity of the young population and health condition of the working age population.

Education represents the main channel of social mobility since it provides social and labor skills that allow people to have access to better paid jobs and it contributes to make better decisions in aspects as health, nutrition, fertility, marriage and other dimensions of the welfare. The access to quality jobs is another important source of opportunities, since it contributes directly to household income and represents the most important channel of social inclusion. The health status is not only one of the most important dimensions of welfare, but it is also crucial to better results in education and labor market insertion. In turn, adolescent pregnancy and single mother conditions affect negatively mothers' possibilities of studying and working, and therefore the future prospects of their children. Poor households are likely to have disadvantages in all the dimensions of opportunities above mentioned.

To analyze the relationship between segregation and opportunities we compute measures of residential segregation of socioeconomic type for the years 1992 and 2002 at the city level. The data comes from the random samples of the population censuses of the respective years. The census is the only data source which is suited to derive measures of residential segregation as it is representative of the different section of cities. However, the census lacks income data, preventing the classification of households in poor and non poor categories utilizing the traditional definition of poverty. Instead, we construct proxy measures of poverty on the basis of three different socioeconomic indices than can be built from the census data.

The measure of segregation utilized in the paper is the index of dissimilarity, which previous studies have shown that correlates well with other available indicators of segregation. Considering sampling restrictions, the analysis is undertaken for the 26 Chilean cities with more

100.000 habitants (in year 2002). The resulting ranking of cities according to the measure of segregation differs from the ranking of cities along poverty or income inequality lines, showing that segregation is a different dimension of the underlying distribution of welfare.

Then, each outcome variable is regressed on the measure of segregation, an interactive variable between segregation and individual poverty, and a set of individual, household and city level control variables. The coefficient of the first variable reports whether there is an association between segregation and the outcome variable at the level of the general population, whereas the coefficient in the interactive term picks up specific associations for the poor population.

The purpose of the research is to identify whether there are causal effects of segregation on the outcome variables. In other words, we would like to establish that segregation causes an outcome variable rather that there is an association between both variables. The identification of causal relationship in econometric analysis requires that some statistical conditions be met. The most relevant requirement is that right hand side variables are not endogenous in the equation.

In our context the identification of the causal effect of residential segregation on individual outcomes can be prevented by shortcomings in the data set or in the estimation methodology. There are three main sources of problems at this respect. First, the location of the residence can be driven by unobservable factors related to the individual outcomes; families that live in the same neighborhood can share non observable traits that bias the estimated coefficients in the segregation equation. Second, there can be idiosyncratic factors that affect a particular geographical area; for instance, a draught can lower regional household incomes and bias the estimated coefficients if it is not accounted for. Third, poverty can be a cause as well an effect of other socioeconomic outcomes.

To deal with these issues the estimation strategy includes three important features. First, the city is considered as the unit of reference to measure segregation, minimizing the endogenous choice of location that can be present at the level of neighborhoods within cities. Second, the preferred econometric specification consists of repeated cross section data that allow to control for observable and non observable city fixed factors. Third, most of the outcome variables refers to opportunities for the children and the young, minimizing the reverse causation between poverty and the outcome variables.

The results suggest that segregation would have negative effects on most dimensions of the opportunities of the poor. Segregation would make more likely that the poor children do not attend preschool education, lag behind grades in school and drop out from schools. Segregation would also make more likely that the non student young from poor households do not participate in the labor force. On the other hand, segregation does not seem to have an effect on the probabilities of teenager pregnancy, young adult mothers being single or the health status of the working age population.

The rest of the paper is organized in as follows. Section 2 presents a summary literature review. Section 3 presents the research methodology and estimation strategy. Section 4 deals with the construction of the segregation indicators, discusses their characteristics, and presents the outcome variables. Section 5 shows and discusses the estimation results. Section 6 concludes.

1. Literature Review

The analysis of the socioeconomic effects of segregation on the opportunities of the poor is novel in the country. Some previous studies such as Sabatini et al (2000) and Rodriguez (2001) have presented data that correlate residential segregation in Chilean cities with some socioeconomic outcomes. However, these studies are based on within cities data and the cited correlations can be originated in third factors if there is sorting across neighborhoods based on non observable characteristics. In the Latin American region there is also scant evidence on the effects of segregation on socioeconomic variables. An important exception is represented by the work of Gray, Perez de Rada and Jimenez (2003) who analyzes segregation in various Bolivian cities.

More generally, there are two types of references in the economic literature which are relevant to the present research. First, theoretical works related to the formation of neighborhoods and location of habitants in cities. Second, empirical works which attempt to estimate parameters that relate residential segregation indicators and socioeconomic outcomes.

The theoretical and empirical strands of literature have not been well connected yet. In general terms, the theoretical models have not been empirically tested and the applied work has focused on estimating causal effects between segregation and outcomes in the context of experimental and quasi experimental data.

The channels through which the effects of segregation theoretically work are of the type of social interactions: role models, peer effects, social networks, information networks, social capital, and others related. The theoretical literature has been focused on modeling how the interaction of individual preferences, expectations and restrictions can lead to different paths of inequality, segregation and growth.

Manksi (1995) classifies interaction effects in terms of their consequences on preferences, expectations and constraints. Interaction in preferences occurs when the preference ordering depends on the behavior of other agents. For instance, the probability than a young person gets involved in illicit activities will depend, among other variables, on the stigma associated to that condition, which itself is a function of the number of people presenting that behavior in the neighborhood. The more frequent the behavior, the less the associated stigma and the more likely its adoption by other agents.

The second channel occurs through the interaction of expectations. An individual forms its expectations based on other people´s actions and associated consequences. For example, it is more likely than a young person starts consuming drugs if other young people in the neighborhood are already consuming drugs without experiencing any problems from that action. The third channel is interactions in constraints. In the case of an action which is forbidden by law, a greater number of people breaking the law reduces the probability of being arrested (with fixed enforcement resources) and lowers the expected cost of performing that action.

The theoretical work written by economists has attempted to explain the existence of segregation as one possible outcome in equilibrium models of residential location. One prominent example is Becker and Murphy (2000) who develop a stylized model of residential equilibrium for two types of agents and tow type of locations within a city. Agents maximize preferences that depend on the type of neighbor and residential area; the price of houses is an endogenous variable that determines the model equilibrium. This can be traced to the parameters of the model and is of three possible types: total integration, partial integration or total segregation.

Benabou (1993) models the links between residential choice, education and productivity within a city that includes several communities. Residential segregation can be caused by human capital complementarities, although a most efficient equilibrium can result under integration. Under a separation equilibrium low productivity workers can be displaced from the labor force. The same author (Benabou (1996)) develops a model based on the formation of communities and human capital accumulation with externalities to analyze the sources of segregation and its effects on efficiency and equity. Small differences in initial endowments, preferences and access to capital markets can result in a segregation equilibrium, under which income inequality persists across generations. On the other hand, Brock and Durlauf (2002) develop a model of individual choice in the context of neighborhood effects. The latter consist in the interrelationship between individual choice and agents characteristics within a common neighborhood. The work generalizes a model of binary choice previously developed by the authors and can be econometrically estimated.

The empirical literature is by far more developed than the theoretical work, although most of the studies have been conducted in the US and as such have been focused on racial segregation. We are particularly interested in studies that have estimated the effects of residential segregation on socioeconomic outcomes. Next we cite some of the most relevant studies along this line of work.

Perhaps the closest methodological reference to the present research is the work of Cutler and Glaeser (1997), who estimate the effects of racial segregation in US cities on education, labor market and single motherhood. The authors find that segregation has significant negative effects on the outcomes for African American. Those who live in more segregated cities have worse socioeconomic outcomes that those living in less segregated cities, other factors kept constant.

Vartanian and Gelason (1999) relate the educational outcome of people at the age of 25 to the characteristics of the neighborhoods where they live in their adolescence years (14-18), utilizing the longitudinal data from the PSID. The results show that the characteristics of neighborhoods affect the future educational outcomes in ways that depend on race. Neighborhoods with a higher number of bi-parental families and a higher rate of employment in professional or managerial positions contribute positively to the probability that black student complete secondary education of the black students. However, these neighborhoods are shown to contribute to college graduation only in the case of white students.

Harding (2003) studies the causal effect of neighborhoods on school drop out and adolescent motherhood on a sample of two comparable groups at the age of 10 but living in separate neighborhoods. Those who live in high poverty neighborhoods are more likely to drop out from school and –in the case of female- get pregnant in the adolescent years. The authors explore potential selection effects arising from non observable factors, concluding that these would have to be surprisingly large to explain the relationship between neighborhoods and socioeconomic outcomes.

Gunther, Wolfe and Itaveman (2000) review available estimates of the effects of neighborhoods on the outcome of children, establishing that there is a large variance in the results which can responds to differences in data, methodologies and the specification of family characteristics. The authors report results for secondary education completion, years of schooling and adolescent motherhood from the PSID. They conclude the identification of neighborhood effects require to fully control by individual and family characteristics.

Roux (2001) reviews the empirical literature of the effects of neighborhoods on health outcomes. Several types of studies have been conducted, including ecological studies that relate geographical characteristics with mortality and morbidity rates, contextual analysis and multilevel analysis that relate the socioeconomic environment with health outcomes. According to this author, more robust inferences about the relationship between neighborhoods and health status require the development of theories and hypothesis on the specific channels that relate neighborhood and individual factors with health.

A second branch of studies in the US are those related to the evaluation of programs which relocate disadvantaged families who live in high risk neighborhoods. A special mention deserves the program Moving to Opportunity (MTO), which finances the reallocation of resident from neighborhoods with high poverty to middle income neighborhoods. The program chooses randomly its beneficiaries, originating exogenous variation among participants and non participant and allowing the estimation of the causal effect of the program within an experimental setting. Several recent studies have reported positive effects of Moving to Opportunity Program. Kling, Luwdig and Katz (2005) show a reduction in the arrests of young men for violent crime, but increases in behavioral problems and crimes against the property. Leventhal and Brooks-Gunn (2003) identify a significant improvement on mental health of children and adults. Ludwig, Duncan and Pinkston (2005) find a significant decrease on the dependence of social assistance which can be traced to MTO.

2. **Research methodology**

The empirical identification strategy consists in the estimation of a fixed effect model based on repeated cross section samples. The equation to be estimated is the following:

$$Y_{ict} = \alpha + \beta X_{ict} + \gamma X_{ct} + \varphi S_{ict} + \delta\left(S_{ct} \cdot P_{ict}\right) + \lambda Z_c + \theta Z_t + \mu_{ict} \qquad (1)$$

Where Y_{ict} is the outcome variable for person i that lives in city c at time t; X_{ict} is a vector of individual control variables for person i; X_{ct} is a vector of city control variables at time t; S_{ct} is the segregation index for the city c where i lives at time t; P_{ict} is a dummy variable that takes value 1 if the person is poor and 0 if otherwise at time t; Z_c is a vector of city fixed effect and Z_t is a time fixed effect.

The methodology attempts to control for those specific city factors that affect the outcome Y and remain invariable over time during the period of evaluation. In particular, the methodology controls for those unobservable fixed factors that can cause correlation between segregation S and Y.

The individual outcome variables are the following: (i) preschool attendance; (ii) school drop out; (iii) student lagging behind in schools; (iv) adolescent mother; (v) single mother; (v) economic inactivity of young adult; and (vi) health condition of the working age population.

In the estimation of (1), the φ parameter represents the effect of segregation on the outcome Y for the general population, while parameter δ is the differential effect on the outcome Y for the poor population.

The role of the X vector is to control statistically the relationship between segregation and the outcome variable. The X vector should include every factor which is related to the outcome Y and the poverty status (P) or the segregation variable (S). Otherwise the estimation of the parameters of interest (φ and) will be biased and inconsistent. It is worth noting that it is not necessary to control for every variable that is related to the outcome Y, but only those variables that are simultaneously related with S or P. Notice also that we are not interested in estimating an structural model of Y, but only in determining whether there is an effect of segregation on the outcome variable.

Sources of Biases

The identification of the effect of residential segregation on individual outcomes can be prevented by shortcomings in the data set or in the estimation methodology. There are three main sources of problems at this respect. First, the choice of location of the residence can be driven by unobservable factors related to the individual outcomes; families that live in the same neighborhood can share non observable traits that bias the estimated coefficients in the segregation equation. Second, there can be idiosyncratic factors that affect a particular geographical area; for instance, a draught can lower regional household incomes and bias the estimated coefficients if it is not accounted for. Third, poverty can be a cause as well an effect of other socioeconomic outcomes. For instance, the lack of income can contribute to bad health through diverse channels (lack of access to medical services, living in a polluted areas, unhealthy life styles, etc); likewise, health problems can affect income generating capacities or drain the financial resources of the family, increasing the probability of poverty. In statistics terms we could have reverse causation problems in the segregation equation.

Sorting of Individual by Unobservable Factors

Individual or family sorting across geographical areas is a very likely situation. People who live in the same neighborhood tend to share common characteristics. The whole idea of socioeconomic segregation is based on the fact that low income families live in different city sections than middle class or rich families. It follows that a socioeconomic outcome like school drop out will not be randomly distributed across a city, but it will be higher in those areas that concentrate individuals who are more likely to drop out from school. This fact does not represent a problem as long as we can control for these characteristics in the equation that relates segregation and school drop out. However, it is safe to assume that there are unobservable factors that are common within neighborhoods and that make more likely that students drop out from school. In this case the estimated parameter of the segregation variable will pick up this effect and we might misinterpret an effect that arises from individual characteristics as one associated with segregation (group interactions).

The choice of the city as unit of reference responds precisely to the objective of minimizing the presence of individual sorting due to unobservable factors in equation (1). This is, unobservable factors which are correlated with the location of the dwelling and with the outcome variable are less likely to be present at the city level. This approach is followed by Cutler and Glassear (1997).[2] This could be illustrated by the case of families that on behalf of the welfare of their children decide to move out from of a rising crime neighborhood (driven by non observable characteristics), but they do not need to change the city of residence to find a safer place where to live.

An indirect indicator of the importance of inter city migration can be derived from the census data. This reports the place of residence at present time and five years ago. From this data it can be estimated the percentage of families that have changed cities in the five years previous to the census year.

Table 1 shows the distribution of household heads in 2002 according to the place of residence five year ago and socioeconomic status. There are 27 “places of residence” under consideration: 26 major cities (over 100.000 habitants) and 1 “other place”, which accounts for smaller cities, towns, rural areas and abroad. The socioeconomic status is approximated by years of schooling adjusted by age, which is an exogenous variable with respect to whether they move or not across places of residence in the previous five year period.

Thus, 91.9% of family heads in 2002 had not changes place of residence between 1997 and 2002, 2.9% had moved across major cities, 3.1% had moved to a city from abroad or smaller towns, and 2.1% had moved from a major city to a smaller location. Considering only the family heads that belong to the lower 25% SES –i.e., the poor population- the respective percentages are 94.7%, 1.1%, 2.3% and 1.9%. It follows that internal migration does not seem to be large in the case of the poor population.

Choosing the city as a unit of reference has a cost in terms of statistical variance. The census data would allow us to work with a much larger number of census tracks or districts, which are much larger figures than the 26 cities which are actually considered.[3] As a matter of fact, it is not

[2] In addition to that, these authors estimate the segregation equation utilizing instrumental variables. However, the estimated coefficients are basically unchanged compared to those from the cities fixed effect specification.

[3] This would imply to work with the census data in the estimations, which it is feasible but not the best option regarding the availability of variables.

uncommon to find articles written by non economists that study the effect of residential segregation based on smaller geographical units than cities. However, it is very likely that the results reported in these articles are biased estimates of the true parameters to the extent that individuals do sort across neighborhoods in response to both observable and non observable factors.

