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Urban segregation and school backwardness in Rio de Janeiro

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This article analyses a dimension that is almost completely absent from studies on the socio-territorial mechanisms that reproduce inequalities in Brazil: differences in the risk of school backwardness among children and young people between 7 and 17 years of age, based on residential segregation in Rio de Janeiro. Data from the 2000 Population Census were used to construct two sets of multilevel logistic regression models to quantify the risk of school backwardness among primary school students in fourth and eighth grade, according to individual characteristics, family socio-educational conditions and the social setting of their place of residence. Apart from showing that residence in a ghetto (*favela*) is associated with a higher risk of school backwardness, the results show that the risk of backwardness and school dropout is higher among inhabitants of *favelas* located in wealthy neighbourhoods. Possible explanatory mechanisms for these findings are reviewed.

I

Introduction

The city of Rio de Janeiro contains large ghettos (known as *favelas*),¹ many of which are located close to the city's most "noble" areas. In the educational domain, although the city's grade level pass rates are higher than the national average, the failure rate is high compared to most countries in the world, and this results in high rates of school backwardness. The purpose of this paper is to analyse the relation between place of residence and the risk of school backwardness.

The so-called "neighbourhood effect" forms part of the general category of explanatory models that hypothesize a causal relation between certain events and the social context in which they occur. The aim is to explain a given social phenomenon in terms of the causal relation between the individual—his or her motivations, options, behaviour patterns and social situation—and social settings arising from the residential concentration of persons with certain shared or similar characteristics. In other words, the goal is to capture the effect that social relations developed in the residential setting have on events that occur in the neighbourhood (Sampson, Raudenbush and Earls, 1997). The neighbourhood effect should not be understood as a mere consequence of neighbourhood social composition, however. The challenge for the researcher is to capture this effect based on a variable that expresses social relations that have the potential to alter the phenomenon being investigated. The study by Sampson, Raudenbush and Earls (1997), for example, showed how collective effectiveness was associated with a reduction in criminality in various areas of Chicago. The concept of collective effectiveness was defined on the basis of a question that captured the level of agreement expressed by respondents with statements measuring the extent to which they considered they could rely on the intervention of neighbours to deal with local problems, such as youth congregating on the streets during school hours and graffiti on the walls. In this classic example of neighbourhood effect studies,

both the phenomenon itself—criminality—and the social relations that affect it—collective effectiveness—occurred in the neighbourhood setting.

A review of work done on the neighbourhood effect in the United States following the publication of the book by Wilson (1987), particularly the bibliographic reviews made by Jencks and Mayer (1990) and Gould Ellen and Austin Turner (1997), revealed a lack of convergence in the specialized literature regarding the existence of any such causal relation, when the social phenomenon being studied is children's school performance. Several authors tend to downplay or deny the existence of the neighbourhood effect, adducing the major influence that the social setting closest to the child—particularly the family—exerts at this stage in an individual's life cycle. In Latin America, however, several recent papers confirm the hypothesis of the influence of the neighbourhood effect on educational achievements. Kaztman and Rematoso (2007), for example, have convincingly demonstrated the existence of causal relations between residential segregation and different learning outcomes among school-age children in Montevideo.

Studies on the determinants of education in Brazil are based on achievement or attainment tests, which are considered measures of success or failure during the years of schooling. In both cases, most authors have approached the topic through three types of factors: the characteristics of the students and their families,² the social setting of schools³ and the characteristics that make certain schools relatively more effective than others.⁴

In recent years, another set of factors has drawn the attention of certain Brazilian researchers, including the relation between the school and the city's social organization. Under the influence of demographic and sociological studies performed in the 1980s and 1990s in the United States, the authors Torres, Ferreira and Gomes (2005) seek to establish a link between

¹ Favelas are settlements classified by the Brazilian Geography and Statistical Institute (IBGE) as a subnormal agglomerate: i.e. they are built on illegally occupied land belonging to third parties, they do not adhere to current standards, are not regulated by public bodies, and their essential services are precarious. For a more detailed description, see footnote 6.

² See Gomes-Neto and Hanusheck, 1994; Paes e Barros, Mendonça and others, 2001; Alves, Ortigão and others, 2007.

³ See Albernaz, Ferreira and Franco, 2002; Soares and Andrade, 2006.