Table 1:

Household heads in 2002 according to place of residence at present and five year ago (%)

Socioeconomic Quartile	No change in place of residence	Moved from one city to another city	Moved from other place to city	Moved from city to other place	Total
1	94.7	1.1	2.3	1.9	100.0
2	92.1	2.8	3.0	2.2	100.0
3	91.7	3.3	3.0	2.0	100.0
4	88.2	5.5	3.9	2.5	100.0
Total	92.0	2.9	3.0	2.1	100.0

Source: own computations based on 5% random sample of the 2002 Population Census
Note: There are 27 “places of residence”: 26 major cities and 1 “other place” (rural, small town, abroad). The table considers all household heads living in the country in 2002.

Idiosyncratic characteristics of cities

To control for idiosyncratic characteristics of cities we regress individual outcomes on residential segregation correcting for city and time fixed effect. Using repeated cross-sections and city fixed effects allows us to take into account city characteristics that do not change over time, such as geographical location or climate. On the other hand, the time fixed effect deals with changes over time that affect all cities, such as macroeconomic recessions or overall economic growth.

However the above strategy does not take into account individual city characteristics that change over the period of analysis, such as local market labor conditions. To deal with this issue we include three control variables at the city level: the unemployment rate, the total population of the city and percentage of poverty[4]. These variables should pick up most of the variations in local conditions that affect the individual outcomes of the poor population.

[4] Following Sanhueza (2005) it would be possible to add an index of labour demand shocks at city level.

Endogeneity of Poverty Condition

Poverty is related to social, cultural, demographic and economic factors in an interwoven net of complex relationships. This makes poverty an endogenous variable in many settings. In the example already cited, poverty can be a cause as well an effect of ill health. Thus, regressing the poverty condition on a measure of health status is subject to reverse causality. The estimated coefficient will account for the statistical association between both variables, but cannot be given a causal interpretation.

In our case we are not interested in the direct relationship between poverty and other individual outcomes, but in the relation between segregation and such outcome. In this equation individual poverty is included in an interaction mode with the measure of segregation. The question is whether there is any bias because of the endogenous nature of poverty in this specification.

Most of our individual outcome variables relate to the opportunities that face the children and young people in poor households. This is the case of variables as preschool attendance, school performance, school drop out, teenager motherhood and economic inactivity of young people. In these cases the causality clearly runs from household poverty to the individual outcomes and not the other way around, so there is no an endogeneity problem to worry about.

The situation is different in the case of the probability of being a single mother for the young adult female population and the health status of the working age population. The issue will be addressed when discussing the results.

3.- Residential segregation in Chilean cities

The index of dissimilarity

There are several indicators that can be used to measure the degree of residential segregation. The indicator which can be most frequently found in the literature is the dissimilarity index, which is utilized in the present research. The dissimilarity index varies between 0 and 1. The value 0 represents the case of no segregation. It happens when each zone within the city has equal fraction of poor population, and this is distributed in a homogeneous pattern through the zones of the city. On the other hand, values of the index close to 1 represent cases of high residential segregation, where the poor population is concentrated in isolated areas of the city.

For each city the dissimilarity index is calculated as:

$$S_c = 0.5 \sum_{j=1}^{J} j \left| \frac{Poor_j}{Poor} - \frac{No\ Poor_j}{No\ Poor} \right| \tag{2}$$

Where $j=1,\ldots,J$ are census tracks within city c.

The main advantage of the dissimilarity index is the ease of computation and interpretation. Moreover, it allows the comparison of results across studies which are based on this frequently utilized index. Its main drawback is its limitation to dichotomies, but this is not an issue for this study as it focuses in the poor/non poor categorization.

One further reason for utilizing the dissimilarity index is its high correlation with other segregation measures. The recent census report on racial and ethnic segregation in the US (Iceland, Weinberg and Steinmetz, 2002) is based on 19 measures of residential segregation, which account for most of the alternatives developed in the literature since 1950´s. Among those the authors chose five leading indicators. One important conclusion of this report is that the results were robust with respect to these leading indicators and that the dissimilarity index was a good summary of those.

Data Sources

This research is based on two main data sets. The computation of the residential segregation indicator requires working with data from the population Census. On the other hand, the econometric analysis is based on outcome and control variables which are drawn from the Casen household surveys (see Section 4). It must be noticed that household surveys are not well suited to calculate measures of the residential segregation, since they are based on representative samples of the population but not of geographical areas.

We have access to a 5% random sample of the 1992 and 2002 Population Censuses, which allows the computation of the dissimilarity index for these years. The census samples include around 780,000 individual observations in year 2002 and around 693,000 in year 1992. The segregation indicator is estimated at city level, considering cities or metropolitan areas with more than 100.000 habitants in 2002. This results in a total of 26 cities. The basic unit in the calculation of residential segregation is the census tract, which constitutes a geographical subdivision of the municipality. There are 2,647 tracts within the 26 cities, with a median population of 3,442 people (year 2002)[5].

The socioeconomic indexes and the definition of poverty

To compute the indicator of segregation in expression (2) the population has to be classified in poor and non poor subgroups at census track level. The traditional measurement of poverty is based on per capita income or per capita spending; so that a household is identified as poor if its per capita income (spending) is lower than the poverty line. However, the census does not include data on household income so that it is not possible to compute the segregation indicator on the basis of income poverty. Instead we work with three proxies of socioeconomic status (SES) based on census data and utilize their respective cumulative distributions to classify the population between poor and non poor categories.

Our first indicator is a socioeconomic index (SES_1) which was computed by the Chilean National Statistical Office through principal components analysis. As it is well known, principal components creates a new variable that contains the common information provided by a set of N variables. In our case, the estimated variable is the SES_1 index and the N vector includes all census variables that correlate with the socioeconomic status. These are a total of 24 variables which belong to the dimensions of education, employment, housing, basic infrastructure, geographical area and durable goods in the household. Most of the education and employment variables belong to characteristics of the household head.[6]

[5] The number of inhabitants which is utilized as threshold in the selection of cities is arbitrary but related to sampling considerations. The same threshold was used by Cutler and Glaeser (1997) in the study of racial segregation in US metropolitan areas. It was suggested to consider cities with a few more habitants however cities with less population have not an representative sample in CASEN Survey.

[6] See Guerrero (2003)

The second indicator is computed on the basis of the number of durable goods owned by the household and the schooling of the head. There are 8 schooling categories and 10 durable goods categories (0, 1….. 9 or more), resulting in 80 household subgroups.[7] For each subgroup we compute the associated mean per capita household income, utilizing the Casen survey where all these variables are also reported. Based on this ranking we compute the SES_2 variable in the Census data as an ordinal index and we rank the population along this index.[8] See Tables A-1 and A-4 in the Annex A for more details about the construction of the SES_2 index.

The third indicator is a predictor of household per capita income based on human capital variables. The prediction is based on estimating Mincer equations in the Casen survey data for occupied male and female earners; then we utilize the estimated coefficients to predict labor income for each occupied person in the Census data. We also predict pension income by regressing the actual pension in a set of socioeconomic and demographic variables in the Casen survey and then imputing pension income for each retired person in the Census data. Next, we proceed to aggregate predicted income at the household level and divide the total sum by the number of household members. The resulting predictor of household per capita income is denominated SES_3.

The following step is to identify the poor population. For this purpose we define as poor those households for which the respective socioeconomic index is below the poverty line. The latter is defined as the cutoff of the cumulative distribution for urban households at the 30th percentile. We apply the same poverty line in years 1992 and 2002, which is akin to work with a constant relative poverty line in the context of unchanged income inequality during the 1992-2002 period.

This approach differs from the official statistics of poverty, according to which the percentage of poor population decreased from 32.6% in 1992 to 18.8% in 2003. The official statistics are based on a poverty line which has been kept fixed in real terms since the year 1987. The value of this poverty line was computed as the cost of purchasing a bundle of commodities which covered a set of basic needs on the basis of an expenditure survey in 1986. The monthly official poverty line is equivalent to US$ 78 in per capita terms in urban areas and to US$ 55 in rural areas.[9]

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[7] The following durable goods are included in the index: refrigerator, washing machine, microwave, personal computer (only 2003), water heating, internet (2003), TV cable (only 2003), video, TV color, telephone and vehicle.

[8] Alternatively, we could have computed a cardinal index utilizing the income metric, but this is not needed in the subsequent utilization of the variable.

[9] The exchange rate is $ 550 = US$ 1

We followed a different approach for two reasons. First, it can be argued that the official statistics overestimate the decline in poverty in the period of analysis. This follows from utilizing a fixed poverty line in real terms in the context of an economy which has more than doubled its per capita income since 1987. To the extent that there is a relative component in needs it follows that the poverty line should be adjusted after significant and permanent changes in per capita income. Cross country data shows that poverty line and per capita income are positively correlated, reflecting than countries do adjust their poverty line as they develop. Second, and more important for this research, to the extent that household income has an important transitory component the measurement of poverty based on cross section data is subject to inclusion and exclusion errors.

From the above arguments it follows that the official measurement of poverty represents only an approximation to the identification and aggregation of the actual poor. Our choice of utilizing fixed percentiles of the distribution function for identifying the poor is an alternative and more conservative approximation. Now, utilizing one or another poverty line is not an essential issue in the context of the present research and it is very unlikely that the results are sensible to this choice. Anyhow, a reader who feels uncomfortable with our choice of the poverty line may prefer to interpret our study as the effect of segregation on the opportunities of the low income population (rather than the poor).

The measure of segregation

The last step is to compute the segregation measures for each socioeconomic indicator. This is done by applying expression (2) in each case, which renders the dissimilarity index of segregation. The computation excludes census tracks with less than 30 households in the 5% census sample, in order to get reasonably stable estimates of the indicators. About 92% of the sample belongs to census tracks with more than 30 households in the 5% sample, so it is unlikely that its exclusion affects the results.

Tables B-1 to B-3 in Annex B present the estimates of the segregation and poverty indicator at city level. Table 2 in the main text summarizes this information by reporting the correlation coefficients across the different indicators for the segregation measures. Table 3 does the same procedure for the poverty measures. The correlation coefficients show that the three SES indices are related but they do not represent identical measures of segregation or poverty. Therefore, it is advisable to base the analysis on the three indicators, as these indices are proxies of the true underlying socioeconomic dimension.

Table 2:

Correlation coefficient matrix for segregation measures 1992 and 2002

	SES-1 92	SES-2 92	SES-3 92	SES-1 02	SES-2 02	SES-3 03
SES-1 92	1					
SES-2 92	0.71	1				
SES-3 92	0.62	0.55	1			
SES-4 02	0.57	0.64	0.63	1		
SES-5 02	0.33	0.71	0.43	0.58	1	
SES-6 02	0.41	0.48	0.83	0.82	0.55	1

Table 3:

Correlation coefficient matrix for poverty measures 1992 and 2002

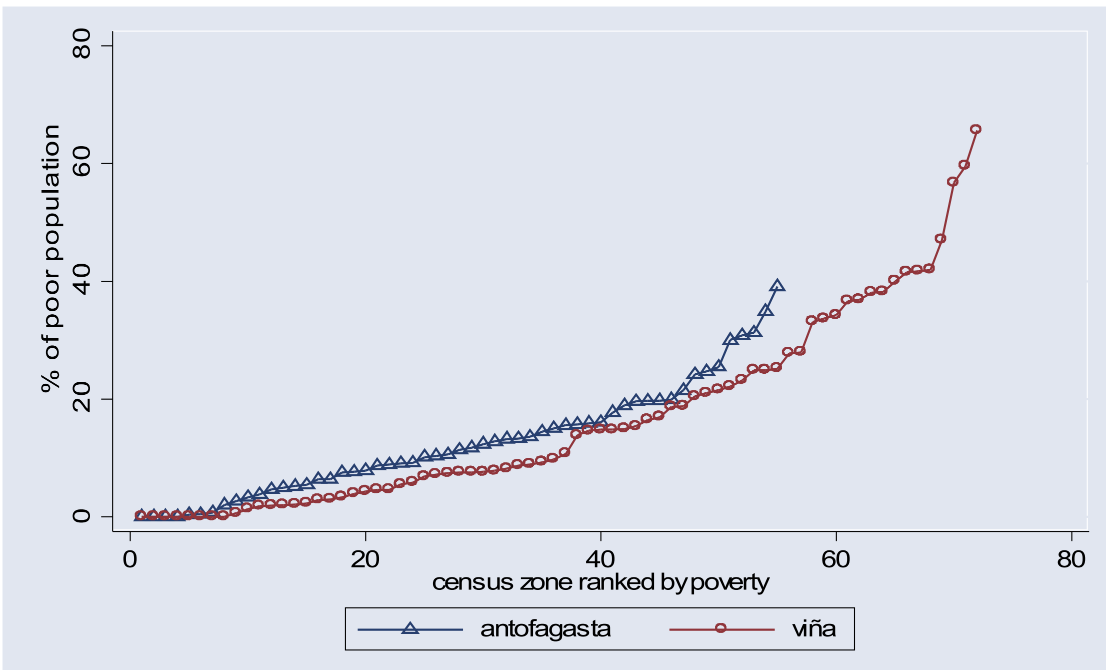
	SES-1 92	SES-2 92	SES-3 92	SES-1 02	SES-2 02	SES-3 03
SES-1 92	1					
SES-2 92	0.64	1				
SES-3 92	0.9	0.75	1			
SES-4 02	0.96	0.66	0.85	1		
SES-5 02	0.66	0.92	0.75	0.69	1	
SES-6 02	0.82	0.78	0.91	0.84	0.78	1

Segregation in Chilean cities

Finally we illustrate the working of the segregation index in the case of the cities of Antofagasta and Viña in year 2002 (Figure 1). The example is based on SES-1, but a similar picture applies to the other indicators. The segregation index is equal to 0.303 for Antofagasta and to 0.442 for Viña. Thus, Viña is more segregated city than Antofagasta. On the other hand, both cities exhibit a similar proportion of poor households.

Recall that the measure of segregation is based on the poverty headcount at census track level. Then, we show in the horizontal axis of Figure 1 the census tracks ranked by the poverty headcount, from less poverty to more poverty. The vertical axis shows the corresponding poverty headcount.

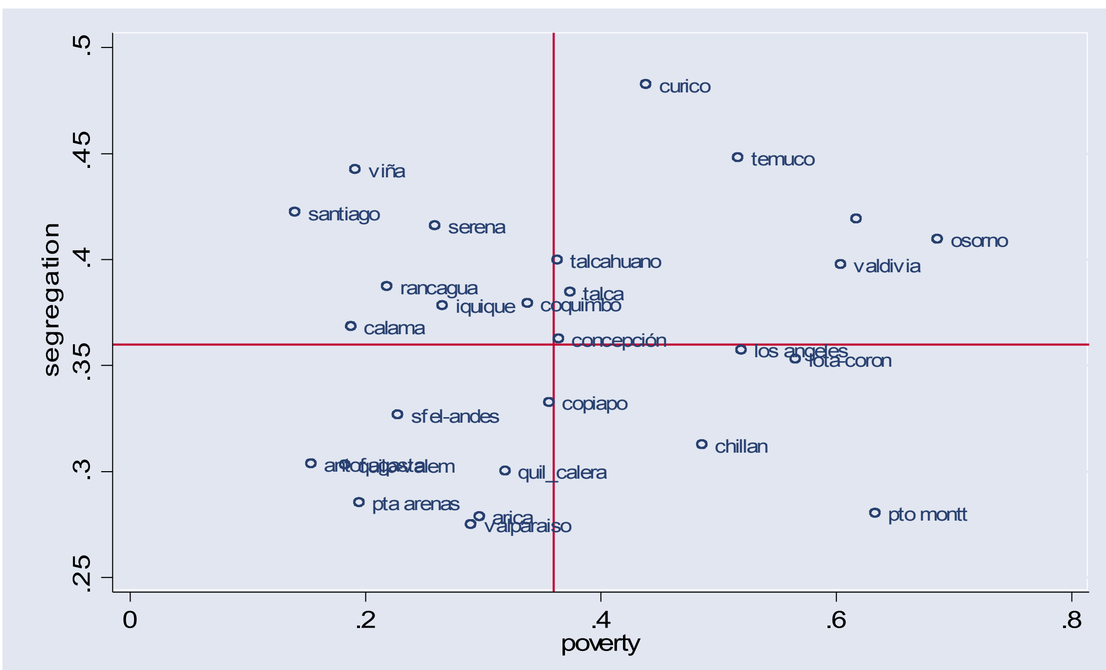
Figure 1:
Segregation in the cities of Antofagasta and Viña, 2002
(% of poor population by census tracks)



It should be clear from Figure 1 that residential segregation is higher in the city of Viña. This is because Viña has census tracks with very low proportion of poverty and others with quite large proportion of poverty. Instead, Antofagasta has a more balanced distribution of the poor population across census tracks. Thus, Viña tends to segregate its poor population in specific areas of the city while Antofagasta presents a more homogenous geographical pattern regarding the location of the poor. Keep in mind that average poverty is similar in both cities.

Figure 2 shows the relationship between segregation (vertical axis) and the poverty headcount (horizontal axes) for the Chilean cities with more than 100,000 inhabitants. The data corresponds to the SES_1 index in 2002, but a similar picture characterizes the relationship between segregation and poverty for the other indicators or period. The cities in Figure 2 are divided in four quadrants: high segregation and high poverty (for instance, Osorno); high segregation and low poverty (Santiago); low segregation and low poverty (Punta Arenas); and low segregation and high poverty (Puerto Montt). Notice that the labels "high" and "low" do not have normative meaning, but they just indicate above or below the respective mean.

Figure 2: Segregation and Poverty in Chilean cities over 100,000 habs, 2003



Anyhow, the data in Figure 2 suggests that segregation and poverty are not related in any systematic way. The most segregated cities are not necessarily the cities with the highest incidence of poverty. Therefore, segregation and poverty address different dimensions of the latent socioeconomic inequality.

4.- Outcome Variables

In this paper we study the effect of residential segregation on seven outcome variables related to the opportunities of the poor population in Chile: preschool attendance, school drop out, school performance, economic inactivity, adolescent mother, single mother and health status.

Education represents the main channel of social mobility since it provides social and labor skills that allow people to have access to better paid jobs and it contributes to make better decisions in aspects as health, nutrition, fertility, marriage and other dimensions of the welfare. The access to quality jobs is another important source of opportunities, since it contributes directly to household income and represents the most important channel of social inclusion. The health status is not only one of the most important dimensions of welfare, but it is also crucial to better results in education and labor market insertion. In turn, adolescent pregnancy and single mother status affect negatively mothers' possibilities of studying and working, and therefore the future prospects of their children. Poor households are likely to have disadvantages in all the dimensions of opportunities above mentioned.

The choice of the outcome variables responds to analytical considerations, but also to data constraints. One important feature in the estimation strategy is the utilization of fixed effects for which it is required to have repeated cross section data. Moreover, the period of analysis is restricted by the years for which the data on segregation is available: the 1992 and 2002 population censuses. There are only two data sets that satisfy the above conditions: the Casen surveys of 1992 and 2003 and the population censuses themselves. The Casen is the main household survey in the country and as such it is a much richer source of socioeconomic data than the population censuses. Therefore, the econometric analysis is based on the Casen data, to which we add the segregation indicator computed from the Census data.

The Casen is a large sample multi-topic household survey which is taken in the country every two or three years since 1987. We utilize the Casen surveys of 1992 and 2003, which are the closest periods to match the census data. The sample size of the Casen surveys reaches to 143,454 and 257,077 individual observations in these respective years.

The data provided by the Casen surveys in variables such as preschool attendance, school drop out, economic inactivity and adolescent mother is the best we could have on the basis of criteria of sampling and relevance in the Chilean context. We are less enthusiastic with respect to the measures of school attainment, single mother and health status which are provided by the Casen Surveys.

School attainment can be approximated by the difference between grade and age in the Casen data. If such a difference is large then the student is lagging behind grades, which it reflects repetition or late entry to school. Repetition is a direct measure of school performance while late entry is associated with learning difficulties and early drop out. However, a better measure of educational attainment in the Chilean context is given by performance in the national standardized tests (Simce). Unfortunately, the Simce data sets are available from 1998 on, preventing the utilization of this performance indicator in the study.[10]

On the other hand, the Casen survey reports the single mother status at the time of the interview, which can be years after the time of birth. Thus, it is possible that some mothers that were single at the time of birth have gotten a partner later. The Casen data does not allow the identification of the status of single mother in this case. However, a single mother at the time of the interview always identifies a single mother at the time of the birth; a married woman can get divorced or separated, but cannot be single anymore. Therefore, our measure of single mother is subject to some exclusion but not inclusion error.

The health status can be approximated by the response to the question if the person had experienced any health problems in the previous 30 days to the survey interview in the 2003 Casen survey (previous 3 months in the 1992 Casen survey). A better indicator is the general health status, which is the answer to the question: “Do you consider that your general health condition is: very good, good, fair, bad or very bad?”[11] This question is included in the 2003 survey, but not in the 1992 questionnaire, preventing its utilization in the econometric estimations.

[10] The Simce test was introduced the year 1988. However, individual data sets were not available until 1998.

[11] The general health condition has proved to make the best predictions of the actual health status among measured of self reported health status in household surveys (Case and Deaton, 2003).

The main descriptive statistics of the outcome variables are presented in Table 4, which shows the mean, standard deviation and number of observations in the years 1992 and 2003 for the poor, non poor and total population. It must be stressed that the poor are defined in this paper as the population in the three lowest deciles of household per capita incomes. Furthermore, the data in Table 4 considers only the 26 cities which are included in the study of residential segregation.

Preschool attendance is defined as a categorical variable equals to one if a child between 3 and 5 years old is attending school and equals to zero if not attending. The mean of this variable is the proportion of children between 3 and 5 that attends preschool. In 1992 about 39% of this population was attending preschool, with a gap of 13.9 percentage points between the poor and non poor population. In 2003 the preschool coverage had increased to almost 54%, as a result of development in both supply and demand factors. The increase in coverage has benefited relatively more the poor population, making the gap between the poor and non poor to decrease to only 8.7 percentage points.

School drop out is defined as a categorical variable with takes the value one if a person between 18 and 21 years old is not studying and did not graduate from secondary school; the variable is equal to zero if the 18-21 person is studying or has already graduated from secondary school. The choice of the age interval is because the population between 18-21 is old enough to have finished the school cycle; a younger cohort would have many members still studying at school and it would not be known what fraction would actually graduate from secondary school. However, the 18-21 age cohort is not too old so that most of them are still living with their parents and we can access to the socioeconomic data of their parental home.[12]

On the other hand, graduation from secondary school is taken as a reference in the definition of the drop out variable as it represents nowadays a minimum requirement for young people to access to most jobs in the labor market. The latter was the motivation behind a recent law that made the completion of high school mandatory, raising the required years of schooling from 8 to 12.

[12] Only 6.1% of the 18-21 population has formed a household of their own (Casen 2003). Notice that household surveys report the data of the current place of residence; regarding school drop out we are interested in the socioeconomic status of the parental household as this is the place of residence in the school years.

In 1992 almost 30% of the 18-21 population had dropped out from school before completing 12 years of schooling; in 2003 the percentage had halved to only 15.5%. The poor have substantially higher drop out rates than the average -42.2% in 1992 and 27.3% in 2003- a situation that can be addressed to factors such as the pressure to enter the labor market, adolescent pregnancy, lower expected returns to education, and others related.

School performance is measured as a categorical variable which takes the value one if age minus the current grade at school is equal or greater than 8 and zero otherwise. The variable is defined for the population between 15 and 21 who is currently attending school. The usual norm in Chile is that the child enters primary school at the age of five or six, so that the difference between age and grade should not be larger than six. In 1992 17.5% of the 15-21 student population was lagging behind in schools according to the above definition; in 2003 the proportion had declined to 10.9%. Among the population of poor students the proportion that was lagging behind grade was 21.7% and 14.5% in the respective years.

Next we turn to the labor market insertion of the young population. For this purpose we define the categorical variable "economic inactive" which takes the value one if the person is not working, looking for a job or studying. The population of reference is young people between 18 and 25 years old. Notice that the term "inactive" can be misleading because it includes people who are actually working in the production of household services. In any case, 20.8% of the 18-25 population was "inactive" in 1992, decreasing to 15.4% in the year 2003. The proportion of the economically inactive is much higher among the poor population, amounting to 34.4% and 27.5% in the respective years.

The status of adolescent mother is defined in the 14-18 age bracket and includes both actual mothers and pregnant girls. In 1992, 5.2% of the female adolescents were mothers or were expecting a child. The proportion among the poor was 7.9%, which in more than doubled the proportion among the non poor (3.8%). In 2003 the overall mean had risen to 6.8%. Most of the increase occurred in the poor population, where a significant 11.6% of the female population between 14 and 18 was mother or pregnant. About a third of adolescent mothers were single in 1992, but in 2003 the proportion increased to 55%. Only 24% of the adolescent mothers were attending schools, in comparison to 89% of non mothers in the same age bracket (in years 1992 and 2003).

The next variable is single mother, which is defined as a categorical variable equals to one if the person is mother and single and equals to zero if the person is mother and non single. Notice that the latter includes married and non married mothers, as long they live with a partner. The reference group is the female population between 19 and 29 years old. In 1992, 15.2% of the 19-29 mothers were single. In the year 2003 the fraction has increased to a surprisingly 27.4%. This trend obeys to an increase in the number of single mothers but also to a decrease in the fertility among married mothers (Larrañaga, 2007). The gap between poor and non poor single mothers is practically nil in 1992, but amounts to 5.7 percentage points in the year 2003.

The last variable is the probability of being health, which is proxied by the lack of health events in the last period. The reference population is the working age group, comprising people between 15 and 60 years old. The choice of this group responds to the association between health and income generating opportunities. Individuals with ill health are likely to earn less income because their productivity is lower or because they spend longer period out of work. Therefore, the working age population is the appropriate reference group in this case.

Near 79% of the working age population did not report experiencing health events in the last 3 months. In 2003 the figure was close to 90%, but the period of reference is now 30 days. The difference in the definition of the variable is another drawback of our health measure, but this feature is dealt with the year fixed effect in the econometric estimation. Notice that there are not significant differences between the poor and non poor populations regarding their health status.

Table 4: Individual outcomes, descriptive statistics

(all variables are dummies with take the value 1 under the specified condition and 0 otherwise)

	1992			2003		
	mean	Std dev	N	mean	Std dev	N
Preschool attendance						
(Population 3-5)						
Poor	.306	.461	1649	.492	.500	1390
Non poor	.445	.497	2263	.579	.493	1966
all	.389	.488	3912	.546	.498	3356
School drop out						
(population 18-21)						
Poor	.422	.493	1307	.273	.449	1471
Non poor	.253	.435	3447	.109	.313	3445
All	.298	.457	4754	.155	.362	4916
Lag behind in school						
(students 15-21)						
Poor	.217	.412	1195	.145	.352	1611
Non poor	.158	.362	2607	.091	.287	2870
all	.175	.379	3802	.109	.311	4481
Labor inactivity						
(population 18-25)						
Poor	.344	.475	2479	.275	.447	2605
Non poor	.163	.369	6942	.114	.318	6895
All	.208	.406	9421	.154	.361	9500

Source: computations from 1992 and 2003 Casen surveys.
Note: The poor population is defined as those who belong to the three lowest per capita income deciles. The data includes only the population living in the 26 cities considered in the estimations.

Table 4 (continuation): Individual outcomes, descriptive statistics

(all variables are dummies with take the value 1 under the specified condition and 0 otherwise)

	1992			2003		
	mean	Std dev	N	Mean	Std dev	N
Adolescent mother (female pop, 14-18)						
Poor	.079	.270	1008	.116	.320	1164
Non poor	.038	.191	1825	.043	.204	1965
all	.052	.222	2833	.068	.253	3129
Single mother (female pop, 19-29)						
Poor	.152	.357	1414	.314	.464	1159
Non poor	.150	.360	1990	.247	.431	1751
all	.152	.359	3404	.272	.445	2910
Did not have health problems (pop 15-60)						
Poor	0.798	0.401	10458	0.888	0.315	12444
Non poor	0.785	0.410	28365	0.898	0.302	32058
all	0.788	0.408	38823	0.896	0.305	44502

Source: computations from 1992 and 2003 Casen surveys.
Note: The poor population is defined as those who belong to the three lowest per capita income deciles. The data includes only the population living in the 26 cities considered in the estimations.

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5.- Estimates of residential segregation effects

This section presents the results the econometric estimations of equation (1). For each one of the outcome variables four specifications were estimated: (i) year 1992; (ii) year 2002; (iii) years 1992 and 2002 with time fixed effect; (iv) years 1992 and 2002 with time and city fixed effects.

The latter is the preferred specification because it is less prone to biases that can from endogeneities in the segregation variable, as already explained in the methodology section.

We also run separate regressions for each of the specifications of the segregation variable and their associated socioeconomic index. Considering the four previous specifications, there is a total of 12 (3*4) estimations for each outcome variable.

All equations contain dichotomous (0, 1) dependent variables and are estimated by probit regressions. The tables in the main text report only the parameters of interest, which are those associated to the segregation variable and to the interaction between city segregation and individual poverty. Tables that contain the full results can be found in the Annex. All tables show marginal coefficients, which report the change in the probability of the outcome variable for a change in the right hand side variable.

Also, all specifications utilize a practically common set of control variables. These include individual characteristics as gender, age and years of schooling; household variables as per capita income, years of schooling of the head, number of members and number of members with less than 18 years old; and city level variables including the unemployment rate, total population and percentage of poor. There are cases when one or other control must be excluded from the estimation (as gender in single mothers and adolescent mother equations). Table 5 shows the descriptive statistics of the control variables.

Table 5: Control variables, descriptive statistics

	1992		2003	
	mean	Std dev	mean	Std dev
Household p/c income, $2003	133.5	236.9	173.6	381.1
Household size	4.75	1.98	4.59	1.92

Number of children 0-18 in hh	1.85	1.45	1.65	1.36
Years of schooling hh head	9.46	4.01	10.79	3.89
Age	29.3	20.2	31.5	20.6
female	.520	.499	.517	.499
Unemployment in city	0.057	0.205	0.102	0.019
Population in city	260.2	2294.9	314.4	2715.6
% poor in city	.289	.088	.281	.073

Source: Computations based in 1992 and 2003 Casen surveys

Pre-school Attendance

Table 6 shows the main results of the estimation of the preschool attendance equation. Residential segregation does not have an impact on this outcome variable at the general population level: none of the twelve specifications exhibit a statistically significant parameter associated to the segregation variable. However, residential segregation does have a significant effect on the probability that children from poor households attend preschool education. This result is robust to the measure of segregation measures and the period of estimation.

Thus, children that belong to poor households have a smaller probability of attending preschool education if they live in a more segregated city as compared to children from poor households who live in less segregated cities. The size of the effect is quite stable across specifications. On average, there is a difference of 4.75 percentage points in the probability of attending preschool between the least and most segregated city, other factors kept constant.[13]

The full regression results are presented in Table C-1 in Annex C. In general terms, all variables show the expected signs, although most of them are not statistically significant. The most relevant of the control variables are the household per capita income, the schooling of the head of the household, the age of the child and the population of the city (bigger cities exhibit higher preschool attendance).