⁴ See Machado Soares, 2005; Soares, 2004; Franco, Ortigão and others, 2006; Lee, Franco and Albernaz, 2007.

residential segregation in the city of São Paulo and inequalities in school performance among youngsters of 18 to 19 years of age. The article by Ribeiro (2005), based on the 2000 Population Census, reviews the relation between school backwardness among 7-15 year-olds, on the one hand, and variables relating to the school capital endowment of families, family assets, and the location of neighbourhoods of residency in the various social segments of the metropolises of Rio de Janeiro, São Paulo and Belo Horizonte.

This article returns to this subject, and attempts to answer the questions raised in those papers, using models that include various additional statistical controls apart from those used by the aforementioned authors. The aim is to study the relation between differences in the risk of school backwardness among children and young people from seven to 17 years of age, on the one hand, and the various social settings that arise from residential segregation processes in the city of Rio de Janeiro, on the other. For this purpose, indicators were constructed using data from the 2000 Population Census, and two sets of multilevel logistic regression models were estimated to quantify the risk of school backwardness among primary school fourth and eighth grade students, based on their individual characteristics, the socio-educational conditions of their families, and the social setting of their place of residence. The latter level of analysis calculated the risk

of school backwardness according to the city's socio-territorial stratification, defined both by average income in 204 subdivisions of Rio de Janeiro, and in terms of being a *favela* or not, which is one of the distinctive features of that city's residential segregation model.

This paper seeks to answer the following: (i) whether the risk of school backwardness in fourth and eighth grade of primary school (*educação fundamental*)⁵ is related to the socio-spatial organization of the city of Rio de Janeiro; and (ii) what hypotheses can be formulated to explain the mechanisms through which a neighbourhood's social setting interacts with school performance. The article also reflects on lessons learned by the case under study, with its specific features in the social, urban and school domains; and these are compared with the results —to some extent refuted— of other studies that review current knowledge on the subject.

This paper firstly discusses the meaning of *favelas* in the literature on the Rio de Janeiro segregation model, the main characteristics of which are territorial proximity and social distance. It then describes the methodology used, provides details of the models developed, and presents and analyses the results obtained. Next, it summarizes the results and reviews their compatibility with theoretical arguments on how poverty concentration can affect the life of individuals.

II

The *favela*, the city, and the Rio de Janeiro model of territorial stratification: physical proximity and social distance

The social space of Rio de Janeiro eloquently expresses the hybrid nature of the regime whereby classes established in Brazilian society by the well-known process of selective modernization (Soares, 2000) interact. Its main characteristic is the territorial proximity between actors who are socially distant from each other and interact according to a socio-cultural matrix that has historically combined holistic hierarchical values with individualistic egalitarian values inherent in a market society (Da Matta, 1981 and 1991; Soares, 1997).

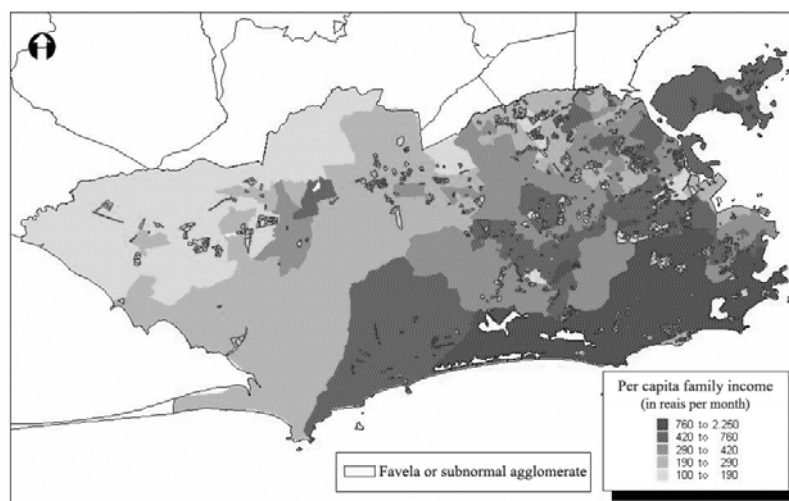
As Map 1 shows, the existence of ghettos scattered around the city, but especially in its noble sectors, is the most visible feature of the city's socio-territorial organization.

¿But what are *favelas*? Ever since their inception, they have been a hierarchical way of accommodating low-income population groups in the city, in the *civitas* and *polis* dimensions of the urban condition.

⁵ In Brazil, primary education encompasses eight school grades.