Table 6: Effects of segregation on preschool attendance

[13] This number comes from multiplying the average distance in the segregation measure between the most and least segregated city (0.25) by the marginal coefficient in the preferred specification (0.19, averaging the three SES indexes).

Probability Attending Pre-School CASEN 1992-2002

	1992	2002	1992-2002	1992-2002
INE Index (SES_1)				
Segregation	-0.261	-0.152	-0.142	0.440
	(1.386)	(0.648)	(0.961)	(1.320)
Poor*Segregation	-0.159**	-0.130*	-0.159**	-0.156**
	(3.371)	(2.246)	(4.229)	(4.128)
Durable Goods Index (SES_2)				
Segregation	-0.013	-0.035	-0.064	0.266
	(0.073)	(0.153)	(0.453)	(0.585)
Poor*Segregation	-0.167**	-0.140*	-0.167**	-0.163**
	(3.209)	(2.236)	(4.079)	(3.960)
Human Capital Index (SES_3)				
Segregation	0.015	-0.210	-0.116	-0.026
	(0.060)	(0.744)	(0.610)	(0.056)
Poor*Segregation	-0.248**	-0.219*	-0.244**	-0.239**
	(3.182)	(2.420)	(4.048)	(3.937)
Observations	3893	3339	7232	7232
Year Fixed Effect			yes	yes
City Fixed Effect				yes

p values in parentheses
* significant at 5%; ** significant at 1%

Note: Probit estimates. Dependent Variable is equal to 1 if person between 3 and 5 and is attending school, 0 if not attending school. All regressions include the following controls: per capita household income, years of schooling of the head of the household, household size, number of children in the household, dummy for female individual, age, total population of the city, percenatge of poor population in the city, unemployment rate in the city.

School drop out

The effects of residential segregation on school drop out are studied for the population between 18 and 21. The main results of the estimations are presented in Table 7. The results are less clear cut than in the previous case, but they are still conclusive.

Residential segregation has a statistically relevant effect on the outcome variable for the general population in most of the estimated specifications, but the sign of the parameters is negative and as such opposite to expected. However, in the most preferred specification the sign turns to be positive, implying than more segregation is related to a higher probability of not completing secondary school, although the coefficients are not statistically significant now. Anyway, the city fixed estimation makes a qualitative difference in this case; in its absence we would have risked to draw the wrong conclusion from the estimations.

Table 7: Effects of segregation on school drop-out

Probability Drop-Out School CASEN 1992-2002				
	1992	2002	1992-2002	1992-2002
INE Index (SES_1)				
Segregation	-0.476**	-0.291**	-0.451**	-0.385
	(3.166)	(3.090)	(4.822)	(1.882)
Poor*Segregation	0.162**	-0.003	0.107**	0.109**
	(4.082)	(0.132)	(4.424)	(4.511)
Durable Goods Index (SES_2)				
Segregation	-0.325*	-0.305**	-0.379**	-0.186
	(2.374)	(3.316)	(4.312)	(0.669)
Poor*Segregation	0.180**	-0.004	0.117**	0.119**
	(4.147)	(0.148)	(4.444)	(4.513)
Human Capital Index (SES_3)				
Segregation	-0.408*	-0.190	-0.336**	0.216
	(1.990)	(1.671)	(2.730)	(0.743)
Poor*Segregation	0.274**	-0.009	0.172**	0.179**
	(4.205)	(0.241)	(4.407)	(4.585)
Observations	4736	4869	9605	9605
Year Fixed Effect			yes	yes
City Fixed Effect				yes

p values in parentheses
* significant at 5%; ** significant at 1%

Note: Probit estimates. Dependent Variable is equal to 1 if person is between 18 and 21, has not completed secondary school and is not studying, 0 if is still studying. All regressions include the following controls: per capita household income, years of schooling of the head of the household, household size, number of children in the household, dummy for female individual, age, total population of the city, percenatge of poor population in the city, unemployment rate in the city.

The preferred specification shows that residential segregation does have a significant and positive impact on the probability that the poor do not complete secondary education. On average there is a difference of almost four percentage points in the probability that poor students drop out schools between the least and most segregated city, other factors kept constant.

The strongest effect among the control variables comes from the years of schooling of the household head (Table C-2 in the Annex). The more educated the head, the lower the probability that the student does not complete secondary school. Other control variables that turn out to be statistically significant are the household per capita income, the household size and the number of members who are younger than 18 years old.

Lagging behind grade in schools

Next we turn to the effect of residential segregation on the probability that students lag behind grade in schools. The main results are shown in Table 8. There are no effects of segregation on the outcome variable when considering all the student population in the age bracket (15-21). On the other hand, residential segregation does affect the educational attainment of students from poor households. All specifications show a positive and statistically significant parameter relating residential segregation and the probability of lagging behind grade for students that belong to poor households.

However, the size of the effect is somewhat smaller than in the previous cases. On average there is a difference of about 2 percentage points in the outcome variable between the least and most segregated city.

Among the control variables (Table C-3 in the Annex) it stands out for its relevance the schooling of the household head. The probability of lagging behind at schools is strongly related to the years of education of the head of the household, showing that schooling of parents is the socioeconomic variable that matters most regarding the educational attainment of students. On the other hand, household per capita income proves to be not statistically significant in any specification. Other control variables that contribute to the probability of lagging behind grade in school are the number of members of the households and gender: being a female student is associated with a lower probability of lagging behind grade of about 3-4 percentage points.

Table 8: Effects of segregation on the probability of lag behind grade in schools

Probability of Lagind Behind in School CASEN 1992-2002

	1992	2002	1992-2002	1992-2002
INE Index (SES_1)				
Segregation	0.286*	-0.036	0.119	0.139
	(2.382)	(0.371)	(1.600)	(0.824)
Poor*Segregation	0.118**	0.056*	0.083**	0.082**
	(3.654)	(2.417)	(4.314)	(4.320)
Durable Goods Index (SES_2)				
Segregation	0.081	-0.006	0.029	-0.088
	(0.718)	(0.058)	(0.404)	(0.401)
Poor*Segregation	0.131**	0.059*	0.090**	0.089**
	(3.644)	(2.399)	(4.297)	(4.260)
Human Capital Index (SES_3)				
Segregation	0.245	0.002	0.094	0.027
	(1.388)	(0.017)	(0.932)	(0.114)
Poor*Segregation	0.197**	0.077*	0.127**	0.127**
	(3.651)	(2.147)	(4.119)	(4.136)
Observations	2312	2426	4738	4738
Year Fixed Effect			yes	yes
City Fixed Effect				yes

z values in parentheses

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

Note: Probit estimates, marginal coefficients. Considers population between 15 and 21 at schools. Dependent Variable is equal to 1 if there is a grade minus age is equal or higher than 8, 0 if otherwise. All regressions include the following controls: per capita household income, years of schooling of the head of the household, household size, number of children in the household, age, total population of the city, percentage of poor population in the city, unemployment rate in the city.

Economic inactivity of young people

The effects of residential segregation on the inactivity status of the population between 18 and 25 years old are shown in Table 9. The impact of segregation on the inactivity status of the general young population differs across specifications. Most of the estimated coefficients are statistically significant but with a negative sign, suggesting that segregation and inactivity are inversely related. However, the preferred specification tells a different story, establishing that the effect of segregation on inactivity is positive but not relevant by statistical criteria. This is another case where the introduction of city fixed effects makes a qualitative difference in the results. We stick to the results in the preferred specification.

On the other hand, all specifications are coincident about the effect of residential segregation on the inactivity status of the young population that belongs to poor households. The estimated parameters are all positively signed and statistically significant, implying that young and poor people living in more segregated cities face a higher probability of being inactive than their counterparts in less segregated cities.

The size of the effect is more sizable in comparison to previous cases. Considering the estimates of the preferred specification, there is a mean difference of 6.5 percentage points in the probability of being inactive between the least and most segregated cities, other factors kept constant.

There are two particular control variables that have a strong impact on the probability of the young being inactive: schooling and gender. As expected, schooling and inactivity are inversely related. More schooling increases the cost of opportunity of not working; also, those currently at school are more likely to have more years of education (they are counted as not inactive in the outcome variable). On the other hand, being female is associated to a higher probability of being inactive, accordingly with the traditional allocation of labor between the market and the household. Other control variables which have statistically significant effects are age and the schooling of the head. The older the person (within the defined age bracket) the higher the probability of being inactive; this effect can be linked to the school cycle. The years of schooling of the head are positively related with the outcome variable, a puzzling result that might arise from the interaction between this variable and the schooling of the young. Finally, it must be noticed that household per capita income is not included this time in the set of controls as it endogenous with the outcome variable.

Table 9: Effects of segregation on the economic inactivity of young people

Probability of Economic Inactivity, CASEN 1992-2002

	1992	2002	1992-2002	1992-2002
INE Index (SES_1)				
Segregation	-0.051	-0.436**	-0.216**	0.237
	(0.609)	(5.108)	(3.715)	(1.865)
Poor*Segregation	0.214**	0.141**	0.179**	0.182**
	(9.362)	(6.792)	(11.671)	(11.866)
Durable Goods Index (SES_2)				
Segregation	-0.139	-0.485**	-0.304**	0.136
	(1.815)	(5.888)	(5.557)	(0.785)
Poor*Segregation	0.233**	0.150**	0.193**	0.197**
	(9.317)	(6.731)	(11.527)	(11.757)
Human Capital Index (SES_3)				
Segregation	-0.221	-0.396**	-0.319**	0.256
	(1.920)	(3.812)	(4.157)	(1.429)
Poor*Segregation	0.352**	0.212**	0.282**	0.290**
	(9.337)	(6.565)	(11.413)	(11.751)
Observations	9338	9389	18727	18727
Year Fixed Effect			yes	yes
City Fixed Effect				yes

z values in parentheses
* significant at 5%; ** significant at 1%
Note: Probit estimates, marginal coefficients. Considers population between 18 and 25. Dependent Variable is equal to 1 if the person is not studying, working or looking for a job, 0 otherwise. All regressions include the following controls: per capita household income, years of schooling of the head of the household, household size, number of children in the household, dummy for female, years of schooling, age, total population of the city, percenatge of poor population in the city, unemployment rate in the city.

Teenager Pregnancy

Table 10 presents the effects of residential segregation on the probability that a young female between 14 and 18 years old be a mother. None of the estimated parameters for the general population is statistically significant, suggesting that there is no relation between living in a more segregated city and being an adolescent mother. This result also applies to the poor population of young females. Opposite to the previous cases, this time there is not effect of residential segregation on the opportunities of the poor as far as adolescent motherhood is concerned.

On the other hand, the probability that a female adolescent has to become a mother is strongly and negatively related to the per capita income of the household, the age of the person (within the defined age bracket) and the schooling of the head of the household. The signs of the associated coefficients are those expected. Because of endogeneity problems the estimation excluded the following control variables: schooling of the person, the size of the household and the number of younger than 18 years old.

Table 10: Effects of segregation on the probability of being an adolescent mother

Probability of Being a Teenager Mother CASEN 1992-2002

		1992	2002	1992-2002	1992-2002
INE Index (SES_1)					
	Segregation	0.037	-0.053	-0.002	-0.022
		(0.909)	(0.987)	(0.044)	(0.280)
	Poor*Segregation	0.006	-0.006	0.003	0.002
		(0.511)	(0.384)	(0.346)	(0.169)
Durable Goods Index (SES_2)					
	Segregation	0.035	-0.028	0.009	0.009
		(0.911)	(0.528)	(0.262)	(0.091)
	Poor*Segregation	0.005	-0.008	0.002	-0.000
		(0.393)	(0.504)	(0.153)	(0.009)
Human Capital Index (SES_3)					
	Segregation	0.041	-0.104	-0.039	-0.148
		(0.672)	(1.574)	(0.838)	(1.365)
	Poor*Segregation	0.010	-0.006	0.007	0.004
		(0.521)	(0.280)	(0.426)	(0.263)
	Observations	2312	2426	4738	4738
	Year Fixed Effect			yes	yes
	City Fixed Effect				yes

z values in parentheses
* significant at 5%; ** significant at 1%

Note: Probit estimates, marginal coefficients. Considers female population between 14 and 18. Dependent Variable is equal to 1 if the person is a mother or is pregnant, 0 if otherwise. All regressions include the following controls: per capita household income, years of schooling of the head of the household, years of schooling, age, total population of the city, percenatge of poor population in the city, unemployment rate in the city.

Single Motherhood

In line with the results for adolescent mothers, there are no statistically significant effects of residential segregation on the probability that a mother between 19 and 29 years old be single

(Table 11). This conclusion is valid for both the general population and the poor population of mothers in the age bracket.

It must not be forgotten that the available data reports the single status of the mother at the time of the survey interview, which can be years later than the time of birth. Strictly speaking, we are studying the effect of segregation on the probability that a mother remains single.

The probability of this outcome is influenced by the household per capita income and the schooling of the head. A higher socioeconomic status, measured by any of these variables, is associated with a lower probability that a mother remains single. The age of the person is inversely related to the outcome variable, a result that it is likely to reflect the time trend of rising single mothers and the fact that most single mothers end up getting married or living with a partner. Both developments are associated with a higher probability that younger mothers be single.

Table 11: Effects of segregation on the probability of being a single mother

Probability of Being a Single Mother CASEN 1992-2002

	1992	2002	1992-2002	1992-2002
INE Index (SES_1)				
Segregation	0.154	-0.113	0.041	0.387
	(1.194)	(0.560)	(0.358)	(1.568)
Poor*Segregation	-0.053	0.125*	0.009	0.012
	(1.642)	(2.498)	(0.330)	(0.424)
Durable Goods Index (SES_2)				
Segregation	(0.861)	(0.754)	(1.368)	(0.636)
	0.045	-0.276	-0.057	0.580
Poor*Segregation	(0.392)	(1.364)	(0.529)	(1.763)
	-0.058	0.138*	0.011	0.014
Human Capital Index (SES_3)				
Segregation	0.008	-0.124	-0.068	-0.141
	(0.043)	(0.490)	(0.450)	(0.402)
Poor*Segregation	-0.085	0.201**	0.024	0.028
	(1.582)	(2.584)	(0.520)	(0.623)
Observations	2312	2426	4738	4738
Year Fixed Effect			yes	yes
City Fixed Effect				yes

z values in parentheses
* significant at 5%; ** significant at 1%

Note: Probit estimates, marginal coefficients. Considers female population between 19 and 29. Dependent Variable is equal to 1 if the person is a single mother, 0 if she is a mother not single. All regressions include the following controls: per capita household income, years of schooling of the head of the household, years of schooling, age, total population of the city, percenatge of poor population in the city, unemployment rate in the city.

Health Status

The last outcome variable is the probability of being healthy for the working age population (Table 12). The preferred specification suggests that residential segregation does not have a well defined effect on the health status of the working age population. Out of the six estimated parameters in the preferred specification, only one turns out to be statistically significant, but its sign is opposed as expected. In the rest of the specifications all estimated parameters for the general population are statistically significant and have the expected sign; but there are not differential effects for the poor population. Anyway, we follow the results of the preferred specification and conclude that no significant effects of residential segregation on health status come out from our estimations.

The health status is related to the control variables in the expected way. The probability of being healthy increases with household per capita income, years of schooling, if the individual is a female, and the household size (which together with per capita income suggests the existence of economies of scale in the household). On the other hand, there is marked relationship between a lower probability of being healthy and age.

All previous remarks must take into considerations the second best nature of our health measure. Therefore, these conclusions are only preliminary.

Table 12: Effects of segregation on the probability of being healthy

Probability of Being Healthy CASEN 1992-2002

	1992	2002	1992-2002	1992-2002
INE Index (SES_1)				
Segregation	-0.294**	-0.088*	-0.176**	-0.072
	(6.420)	(2.392)	(6.190)	(1.129)
Poor*Segregation	0.005	-0.019*	-0.007	-0.009
	(0.443)	(2.078)	(1.046)	(1.231)
Durable Goods Index (SES_2)				
Segregation	-0.347**	-0.025	-0.164**	0.342**
	(8.182)	(0.707)	(6.104)	(3.989)
Poor*Segregation	0.002	-0.019	-0.009	-0.010
	(0.166)	(1.898)	(1.171)	(1.265)
Human Capital Index (SES_3)				
Segregation	-0.482**	-0.098*	-0.307**	0.068
	(7.338)	(2.202)	(8.026)	(0.732)
Poor*Segregation	0.006	-0.028	-0.011	-0.014
	(0.343)	(1.947)	(0.991)	(1.239)
Observations	38649	43955	82604	82604
Year Fixed Effect			yes	yes
City Fixed Effect				yes

z values in parentheses
* significant at 5%; ** significant at 1%
Note: Probit estimates, marginal coefficients. It considers population between 15 and 60 years old. Dependent Variable is equal to 1 if person has not had an accident or has been sick in the last 30 days (2003) or 3 months (1992), 0 if the person has. All regressions include the following controls: per capita household income, years of schooling of the head of the household, household size, number of children in the household, dummy for female individual, years of schooling, age, total population of the city, percenatge of poor population in the city,

5. Concluding Remarks

This study has estimated the effects of residential segregation on individual outcomes related to the opportunities of the poor in Chile. The results show that residential segregation affects negatively the opportunities of the poor in variables such us preschool attendance, school drop-out, lagging behind grade in school and economic inactivity of the young people. On the other hand, we do not find effects of segregation on the probabilities of being an adolescent mother, being a single mother for the young adult population, or being healthy in the case of the working age population. However, our measures of health status and single mother status are noisy approximation of the actual variables, so that the conclusions regarding these dimensions are only preliminary.

A common issue in this type of studies is whether the estimated coefficients represent causal effects or just statistical correlation between residential segregation and individual outcomes. Our aim has been the estimation of causal effects. For this purpose we measure segregation at city level to minimize the biases which can arise if there is sorting of the population across neighborhoods within cities. Also, we present data that shows that the poor population does not change place of residence across cities of residence often. Moreover, our preferred specification is based on repeated cross section data that allow to control for city fixed effects, ruling out another source of endogeneity.

Our results are important in two respects. First, they establish that residential segregation is a dimension of inequality that has importance in itself, more than being just another expression of that problem. Second, they represent an input to the formulation of housing social policy which until now has prioritize the construction of large conglomerate of dwelling that concentrate low income population.

However, it is also important to acknowledge the quantitative importance of the estimations. We have found statistically relevant but not large effects of residential segregation on individual outcomes. The difference in the outcome variables between the least and most segregated cities is about 2 to 5 percentage point of the outcome variable.

Also, we have not explained the channels through which residential segregation affect the outcomes. The estimation methodology allows the computation of coefficients that quantify the effect of segregation on outcomes, but it does not provide an explanation for them. To this extent our work must be considered a first step in this research agenda.

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Annex A: SES_2 Index

Table A-1: Education and Durable Goods Cells, 1992

CASEN 1992

HH Schooling	Number of Goods: 0	1	2	3	4	5	6	7	8	9
No Schooling	1	2	3	4	5	6	7	8	9	
Incomple Primary	10	11	12	13	14	15	16	17	18	
Complete Primary	19	20	21	22	23	24	25	26	27	28
Incomple Secondary	29	30	31	32	33	34	35	36	37	38
Complete Secondary	39	40	41	42	43	44	45	46	47	48
Incomplete Technical Studies	49	50	51	52	53	54	55	56	57	
Complete Technical Studies and Incomplete University	58	59	60	61	62	63	64	65	66	67
Complete University and more	68	69	70	71	72	73	74	75	76	77

20% 30% 40%

Table A-2: Cells ranked by per capita household income, 1992

Corresponding Income Per Capita to Cells: CASEN 1992

Cell	Schooling Head	Number of Goods	Per capita hh income	Obs	%	Cum %
1	1	0	16980.44	620	0.4%	0.4%
2	1	1	25602.37	1,565	1.1%	1.6%
3	1	2	29654.81	1,310	0.9%	2.5%
10	2	0	31301.89	2,872	2.1%	4.6%
11	2	1	38524.72	8,276	6.0%	10.6%
20	3	1	40433.59	2,074	1.5%	12.1%
12	2	2	42487.99	8,904	6.4%	18.5%
19	3	0	45787.11	720	0.5%	19.0%
39	5	0	47248.82	421	0.3%	19.3%
29	4	0	48041.4	955	0.7%	20.0%
4	1	3	48307.39	783	0.6%	20.6%
5	1	4	48634.01	581	0.4%	21.0%
49	6	0	48836.23	78	0.1%	21.1%
6	1	5	49012.52	381	0.3%	21.3%
13	2	3	49577.74	7,196	5.2%	26.5%
31	4	2	50159.1	3,533	2.6%	29.1%
30	4	1	50372.09	3,064	2.2%	31.3%
21	3	2	53877.32	2,374	1.7%	33.0%
22	3	3	56731.73	1,949	1.4%	34.4%
32	4	3	58171.52	3,218	2.3%	36.8%
14	2	4	61086.85	7,005	5.1%	41.8%

Source: computations based on 5% sample 1992 population census and 1992 Casen survey

Table A-3: Education and Durable Goods Cells, 2002

CASEN 2003

HH Schooling	Number of Goods 0	1	2	3	4	5	6	7	8	9
No Schooling	1	2	3	4	5	6	7	8	9	
Incomple Primary	10	11	12	13	14	15	16	17	18	
Complete Primary	19	20	21	22	23	24	25	26	27	28
Incomple Secondary	29	30	31	32	33	34	35	36	37	38
Complete Secondary	39	40	41	42	43	44	45	46	47	48
Incomplete Technical Studies	49	50	51	52	53	54	55	56	57	
Complete Technical Studies and Incomplete University	58	59	60	61	62	63	64	65	66	67
Complete University and more	68	69	70	71	72	73	74	75	76	77

20%	30%	40%

Table A-4: Cells ranked by per capita household income, 2002

Corresponding Income Per Capita to Cells: CASEN 2003

Cell	Schooling Head	Number of Goods	Per capita hh income	Obs	%	Cum %
1	1	0	16980.44	327	0.2%	0.2%
2	1	1	25602.37	775	0.4%	0.6%
3	1	2	29654.81	690	0.4%	1.0%
10	2	0	31301.89	1077	0.6%	1.6%
11	2	1	38524.72	2886	1.6%	3.2%
20	3	1	40433.59	930	0.5%	3.7%
12	2	2	42487.99	3094	1.7%	5.5%
19	3	0	45787.11	294	0.2%	5.6%
39	5	0	47248.82	223	0.1%	5.7%
29	4	0	48041.4	336	0.2%	5.9%
4	1	3	48307.39	1015	0.6%	6.5%
5	1	4	48634.01	1739	1.0%	7.5%
49	6	0	48836.23	65	0.0%	7.5%
6	1	5	49012.52	1595	0.9%	8.4%
13	2	3	49577.74	5079	2.8%	11.2%
31	4	2	50159.1	1553	0.9%	12.1%
30	4	1	50372.09	1518	0.8%	12.9%
21	3	2	53877.32	1112	0.6%	13.6%
22	3	3	56731.73	1979	1.1%	14.7%
32	4	3	58171.52	2864	1.6%	16.3%
14	2	4	61086.85	9594	5.4%	21.6%
41	5	2	65163.21	1412	0.8%	22.4%
7	1	6	68702.62	705	0.4%	22.8%
40	5	1	68896.95	1450	0.8%	23.6%
15	2	5	74143.59	10785	6.0%	29.6%
33	4	4	74265.2	6201	3.5%	33.1%
23	3	4	77567.36	3970	2.2%	35.3%
42	5	3	81224.28	2712	1.5%	36.8%
51	6	2	81600.22	413	0.2%	37.0%
58	7	0	84195.7	29	0.0%	37.1%
34	4	5	88791.01	7478	4.2%	41.2%

Source: computations based on 5% sample 2002 population census and 2003 Casen survey

Annex B: Segregation in Chilean cities

Table B-1: segregation and poverty, SES_1

Segregation and Poverty, city level, Socioeconomic Index 1				
City	Segregation Dissimilarity		Poverty headcount	
	1992	2002	1992	2002
antofagasta	0.416	0.303	0.122	0.154
arica	0.303	0.278	0.163	0.298
calama	0.485	0.368	0.21	0.188
chillan	0.282	0.312	0.435	0.487
concepción	0.39	0.362	0.361	0.365
copiapo	0.367	0.332	0.25	0.357
coquimbo	0.363	0.379	0.361	0.338
curico	0.411	0.482	0.439	0.439
iquique	0.404	0.378	0.124	0.266
los angeles	0.25	0.357	0.481	0.52
lota-coron	0.419	0.352	0.506	0.566
osorno	0.363	0.409	0.657	0.687
pta arenas	0.339	0.285	0.093	0.195
pto montt	0.301	0.28	0.644	0.634
quil_calera	0.383	0.3	0.34	0.319
quilp-valem	0.288	0.303	0.186	0.183
rancagua	0.452	0.387	0.213	0.219
santiago	0.436	0.422	0.124	0.141
serena	0.437	0.415	0.265	0.26
sfel-andes	0.33	0.326	0.185	0.228
talca	0.366	0.384	0.367	0.375
talcahuano	0.379	0.399	0.239	0.364
temuco	0.494	0.447	0.492	0.518
valdivia	0.275	0.397	0.578	0.605
valparaiso	0.363	0.275	0.237	0.29
viña	0.5	0.442	0.176	0.192
Total	0.377	0.361	0.317	0.353

Source: computations based on 5% sample 1992 and 2002 population censuses

Table B-2: segregation and poverty, SES_2

Segregation and Poverty, city level, Socioeconomic Index 2				
City	Segregation Dissimilarity		Poverty headcount	
	1992	2002	1992	2002
antofagasta	0.32	0.273	0.227	0.242
Arica	0.308	0.298	0.256	0.309
calama	0.455	0.339	0.235	0.264
chillan	0.312	0.302	0.399	0.366
concepción	0.365	0.331	0.325	0.308
copiapo	0.299	0.301	0.301	0.351
coquimbo	0.338	0.349	0.359	0.378
curico	0.489	0.45	0.355	0.412
iquique	0.352	0.34	0.188	0.272
los angeles	0.425	0.445	0.382	0.394
lota-coron	0.318	0.268	0.429	0.471
osorno	0.358	0.353	0.421	0.441
pta arenas	0.353	0.283	0.172	0.275
pto montt	0.299	0.249	0.413	0.389
quil_calera	0.358	0.29	0.382	0.356
quilp-valem	0.266	0.276	0.227	0.228
rancagua	0.437	0.388	0.252	0.288
santiago	0.391	0.391	0.241	0.249
serena	0.483	0.378	0.275	0.293
sfel-andes	0.258	0.282	0.279	0.354
talca	0.377	0.345	0.35	0.364
talcahuano	0.326	0.347	0.247	0.331
temuco	0.474	0.453	0.323	0.336
valdivia	0.19	0.319	0.343	0.346
valparaiso	0.236	0.245	0.283	0.277
viña	0.408	0.384	0.217	0.226
Total	0.354	0.334	0.303	0.328

Source: computations based on 5% sample 1992 and 2002 population censuses

Table B-3: segregation and poverty, SES_3

Segregation and Poverty, city level, Socioeconomic Index 3				
City	Segregation Dissimilarity		Poverty headcount	
	1992	2002	1992	2002
antofagasta	0.214	0.219	0.301	0.292
arica	0.174	0.158	0.284	0.301
calama	0.206	0.215	0.325	0.305
chillan	0.154	0.165	0.335	0.319
concepción	0.216	0.189	0.285	0.297
copiapo	0.192	0.22	0.315	0.329
coquimbo	0.187	0.171	0.331	0.335
curico	0.27	0.246	0.292	0.287
iquique	0.206	0.206	0.259	0.249
los angeles	0.149	0.231	0.337	0.365
lota-coron	0.199	0.146	0.444	0.446
osorno	0.222	0.232	0.371	0.34
pta arenas	0.178	0.187	0.254	0.253
pto montt	0.166	0.165	0.309	0.3
quil_calera	0.156	0.15	0.313	0.335
quilp-valem	0.185	0.175	0.279	0.276
rancagua	0.269	0.248	0.286	0.284
santiago	0.248	0.256	0.257	0.246
serena	0.241	0.241	0.279	0.311
sfel-andes	0.144	0.159	0.278	0.286
talca	0.198	0.219	0.326	0.308
talcahuano	0.227	0.22	0.339	0.348
temuco	0.262	0.23	0.297	0.318
valdivia	0.147	0.203	0.303	0.348
valparaiso	0.174	0.182	0.3	0.298
viña	0.199	0.17	0.269	0.258
Total	0.199	0.2	0.306	0.309

Source: computations based on 5% sample 1992 and 2002 population censuses

Annex C: Complete Regressions

Table C-1 Probability Drop-Out School CASEN 1992-2002

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Durable Goods Index				INE Index				Human Capital Index			
	1992	2002	1992-2002	1992-2002	1992	2002	1992-2002	1992-2002	1992	2002	1992-2002	1992-2002
Segregation-Durable Goods Index	-0.325*	-0.305**	-0.379**	-0.186								
	(2.374)	(3.316)	(4.312)	(0.669)								
Poor*Segregation-Durable Goods Index	0.180**	-0.004	0.117**	0.119**								
	(4.147)	(0.148)	(4.444)	(4.513)								
Segregation-INE Index					-0.476**	-0.291**	-0.451**	-0.385				
					(3.166)	(3.090)	(4.822)	(1.882)				
Poor*Segregation-INE Index					0.162**	-0.003	0.107**	0.109**				
					(4.082)	(0.132)	(4.424)	(4.511)				
Segregation-Human Capital Index									-0.408*	-0.190	-0.336**	0.216
									(1.990)	(1.671)	(2.730)	(0.743)
Poor*Segregation-Human Capital Index									0.274**	-0.009	0.172**	0.179**
									(4.205)	(0.241)	(4.407)	(4.585)
per capita hh income	0.000	-0.000**	-0.000**	-0.000**	0.000	-0.000**	-0.000**	-0.000**	0.000	-0.000**	-0.000**	-0.000**
	(0.450)	(5.986)	(3.908)	(3.943)	(0.410)	(5.965)	(3.956)	(3.961)	(0.437)	(5.992)	(3.941)	(3.917)
schooling head	-0.036**	-0.020**	-0.030**	-0.030**	-0.036**	-0.020**	-0.030**	-0.030**	-0.036**	-0.020**	-0.030**	-0.030**
	(18.442)	(16.753)	(24.825)	(24.407)	(18.344)	(16.833)	(24.728)	(24.398)	(18.377)	(16.803)	(24.731)	(24.371)
household size	-0.036**	-0.002	-0.019**	-0.020**	-0.036**	-0.002	-0.019**	-0.020**	-0.036**	-0.002	-0.019**	-0.020**
	(7.102)	(0.878)	(6.205)	(6.496)	(7.037)	(0.880)	(6.187)	(6.503)	(7.069)	(0.800)	(6.156)	(6.464)
total number of children <= 18 in the hh	0.088**	0.027**	0.062**	0.062**	0.087**	0.027**	0.061**	0.062**	0.087**	0.027**	0.061**	0.062**
	(11.207)	(6.295)	(13.225)	(13.248)	(11.106)	(6.307)	(13.130)	(13.218)	(11.146)	(6.277)	(13.149)	(13.205)
1 if female, 0 if male	-0.000	-0.018*	-0.010	-0.010	-0.001	-0.017*	-0.010	-0.010	-0.000	-0.017*	-0.010	-0.010
	(0.027)	(2.407)	(1.236)	(1.269)	(0.044)	(2.373)	(1.244)	(1.289)	(0.031)	(2.305)	(1.177)	(1.264)
edad	0.063**	0.020**	0.044**	0.043**	0.063**	0.021**	0.044**	0.043**	0.063**	0.021**	0.044**	0.043**
	(9.769)	(5.858)	(11.331)	(11.230)	(9.768)	(5.881)	(11.292)	(11.192)	(9.725)	(5.968)	(11.294)	(11.250)
population of city	0.000	0.000	0.000	0.000	0.000*	0.000	0.000*	0.000	0.000	-0.000	0.000	0.000
	(1.630)	(0.971)	(1.829)	(0.375)	(1.968)	(0.903)	(2.187)	(0.357)	(1.574)	(0.854)	(0.803)	(0.247)
% poor in city	0.403**	-0.017	0.174*	0.227	0.327**	-0.045	0.116	0.249	0.360**	-0.101	0.105	0.303
	(3.619)	(0.245)	(2.542)	(1.297)	(2.891)	(0.684)	(1.707)	(1.421)	(3.203)	(1.496)	(1.522)	(1.579)
unemployment rate by city	-0.807*	-0.506*	-0.673**	-0.405	-0.520	-0.373	-0.430*	-0.385	-0.675	-0.369	-0.510*	-0.329
	(2.179)	(2.421)	(2.992)	(1.085)	(1.431)	(1.853)	(1.978)	(1.036)	(1.869)	(1.832)	(2.337)	(0.858)
year==2002			-0.058**	-0.070**			-0.075**	-0.076**			-0.061**	-0.071**
			(4.480)	(3.259)			(5.676)	(3.602)			(4.691)	(3.414)
ciudad==2				-0.052				-0.077				-0.048
				(1.036)				(1.537)				(0.970)
ciudad==3				0.051				0.045				0.049
				(1.025)				(0.950)				(1.006)
ciudad==4				-0.035				-0.032				-0.057
				(0.745)				(0.698)				(1.232)
ciudad==5				0.010				-0.002				0.005
				(0.163)				(0.041)				(0.084)
ciudad==6				-0.057				-0.063				-0.087
				(0.958)				(1.132)				(1.526)
ciudad==7				0.016				0.003				0.006
				(0.266)				(0.059)				(0.097)
ciudad==8				-0.009				-0.021				0.003
				(0.155)				(0.414)				(0.049)
ciudad==9				-0.047				-0.067				-0.036
				(0.859)				(1.306)				(0.690)
ciudad==10				-0.074				-0.061				-0.094*
				(1.722)				(1.337)				(2.128)
ciudad==11				-0.005				-0.023				-0.012
				(0.074)				(0.344)				(0.175)
ciudad==12				-0.038				-0.050				-0.010
				(0.694)				(0.998)				(0.171)
ciudad==13				-0.022				-0.023				-0.045
				(0.470)				(0.535)				(1.022)
ciudad==14				-0.013				-0.012				-0.045
				(0.197)				(0.194)				(0.779)
ciudad==15				-0.043				-0.054				-0.069
				(0.794)				(1.013)				(1.191)
ciudad==16				-0.074				-0.095				-0.082
				(1.299)				(1.726)				(1.462)
ciudad==17				-0.045				-0.053				-0.061
				(1.052)				(1.249)				(1.346)
ciudad==18				-0.056				-0.061				-0.064
				(0.737)				(0.830)				(0.870)
ciudad==19				0.025				0.018				-0.002
				(0.413)				(0.295)				(0.033)
ciudad==20				0.028				-0.019				-0.005
				(0.363)				(0.261)				(0.064)
ciudad==21				-0.088				-0.084				-0.117*
				(1.674)				(1.743)				(2.349)
ciudad==22				-0.060				-0.069				-0.076
				(1.038)				(1.222)				(1.312)
ciudad==23				-0.074				-0.084				-0.066
				(1.268)				(1.595)				(1.242)
ciudad==24				0.032				0.001				0.042
				(0.518)				(0.018)				(0.728)
ciudad==25				-0.011				-0.034				-0.004
				(0.214)				(0.658)				(0.074)
ciudad==26				-0.048				-0.040				-0.054
				(0.455)				(0.386)				(0.517)
Observations	4736	4869	9605	9605	4736	4869	9605	9605	4736	4869	9605	9605

z values in parentheses

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

Table C-2 Probability Attending Pre-School CASEN 1992-2002

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Durable Goods Index				INE Index				Human Capital Index			
	1992	2002	1992-2002	1992-2002	1992	2002	1992-2002	1992-2002	1992	2002	1992-2002	1992-2002
Segregation-Durable Goods Index	-0.013	-0.035	-0.064	0.266								
	(0.073)	(0.153)	(0.453)	(0.585)								
Poor*Segregation-Durable Goods Index	-0.167**	-0.140*	-0.167**	-0.163**								
	(3.209)	(2.236)	(4.079)	(3.960)								
Segregation-INE Index					-0.261	-0.152	-0.142	0.440				
					(1.386)	(0.648)	(0.961)	(1.320)				
Poor*Segregation-INE Index					-0.159**	-0.130*	-0.159**	-0.156**				
					(3.371)	(2.246)	(4.229)	(4.128)				
Segregation-Human Capital Index									0.015	-0.210	-0.116	-0.026
									(0.060)	(0.744)	(0.610)	(0.056)
Poor*Segregation-Human Capital Index									-0.248**	-0.219*	-0.244**	-0.239**
									(3.182)	(2.420)	(4.048)	(3.937)
per capita hh income	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
	(6.666)	(6.295)	(7.682)	(7.602)	(6.588)	(6.308)	(7.640)	(7.581)	(6.660)	(6.282)	(7.674)	(7.585)
schooling head	0.014**	-0.001	0.009**	0.009**	0.014**	-0.001	0.009**	0.009**	0.014**	-0.001	0.009**	0.009**
	(5.545)	(0.206)	(4.403)	(4.501)	(5.572)	(0.227)	(4.397)	(4.437)	(5.561)	(0.293)	(4.399)	(4.495)
household size	-0.014*	-0.006	-0.011*	-0.010	-0.014*	-0.006	-0.012*	-0.010	-0.014*	-0.006	-0.011*	-0.010
	(2.029)	(0.746)	(2.113)	(1.877)	(2.039)	(0.763)	(2.152)	(1.895)	(2.039)	(0.785)	(2.110)	(1.872)
total number of children <= 18 in the hh	0.007	0.000	0.003	0.002	0.007	0.000	0.004	0.002	0.007	0.001	0.003	0.002
	(0.648)	(0.027)	(0.403)	(0.205)	(0.676)	(0.035)	(0.439)	(0.256)	(0.644)	(0.083)	(0.397)	(0.188)
1 if female, 0 if male	0.031	-0.038*	0.000	-0.001	0.031	-0.039*	0.000	-0.000	0.031	-0.038*	0.000	-0.000
	(1.904)	(2.079)	(0.017)	(0.046)	(1.891)	(2.090)	(0.015)	(0.027)	(1.910)	(2.074)	(0.023)	(0.036)
edad	0.241**	0.278**	0.263**	0.265**	0.241**	0.277**	0.263**	0.265**	0.241**	0.278**	0.263**	0.265**
	(23.061)	(23.860)	(33.098)	(33.082)	(23.054)	(23.856)	(33.100)	(33.091)	(23.067)	(23.879)	(33.116)	(33.086)
population of city	0.000**	0.000**	0.000**	-0.000**	0.000**	0.000**	0.000**	-0.000**	0.000**	0.000**	0.000**	-0.000**
	(3.299)	(2.717)	(3.951)	(4.348)	(3.667)	(2.959)	(4.127)	(4.520)	(3.206)	(3.121)	(4.063)	(4.434)
% poor in city	0.021	0.846**	0.292**	0.548	-0.041	0.842**	0.263*	0.512	0.001	0.790**	0.249*	0.513
	(0.154)	(5.108)	(2.752)	(1.951)	(0.290)	(5.128)	(2.488)	(1.808)	(0.009)	(4.617)	(2.308)	(1.654)
unemployment rate by city	-0.469	-0.845	-0.798*	-0.390	-0.264	-0.799	-0.670	-0.388	-0.443	-0.840	-0.754*	-0.413
	(0.997)	(1.636)	(2.259)	(0.684)	(0.567)	(1.573)	(1.931)	(0.682)	(0.964)	(1.644)	(2.177)	(0.702)
year==2002			0.175**	0.237**			0.167**	0.241**			0.176**	0.234**
			(8.591)	(7.005)			(7.937)	(7.298)			(8.597)	(7.080)
ciudad==2				-0.055				-0.019				-0.064
				(0.659)				(0.214)				(0.797)
ciudad==3				-0.101				-0.097				-0.109
				(1.506)				(1.512)				(1.672)
ciudad==4				-0.318**				-0.318**				-0.308**
				(4.770)				(4.905)				(4.423)
ciudad==5				-0.139				-0.127				-0.142
				(1.516)				(1.391)				(1.576)
ciudad==6				-0.208*				-0.198*				-0.185
				(2.195)				(2.203)				(1.821)
ciudad==7				-0.110				-0.095				-0.105
				(1.203)				(1.027)				(1.135)
ciudad==8				-0.185*				-0.170*				-0.202**
				(2.100)				(2.099)				(2.788)
ciudad==9				-0.155				-0.132				-0.169*
				(1.734)				(1.460)				(2.076)
ciudad==10				-0.203**				-0.215**				-0.186*
				(2.973)				(3.132)				(2.388)
ciudad==11				-0.128				-0.106				-0.128
				(1.221)				(0.982)				(1.203)
ciudad==12				-0.059				-0.044				-0.084
				(0.661)				(0.528)				(1.003)
ciudad==13				-0.078				-0.073				-0.058
				(1.090)				(1.081)				(0.793)
ciudad==14				-0.104				-0.093				-0.072
				(0.996)				(1.017)				(0.755)
ciudad==15				-0.068				-0.051				-0.051
				(0.747)				(0.544)				(0.484)
ciudad==16				-0.034				0.004				-0.034
				(0.338)				(0.037)				(0.328)
ciudad==17				-0.044				-0.033				-0.037
				(0.629)				(0.462)				(0.471)
ciudad==18				-0.221				-0.213				-0.224
				(1.801)				(1.773)				(1.820)
ciudad==19				-0.183*				-0.175*				-0.174
				(2.203)				(2.107)				(1.826)
ciudad==20				-0.230*				-0.182				-0.210
				(2.132)				(1.610)				(1.912)
ciudad==21				-0.156				-0.155				-0.122
				(1.660)				(1.835)				(1.195)
ciudad==22				-0.105				-0.089				-0.094
				(1.064)				(0.885)				(0.888)
ciudad==23				-0.179				-0.169				-0.189*
				(1.805)				(1.795)				(2.076)
ciudad==24				-0.159				-0.133				-0.172*
				(1.833)				(1.489)				(2.182)
ciudad==25				-0.049				-0.021				-0.054
				(0.607)				(0.255)				(0.682)
ciudad==26				0.590**				0.582**				0.584**
				(4.031)				(4.058)				(3.978)
Observations	3893	3339	7232	7232	3893	3339	7232	7232	3893	3339	7232	7232
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	3886	3338	7224	7224	3886	3338	7224	7224	3886	3338	7224	7224

z values in parentheses

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

Table C-3: Probability of Lag Behind in School CASEN 1992-2002

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	ACT 1992	ACT 2002	ACT 1992-20(	ACT 1992-20(	INE 1992	INE 2002	INE 1992-200	INE 1992-200	KH 1992	KH 2002	KH 1992-2002	KH 1992-2002
per capita hh income	0.000	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	-0.000
	(1.527)	(1.351)	(0.503)	(0.600)	(1.594)	(1.345)	(0.507)	(0.590)	(1.520)	(1.414)	(0.546)	(0.623)
schooling head	-0.012**	-0.008**	-0.010**	-0.010**	-0.012**	-0.008**	-0.010**	-0.010**	-0.012**	-0.008**	-0.010**	-0.010**
	(7.352)	(7.152)	(10.110)	(10.131)	(7.400)	(7.140)	(10.114)	(10.102)	(7.326)	(7.191)	(10.112)	(10.118)
household size	0.014**	0.008**	0.011**	0.011**	0.014**	0.008**	0.011**	0.011**	0.014**	0.008**	0.011**	0.011**
	(3.000)	(2.741)	(4.210)	(4.083)	(3.043)	(2.724)	(4.229)	(4.093)	(2.995)	(2.718)	(4.197)	(4.079)
total number of children <= 18 in the hh	-0.008	0.000	-0.003	-0.002	-0.008	0.000	-0.003	-0.003	-0.008	0.001	-0.003	-0.002
	(1.201)	(0.072)	(0.803)	(0.634)	(1.251)	(0.087)	(0.825)	(0.639)	(1.178)	(0.131)	(0.763)	(0.608)
1 if female, 0 if male	-0.040**	-0.016*	-0.027**	-0.027**	-0.039**	-0.016*	-0.026**	-0.027**	-0.040**	-0.016*	-0.026**	-0.027**
	(3.427)	(2.104)	(3.986)	(4.081)	(3.355)	(2.105)	(3.970)	(4.092)	(3.433)	(2.112)	(3.982)	(4.081)
edad	0.082**	0.056**	0.068**	0.067**	0.082**	0.056**	0.068**	0.067**	0.082**	0.056**	0.068**	0.067**
	(19.814)	(19.869)	(28.024)	(28.021)	(19.782)	(19.873)	(28.008)	(28.035)	(19.827)	(19.867)	(28.020)	(28.031)
population of city	-0.000	-0.000	-0.000	0.000	-0.000	0.000	-0.000	0.000	-0.000	-0.000	-0.000	0.000
	(1.299)	(0.126)	(0.609)	(1.494)	(1.718)	(0.039)	(1.045)	(1.356)	(1.381)	(0.064)	(0.492)	(1.495)
% poor in city	-0.008	-0.080	-0.019	0.167	0.045	-0.077	-0.004	0.139	0.041	-0.071	0.009	0.190
	(0.083)	(1.197)	(0.353)	(1.133)	(0.491)	(1.164)	(0.072)	(0.941)	(0.435)	(1.020)	(0.166)	(1.189)
unemployment rate by city	0.870**	-0.045	0.360*	0.205	0.696*	-0.055	0.304	0.186	0.846**	-0.050	0.351*	0.221
	(2.884)	(0.228)	(2.103)	(0.754)	(2.394)	(0.279)	(1.817)	(0.688)	(2.887)	(0.253)	(2.082)	(0.798)
Segregation-Durable Goods Index	0.081	-0.006	0.029	-0.088								
	(0.718)	(0.058)	(0.404)	(0.401)								
Poor*Segregation-Durable Goods Index	0.131**	0.059*	0.090**	0.089**								
	(3.644)	(2.399)	(4.297)	(4.260)								
Segregation-INE Index					0.286*	-0.036	0.119	0.139				
					(2.382)	(0.371)	(1.600)	(0.824)				
Poor*Segregation-INE Index					0.118**	0.056*	0.083**	0.082**				
					(3.654)	(2.417)	(4.314)	(4.320)				
Segregation-Human Capital Index									0.245	0.002	0.094	0.027
									(1.388)	(0.017)	(0.932)	(0.114)
Poor*Segregation-Human Capital Index									0.197**	0.077*	0.127**	0.127**
									(3.651)	(2.147)	(4.119)	(4.136)
year==2002			-0.053**	-0.055**			-0.047**	-0.049**			-0.054**	-0.055**
			(5.100)	(3.134)			(4.482)	(2.850)			(5.133)	(3.267)
ciudad==2				-0.065*				-0.052				-0.063*
				(1.969)				(1.349)				(2.006)
ciudad==3				0.007				0.018				0.008
				(0.194)				(0.472)				(0.211)
ciudad==4				0.029				0.022				0.021
				(0.731)				(0.576)				(0.514)
ciudad==5				-0.057				-0.050				-0.058
				(1.555)				(1.301)				(1.600)
ciudad==6				-0.036				-0.038				-0.044
				(0.819)				(0.918)				(0.987)
ciudad==7				-0.063				-0.059				-0.064
				(1.730)				(1.532)				(1.770)
ciudad==8				-0.018				0.003				-0.014
				(0.380)				(0.072)				(0.367)
ciudad==9				-0.068*				-0.057				-0.066*
				(2.032)				(1.556)				(2.119)
ciudad==10				-0.003				-0.014				-0.011
				(0.086)				(0.415)				(0.290)
ciudad==11				-0.018				-0.001				-0.018
				(0.338)				(0.024)				(0.354)
ciudad==12				-0.055				-0.042				-0.049
				(1.469)				(1.109)				(1.351)
ciudad==13				-0.045				-0.049				-0.050
				(1.465)				(1.719)				(1.644)
ciudad==14				-0.051				-0.058				-0.057
				(1.140)				(1.499)				(1.394)
ciudad==15				-0.020				-0.012				-0.027
				(0.448)				(0.254)				(0.567)
ciudad==16				-0.043				-0.024				-0.045
				(0.963)				(0.466)				(1.022)
ciudad==17				-0.020				-0.013				-0.024
				(0.595)				(0.385)				(0.672)
ciudad==18				-0.056				-0.048				-0.057
				(1.019)				(0.857)				(1.066)
ciudad==19				-0.066				-0.062				-0.069
				(1.953)				(1.802)				(1.923)
ciudad==20				-0.042				-0.028				-0.048
				(0.851)				(0.499)				(0.974)
ciudad==21				-0.039				-0.048				-0.049
				(0.966)				(1.318)				(1.165)
ciudad==22				-0.056				-0.052				-0.059
				(1.380)				(1.228)				(1.423)
ciudad==23				-0.051				-0.039				-0.050
				(1.205)				(0.929)				(1.289)
ciudad==24				-0.044				-0.026				-0.042
				(1.118)				(0.587)				(1.148)
ciudad==25				-0.025				-0.012				-0.023
				(0.673)				(0.287)				(0.618)
ciudad==26				-0.157				-0.145				-0.156
				(1.769)				(1.685)				(1.784)
Observations	3785	4455	8240	8240	3785	4455	8240	8240	3785	4455	8240	8240

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%

Table C-4: Probability of Inactivity,young population, CASEN 1992-2002

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	ACT 1992	ACT 2002	ACT 1992-20(	ACT 1992-20(	INE 1992	INE 2002	INE 1992-200	INE 1992-200	KH 1992	KH 2002	KH 1992-2002	KH 1992-2002
schooling head	0.007**	0.001	0.004**	0.004**	0.007**	0.001	0.004**	0.004**	0.007**	0.001	0.004**	0.004**
	(5.356)	(1.020)	(4.973)	(5.045)	(5.382)	(0.957)	(5.062)	(5.030)	(5.417)	(0.980)	(5.081)	(5.087)
household size	-0.002	0.002	0.001	0.000	-0.002	0.002	0.001	0.000	-0.002	0.003	0.001	0.000
	(0.633)	(0.928)	(0.292)	(0.023)	(0.628)	(0.990)	(0.343)	(0.061)	(0.586)	(1.149)	(0.375)	(0.102)
total number of children <= 18 in the hh	0.002	0.005	0.004	0.004	0.002	0.005	0.004	0.004	0.002	0.005	0.004	0.004
	(0.514)	(1.229)	(1.265)	(1.295)	(0.508)	(1.202)	(1.175)	(1.293)	(0.496)	(1.131)	(1.211)	(1.232)
years of schooling	-0.030**	-0.029**	-0.030**	-0.029**	-0.030**	-0.029**	-0.030**	-0.030**	-0.030**	-0.029**	-0.030**	-0.030**
	(19.833)	(19.999)	(28.529)	(28.400)	(19.809)	(19.959)	(28.450)	(28.425)	(19.822)	(20.071)	(28.578)	(28.415)
1 if female, 0 if male	0.268**	0.153**	0.209**	0.208**	0.268**	0.154**	0.209**	0.208**	0.268**	0.155**	0.209**	0.208**
	(31.357)	(21.157)	(37.204)	(37.167)	(31.372)	(21.192)	(37.247)	(37.177)	(31.384)	(21.262)	(37.279)	(37.202)
edad	0.011**	0.001	0.006**	0.006**	0.011**	0.001	0.006**	0.006**	0.011**	0.001	0.006**	0.006**
	(6.625)	(0.473)	(4.901)	(4.946)	(6.631)	(0.526)	(4.914)	(4.992)	(6.648)	(0.520)	(4.895)	(4.941)
population of city	-0.000	0.000	0.000	-0.000	-0.000	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.000
	(0.646)	(1.249)	(0.072)	(0.331)	(0.951)	(0.983)	(0.612)	(0.206)	(0.545)	(1.724)	(1.334)	(0.060)
% poor in city	0.132*	0.114	0.114**	0.217	0.136*	0.076	0.077	0.204	0.125*	-0.013	0.060	0.327**
	(2.087)	(1.815)	(2.605)	(1.913)	(2.130)	(1.231)	(1.790)	(1.793)	(1.973)	(0.206)	(1.366)	(2.643)
unemployment rate by city	-0.010	-0.820**	-0.434**	-0.812**	-0.004	-0.640**	-0.279*	-0.816**	0.038	-0.671**	-0.325*	-0.682**
	(0.047)	(4.164)	(3.037)	(3.464)	(0.019)	(3.351)	(2.010)	(3.485)	(0.184)	(3.532)	(2.337)	(2.842)
Segregation-Durable Goods Index	-0.162*	-0.508**	-0.329**	0.127								
	(2.102)	(6.088)	(5.938)	(0.728)								
Poor*Segregation-Durable Goods Index	0.273**	0.174**	0.226**	0.229**								
	(11.222)	(7.975)	(13.838)	(14.041)								
Segregation-INE Index					-0.063	-0.457**	-0.231**	0.236				
					(0.745)	(5.290)	(3.923)	(1.836)				
Poor*Segregation-INE Index					0.250**	0.163**	0.210**	0.212**				
					(11.287)	(8.038)	(13.995)	(14.137)				
Segregation-Human Capital Index									-0.249*	-0.424**	-0.348**	0.222
									(2.152)	(4.028)	(4.485)	(1.226)
Poor*Segregation-Human Capital Index									0.412**	0.247**	0.332**	0.339**
									(11.261)	(7.814)	(13.764)	(14.070)
year==2002			0.001	0.025			-0.007	0.028*			-0.000	0.015
			(0.125)	(1.847)			(0.854)	(2.109)			(0.044)	(1.141)
ciudad==2				-0.006				0.018				-0.019
				(0.178)				(0.465)				(0.581)
ciudad==3				0.039				0.039				0.012
				(1.215)				(1.273)				(0.406)
ciudad==4				0.013				0.013				0.002
				(0.408)				(0.410)				(0.054)
ciudad==5				0.002				0.008				-0.022
				(0.061)				(0.203)				(0.619)
ciudad==6				-0.059				-0.050				-0.071*
				(1.631)				(1.422)				(1.989)
ciudad==7				0.009				0.017				-0.008
				(0.221)				(0.419)				(0.203)
ciudad==8				0.060				0.062				0.022
				(1.388)				(1.609)				(0.655)
ciudad==9				0.024				0.041				0.006
				(0.587)				(0.978)				(0.170)
ciudad==10				-0.048				-0.058*				-0.064*
				(1.724)				(2.157)				(2.246)
ciudad==11				0.016				0.031				-0.004
				(0.347)				(0.636)				(0.085)
ciudad==12				0.022				0.027				0.024
				(0.555)				(0.715)				(0.632)
ciudad==13				0.007				0.012				-0.004
				(0.217)				(0.398)				(0.134)
ciudad==14				-0.096**				-0.093**				-0.096**
				(3.085)				(3.232)				(3.261)
ciudad==15				-0.014				-0.004				-0.048
				(0.391)				(0.118)				(1.290)
ciudad==16				-0.040				-0.020				-0.066
				(1.052)				(0.465)				(1.874)
ciudad==17				-0.008				-0.003				-0.033
				(0.286)				(0.089)				(1.129)
ciudad==18				0.073				0.062				0.020
				(1.164)				(1.039)				(0.345)
ciudad==19				0.008				0.009				-0.032
				(0.210)				(0.237)				(0.854)
ciudad==20				-0.047				0.001				-0.056
				(1.121)				(0.030)				(1.362)
ciudad==21				-0.081**				-0.079**				-0.093**
				(2.611)				(2.769)				(3.002)
ciudad==22				-0.049				-0.044				-0.070*
				(1.357)				(1.172)				(1.974)
ciudad==23				-0.025				-0.025				-0.049
				(0.606)				(0.649)				(1.443)
ciudad==24				-0.002				0.016				-0.021
				(0.055)				(0.405)				(0.630)
ciudad==25				0.018				0.038				0.016
				(0.505)				(0.998)				(0.447)
ciudad==26				-0.004				-0.015				-0.040
				(0.059)				(0.227)				(0.600)
Observations	9343	9390	18733	18733	9343	9390	18733	18733	9343	9390	18733	18733

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%

Table C-5: Probability of Being an Teenager Mother CASEN 1992-2002

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	ACT 1992	ACT 2002	ACT 1992-20(	ACT 1992-20(	INE 1992	INE 2002	INE 1992-200	INE 1992-200	KH 1992	KH 2002	KH 1992-2002	KH 1992-2002
per capita hh income	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**
	(4.785)	(5.137)	(6.936)	(7.045)	(4.709)	(5.062)	(6.858)	(6.975)	(4.710)	(5.016)	(6.771)	(6.893)
schooling head	0.000	-0.002**	-0.001*	-0.001*	-0.000	-0.002**	-0.001*	-0.001*	-0.000	-0.002**	-0.001*	-0.001*
	(0.001)	(3.051)	(2.182)	(2.027)	(0.091)	(3.084)	(2.205)	(2.026)	(0.024)	(3.115)	(2.251)	(2.037)
edad	0.017**	0.016**	0.017**	0.016**	0.017**	0.016**	0.017**	0.016**	0.017**	0.016**	0.017**	0.016**
	(9.841)	(10.096)	(14.139)	(14.162)	(9.836)	(10.085)	(14.137)	(14.167)	(9.839)	(10.068)	(14.129)	(14.172)
population of city	-0.000	0.000	0.000	0.000	-0.000	0.000	0.000	0.000	-0.000	0.000	0.000	0.000
	(0.899)	(0.594)	(0.140)	(1.461)	(0.924)	(0.835)	(0.250)	(1.631)	(0.837)	(0.532)	(0.413)	(1.595)
% poor in city	-0.021	-0.065	-0.035	-0.004	-0.014	-0.068	-0.035	-0.002	-0.014	-0.087*	-0.040	-0.047
	(0.694)	(1.757)	(1.423)	(0.071)	(0.453)	(1.855)	(1.402)	(0.029)	(0.457)	(2.275)	(1.551)	(0.674)
unemployment rate by city	-0.086	-0.091	-0.090	-0.103	-0.121	-0.077	-0.096	-0.103	-0.103	-0.095	-0.101	-0.147
	(0.852)	(0.810)	(1.115)	(0.854)	(1.222)	(0.695)	(1.208)	(0.848)	(1.031)	(0.850)	(1.266)	(1.163)
Segregation-Durable Goods Index	0.035	-0.028	0.009	0.009								
	(0.911)	(0.528)	(0.262)	(0.091)								
Poor*Segregation-Durable Goods Index	0.005	-0.008	0.002	-0.000								
	(0.393)	(0.504)	(0.153)	(0.009)								
Segregation-INE Index					0.037	-0.053	-0.002	-0.022				
					(0.909)	(0.987)	(0.044)	(0.280)				
Poor*Segregation-INE Index					0.006	-0.006	0.003	0.002				
					(0.511)	(0.384)	(0.346)	(0.169)				
Segregation-Human Capital Index									0.041	-0.104	-0.039	-0.148
									(0.672)	(1.574)	(0.838)	(1.365)
Poor*Segregation-Human Capital Index									0.010	-0.006	0.007	0.004
									(0.521)	(0.280)	(0.426)	(0.263)
year==2002			0.031**	0.026**			0.031**	0.025**			0.032**	0.027**
			(6.118)	(3.421)			(5.992)	(3.449)			(6.126)	(3.808)
ciudad==2				-0.012				-0.013				-0.012
				(0.913)				(1.010)				(0.979)
ciudad==3				-0.008				-0.009				-0.005
				(0.665)				(0.813)				(0.360)
ciudad==4				-0.013				-0.013				-0.009
				(1.208)				(1.184)				(0.616)
ciudad==5				-0.015				-0.015				-0.013
				(1.160)				(1.270)				(0.967)
ciudad==6				-0.010				-0.010				0.003
				(0.602)				(0.601)				(0.124)
ciudad==7				0.007				0.006				0.014
				(0.325)				(0.268)				(0.592)
ciudad==8				-0.012				-0.014				-0.012
				(0.796)				(1.094)				(0.974)
ciudad==9				-0.019				-0.020*				-0.019*
				(1.856)				(2.017)				(2.102)
ciudad==10				-0.010				-0.009				-0.000
				(0.870)				(0.736)				(0.013)
ciudad==11				-0.010				-0.011				-0.007
				(0.530)				(0.607)				(0.348)
ciudad==12				-0.017				-0.018				-0.019*
				(1.441)				(1.669)				(2.019)
ciudad==13				-0.012				-0.011				-0.006
				(1.052)				(1.065)				(0.410)
ciudad==14				-0.013				-0.013				-0.007
				(0.857)				(0.847)				(0.382)
ciudad==15				-0.013				-0.014				-0.004
				(0.974)				(1.008)				(0.170)
ciudad==16				-0.015				-0.016				-0.011
				(1.042)				(1.130)				(0.625)
ciudad==17				-0.008				-0.009				0.000
				(0.653)				(0.710)				(0.006)
ciudad==18				-0.010				-0.011				-0.002
				(0.425)				(0.506)				(0.069)
ciudad==19				-0.016				-0.016				-0.009
				(1.355)				(1.412)				(0.511)
ciudad==20				-0.013				-0.014				-0.008
				(0.803)				(0.857)				(0.379)
ciudad==21				-0.018				-0.018				-0.011
				(1.588)				(1.645)				(0.628)
ciudad==22				-0.013				-0.013				-0.006
				(0.856)				(0.895)				(0.308)
ciudad==23				-0.018				-0.019				-0.018
				(1.528)				(1.716)				(1.493)
ciudad==24				-0.008				-0.010				-0.008
				(0.461)				(0.625)				(0.524)
ciudad==25				-0.006				-0.007				-0.008
				(0.429)				(0.534)				(0.606)
ciudad==26				-0.088				-0.091				-0.077
				(1.829)				(1.938)				(1.686)
Observations	2820	3105	5925	5925	2820	3105	5925	5925	2820	3105	5925	5925

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%
* significant at 5%; ** significant at 1%

Table C-6: Probability of being a single mother (among mothers, 19-29)

CASEN 1992-2002

	(1) ACT 1992	(2) ACT 2002	(3) ACT 1992-20(	(4) ACT 1992-20(
per capita hh income	0.000	-0.000*	-0.000	-0.000
	(0.401)	(2.257)	(1.765)	(1.746)
schooling head	-0.023**	-0.031**	-0.027**	-0.027**
	(9.127)	(7.820)	(11.950)	(11.851)
years of schooling	0.013**	0.045**	0.025**	0.025**
	(5.049)	(10.046)	(10.443)	(10.371)
edad	-0.017**	-0.037**	-0.026**	-0.026**
	(8.712)	(12.933)	(15.394)	(15.221)
population of city	-0.000*	0.000	-0.000	0.000
	(2.378)	(0.174)	(1.614)	(0.417)
% poor in city	-0.084	-0.044	-0.061	0.010
	(0.924)	(0.306)	(0.761)	(0.048)
unemployment rate by city	0.273	0.323	0.357	0.279
	(0.861)	(0.754)	(1.368)	(0.636)
Segregation-Durable Goods Index	0.045	-0.276	-0.057	0.580
	(0.392)	(1.364)	(0.529)	(1.763)
Poor*Segregation-Durable Goods Index	-0.058	0.138*	0.011	0.014
Segregation-Human Capital Index				
Poor*Segregation-Human Capital Index				
year==2002			0.106**	0.109**
			(6.680)	(4.148)
ciudad==2				0.105
				(1.379)
ciudad==3				0.050
				(0.874)
ciudad==4				0.045
				(0.736)
ciudad==5				0.080
				(1.013)
ciudad==6				-0.055
				(0.794)
ciudad==7				0.071
				(0.941)
ciudad==8				0.024
				(0.320)
ciudad==9				0.066
				(0.863)
ciudad==10				-0.003
				(0.051)
ciudad==11				-0.008
				(0.102)
ciudad==12				0.022
				(0.294)
ciudad==13				-0.048
				(0.945)
ciudad==14				-0.063
				(0.884)
ciudad==15				0.024
				(0.332)
ciudad==16				0.013
				(0.163)
ciudad==17				-0.020
				(0.368)
ciudad==18				0.005
				(0.054)
ciudad==19				0.074
				(1.001)
ciudad==20				-0.102
				(1.447)
ciudad==21				-0.118*
				(2.078)
ciudad==22				0.044
				(0.544)
ciudad==23				0.087
				(0.966)
ciudad==24				0.080
				(1.060)
ciudad==25				0.012
				(0.179)
ciudad==26				-0.092
				(0.710)
Segregation-INE Index				
Poor*Segregation-INE Index				
	(1.640)	(2.546)	(0.347)	(0.464)
Observations	3380	2897	6277	6277

	(5) INE 1992	(6) INE 2002	(7) INE 1992-200	(8) INE 1992-200
per capita hh income	0.000	-0.000*	-0.000	-0.000
	(0.414)	(2.277)	(1.771)	(1.751)
schooling head	-0.023**	-0.031**	-0.027**	-0.027**
	(9.118)	(7.816)	(11.931)	(11.848)
years of schooling	0.013**	0.045**	0.025**	0.025**
	(4.990)	(10.059)	(10.426)	(10.321)
edad	-0.017**	-0.037**	-0.026**	-0.026**
	(8.684)	(12.924)	(15.382)	(15.213)
population of city	-0.000**	-0.000	-0.000	0.000
	(2.618)	(0.218)	(1.952)	(0.872)
% poor in city	-0.062	-0.057	-0.061	-0.005
	(0.668)	(0.400)	(0.767)	(0.025)
unemployment rate by city	0.217	0.394	0.378	0.308
	(0.702)	(0.933)	(1.480)	(0.704)
Segregation-Durable Goods Index				
Poor*Segregation-Durable Goods Index				
Segregation-Human Capital Index				
Poor*Segregation-Human Capital Index				
year==2002			0.107**	0.104**
			(6.596)	(4.057)
ciudad==2				0.126
				(1.523)
ciudad==3				0.030
				(0.562)
ciudad==4				0.065
				(1.080)
ciudad==5				0.074
				(0.946)
ciudad==6				-0.017
				(0.247)
ciudad==7				0.082
				(1.062)
ciudad==8				-0.008
				(0.121)
ciudad==9				0.059
				(0.780)
ciudad==10				-0.005
				(0.092)
ciudad==11				0.003
				(0.033)
ciudad==12				-0.000
				(0.007)
ciudad==13				-0.025
				(0.489)
ciudad==14				-0.025
				(0.355)
ciudad==15				0.040
				(0.536)
ciudad==16				0.030
				(0.339)
ciudad==17				-0.015
				(0.275)
ciudad==18				-0.020
				(0.216)
ciudad==19				0.069
				(0.941)
ciudad==20				-0.036
				(0.419)
ciudad==21				-0.095
				(1.704)
ciudad==22				0.056
				(0.683)
ciudad==23				0.052
				(0.639)
ciudad==24				0.077
				(1.012)
ciudad==25				0.030
				(0.417)
ciudad==26				-0.134
				(1.056)
Segregation-INE Index	0.154	-0.113	0.041	0.387
	(1.194)	(0.560)	(0.358)	(1.568)
Poor*Segregation-INE Index	-0.053	0.125*	0.009	0.012
	(1.642)	(2.498)	(0.330)	(0.424)
Observations	3380	2897	6277	6277

	(9) KH 1992	(10) KH 2002	(11) KH 1992-2002	(12) KH 1992-2002
per capita hh income	0.000	-0.000*	-0.000	-0.000
	(0.415)	(2.261)	(1.726)	(1.727)
schooling head	-0.023**	-0.031**	-0.027**	-0.026**
	(9.150)	(7.808)	(11.933)	(11.818)
years of schooling	0.013**	0.045**	0.025**	0.025**
	(5.056)	(10.067)	(10.459)	(10.357)
edad	-0.017**	-0.037**	-0.026**	-0.026**
	(8.717)	(12.926)	(15.395)	(15.222)
population of city	-0.000*	-0.000	-0.000	0.000
	(2.282)	(0.444)	(1.866)	(0.990)
% poor in city	-0.088	-0.067	-0.074	0.003
	(0.961)	(0.448)	(0.901)	(0.013)
unemployment rate by city	0.249	0.376	0.376	0.303
	(0.809)	(0.888)	(1.470)	(0.670)
Segregation-Durable Goods Index				
Poor*Segregation-Durable Goods Index				
Segregation-Human Capital Index	0.008	-0.124	-0.068	-0.141
	(0.043)	(0.490)	(0.450)	(0.402)
Poor*Segregation-Human Capital Index	-0.085	0.201**	0.024	0.028
	(1.582)	(2.584)	(0.520)	(0.623)
year==2002			0.105**	0.096**
			(6.655)	(3.746)
ciudad==2				0.064
				(0.922)
ciudad==3				0.018
				(0.344)
ciudad==4				0.089
				(1.339)
ciudad==5				0.051
				(0.669)
ciudad==6				-0.003
				(0.034)
ciudad==7				0.066
				(0.868)
ciudad==8				-0.043
				(0.780)
ciudad==9				0.010
				(0.155)
ciudad==10				0.030
				(0.445)
ciudad==11				-0.022
				(0.278)
ciudad==12				-0.040
				(0.628)
ciudad==13				-0.011
				(0.188)
ciudad==14				0.004
				(0.051)
ciudad==15				0.037
				(0.431)
ciudad==16				-0.011
				(0.141)
ciudad==17				-0.020
				(0.343)
ciudad==18				-0.032
				(0.336)
ciudad==19				0.069
				(0.824)
ciudad==20				-0.068
				(0.860)
ciudad==21				-0.071
				(1.012)
ciudad==22				0.050
				(0.581)
ciudad==23				0.018
				(0.245)
ciudad==24				0.023
				(0.362)
ciudad==25				-0.006
				(0.094)
ciudad==26				-0.131
				(1.011)
Segregation-INE Index				
Poor*Segregation-INE Index				
Observations	3380	2897	6277	6277

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%

Table C-7: Probability of being healthy

CASEN 1992-2002	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	ACT 1992	ACT 2002	ACT 1992-20(	ACT 1992-20(	INE 1992	INE 2002	INE 1992-200	INE 1992-200	KH 1992	KH 2002	KH 1992-2002	KH 1992-2002
per capita hh income	0.000*	0.000**	0.000**	0.000**	0.000*	0.000**	0.000**	0.000**	0.000*	0.000**	0.000**	0.000**
	(2.350)	(2.828)	(4.157)	(3.945)	(2.173)	(2.836)	(4.111)	(3.913)	(2.264)	(2.848)	(4.164)	(3.903)
schooling head	0.001	-0.001	-0.000	-0.000	0.001	-0.001	-0.000	-0.000	0.001	-0.001	-0.000	-0.000
	(0.825)	(1.191)	(0.378)	(0.315)	(0.952)	(1.232)	(0.351)	(0.329)	(0.890)	(1.211)	(0.341)	(0.305)
household size	0.018**	0.015**	0.016**	0.017**	0.018**	0.015**	0.016**	0.017**	0.018**	0.015**	0.016**	0.017**
	(11.010)	(12.790)	(17.188)	(17.932)	(10.822)	(12.768)	(17.153)	(17.922)	(10.916)	(12.797)	(17.241)	(17.933)
total number of children <= 18 in the hh	-0.008**	-0.009**	-0.009**	-0.009**	-0.008**	-0.008**	-0.009**	-0.009**	-0.008**	-0.009**	-0.009**	-0.009**
	(3.614)	(4.950)	(6.537)	(6.721)	(3.576)	(4.876)	(6.554)	(6.714)	(3.636)	(4.926)	(6.596)	(6.715)
years of schooling	0.001	0.002**	0.002**	0.002**	0.001	0.002**	0.002**	0.002**	0.001	0.002**	0.002**	0.002**
	(1.339)	(4.405)	(4.220)	(4.061)	(1.429)	(4.401)	(4.288)	(4.084)	(1.391)	(4.409)	(4.223)	(4.066)
1 if female, 0 if male	-0.067**	-0.042**	-0.053**	-0.053**	-0.067**	-0.042**	-0.053**	-0.053**	-0.066**	-0.042**	-0.053**	-0.053**
	(15.956)	(14.584)	(21.539)	(21.621)	(15.946)	(14.570)	(21.537)	(21.609)	(15.923)	(14.578)	(21.533)	(21.610)
edad	-0.002**	-0.002**	-0.002**	-0.002**	-0.002**	-0.002**	-0.002**	-0.002**	-0.002**	-0.002**	-0.002**	-0.002**
	(9.010)	(13.505)	(15.625)	(15.881)	(8.964)	(13.525)	(15.615)	(15.854)	(8.933)	(13.519)	(15.615)	(15.856)
population of city	-0.000**	0.000**	0.000	0.000**	-0.000**	0.000**	0.000	0.000**	-0.000**	0.000**	0.000	0.000**
	(5.438)	(4.599)	(1.005)	(6.259)	(5.643)	(5.505)	(1.165)	(8.091)	(5.417)	(5.100)	(0.112)	(8.059)
% poor in city	-0.115**	0.009	-0.032	-0.078	-0.189**	0.011	-0.062**	-0.056	-0.179**	-0.013	-0.085**	-0.045
	(3.358)	(0.346)	(1.544)	(1.475)	(5.375)	(0.431)	(2.985)	(1.069)	(5.154)	(0.474)	(4.018)	(0.783)
unemployment rate by city	0.051	0.578**	0.362**	-0.006	0.386**	0.588**	0.484**	0.036	0.231	0.571**	0.414**	0.049
	(0.424)	(7.207)	(5.166)	(0.057)	(3.282)	(7.496)	(7.064)	(0.319)	(1.959)	(7.200)	(6.013)	(0.424)
Segregation-Durable Goods Index	-0.347**	-0.025	-0.164**	0.342**								
	(8.182)	(0.707)	(6.104)	(3.989)								
Poor*Segregation-Durable Goods Inde:	0.002	-0.019	-0.009	-0.010								
	(0.166)	(1.898)	(1.171)	(1.265)								
Segregation-INE Index					-0.294**	-0.088*	-0.176**	-0.072				
					(6.420)	(2.392)	(6.190)	(1.129)				
Poor*Segregation-INE Index					0.005	-0.019*	-0.007	-0.009				
					(0.443)	(2.078)	(1.046)	(1.231)				
Segregation-Human Capital Index									-0.482**	-0.098*	-0.307**	0.068
									(7.338)	(2.202)	(8.026)	(0.732)
Poor*Segregation-Human Capital Index									0.006	-0.028	-0.011	-0.014
									(0.343)	(1.947)	(0.991)	(1.239)
year==2002			0.085**	0.088**			0.077**	0.077**			0.085**	0.078**
			(19.929)	(12.671)			(17.857)	(11.442)			(19.962)	(11.545)
ciudad==2				0.061**				0.041**				0.048**
				(4.325)				(2.586)				(3.360)
ciudad==3				-0.018				-0.044**				-0.043**
				(1.288)				(3.056)				(2.973)
ciudad==4				-0.013				0.006				-0.000
				(0.862)				(0.437)				(0.003)
ciudad==5				0.017				-0.003				-0.002
				(1.043)				(0.187)				(0.091)
ciudad==6				-0.113**				-0.077**				-0.087**
				(4.907)				(3.713)				(3.667)
ciudad==7				-0.007				-0.014				-0.014
				(0.387)				(0.784)				(0.751)
ciudad==8				0.094**				0.066**				0.070**
				(6.895)				(4.968)				(5.547)
ciudad==9				0.068**				0.042**				0.049**
				(4.600)				(2.617)				(3.335)
ciudad==10				0.060**				0.072**				0.065**
				(4.918)				(5.996)				(4.795)
ciudad==11				0.093**				0.085**				0.087**
				(5.895)				(5.133)				(5.297)
ciudad==12				0.062**				0.033*				0.041**
				(4.167)				(2.162)				(2.720)
ciudad==13				-0.020				0.003				-0.003
				(1.415)				(0.218)				(0.205)
ciudad==14				0.007				0.045**				0.039*
				(0.358)				(2.779)				(2.261)
ciudad==15				0.025				0.022				0.018
				(1.469)				(1.280)				(0.925)
ciudad==16				0.041*				0.018				0.022
				(2.374)				(0.923)				(1.202)
ciudad==17				0.055**				0.050**				0.048**
				(4.584)				(4.071)				(3.579)
ciudad==18				0.071**				0.050*				0.049*
				(3.379)				(2.292)				(2.162)
ciudad==19				0.025				0.014				0.010
				(1.518)				(0.849)				(0.507)
ciudad==20				-0.003				0.012				0.016
				(0.124)				(0.550)				(0.730)
ciudad==21				-0.047*				-0.004				-0.017
				(2.301)				(0.226)				(0.806)
ciudad==22				0.021				0.017				0.014
				(1.129)				(0.892)				(0.717)
ciudad==23				0.084**				0.057**				0.060**
				(5.247)				(3.469)				(3.854)
ciudad==24				0.068**				0.043**				0.050**
				(4.702)				(2.684)				(3.435)
ciudad==25				0.068**				0.058**				0.063**
				(5.291)				(4.159)				(4.807)
ciudad==26				-0.186**				-0.213**				-0.218**
				(6.048)				(7.128)				(7.083)
Observations	38649	43955	82604	82604	38649	43955	82604	82604	38649	43955	82604	82604

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%