MAP 1

Municipality of Rio de Janeiro: socio-territorial division
and location of favelas in the Municipality of Rio de Janeiro



Source: *Metropolis Observatory* Urban and Regional Planning Research Institute/Federal University of Rio de Janeiro/Federation of Social Assistance and Educational Organizations (fase), 2006. The metrodata team, a unit belonging to the *Metropolis Observatory*, included Juciano Rodrigues, Paulo Renato Azevedo and Ricardo Sierpe.

In political terms they correspond territorially to what Santos (1979) has called “regulated citizenship”, or what Carvalho (1987) referred to as super-citizenship or “*estadania*”, or what Machado (2002) called a situation of “negotiated control”.

Far from disappearing, this polarized form of urban organization has strengthened in recent years, for not only has the importance of *favelas* increased, but so also has their presence in the wealthier zones of the city (Ribeiro and Lago, 2000).⁶ The relative and

⁶ This paper uses the statistical category of “subnormal agglomerate” defined by the Brazilian Geography and Statistical Institute (IBGE) as the variable representing *favelas*. This decision is based on the IBGE’s own definition of this category as: a group consisting of at least 51 housing units (precarious homes, houses), which occupy or until recently have occupied land owned by third parties (public or private), generally haphazardly and densely arranged, and mostly lacking essential public utilities. The identification of subnormal agglomerates is based on the following criteria: (a) illegal occupation of the land, i.e. construction on land plots owned by third parties (public or private) at the time or recently (property title obtained no more than 10 years ago); (b) at least one of the following characteristics: (i) urbanisation that does not comply with current standards, reflected in narrow and irregular streets; and (ii) land plots of varying sizes and shapes, and constructions that are not regulated by public bodies; and (c) precarious essential public services. In Rio de Janeiro the registered number of subnormal agglomerate does not agree with the municipality’s cadastre of *favelas*. Nonetheless, several studies —to be mentioned below— support the use of the IBGE

absolute weight of these settlements grew in the 1980s, as a result of their own development and because of a drop in the rate of population growth in the wealthiest residential zones. The reasons for this phenomenon are basically the following:

- (i) the crisis of internal mobility in the metropolitan area of Rio de Janeiro, which forced less skilled workers to live close to (or at an accessible low-cost distance from) the city’s wealthiest zones, where the highest-income segments are concentrated and hence great demand for personal domestic services;⁷
- (ii) job opportunities in the informal labour market within *favelas* themselves, particularly the largest ones, which, under the momentum of social diversification, generate a market for services and trade aimed at meeting local demands;⁸

category as an efficient indicator to describe the sociodemographic characteristics of the population and its territorial organisation.

⁷ See Gobierno del Estado de Rio de Janeiro (undated).

⁸ For further details regarding clear signs of a territorial economy within *favelas*, see Fonseca (2005), which considers youth employment in the *mototaxi* service invented in the Rocinha *favela*. The authors of this article agree with Abramo (2003) on the need to analyse the growth of *favelas* as a result of structural constraints and the alternatives and preferences of families.

- (iii) the desire to exploit externalities and urban attractions generated by a concentration of the wealthiest sectors in the coastal zone of the city; and
- (iv) without any doubt, the change from a policy of total tolerance to a policy to officially recognize the *favela* as a zone of residence in the city, which has been favoured since the early 1980s by urbanization programs and also by the partial regularization of property ownership.

Rio de Janeiro is an exceptional case among the world's leading metropolises, because it has not experienced the classical territorial segregation of social groups and classes characteristic of large cities in the industrial era. There are many reasons explaining this specific feature, which cannot be discussed within the scope of this article. Nonetheless, for the purposes of this study, it is important to note that the history of *favelas* in the municipality of Rio de Janeiro relates directly to the turbulent and confused history of private land ownership in the city. This institutional framework largely favoured tolerance of illegal and irregular procedures as a means to incorporate low-income groups into the burgeoning urban society.⁹

A number of recent studies on *favelas* have fuelled a debate on the sociological relevance of distinguishing between *favela* and city for understanding the way

space is socially organized in Rio de Janeiro. When analysing the evident improvements that have occurred in urban conditions of life in the *favelas*—particularly housing—some authors have highlighted the growing process of diversification of these spaces and their social approximation to popular neighbourhoods on the outskirts of the city (Preteceille and Valladares, 2000). Those studies explicitly or implicitly criticize the conception of *favelas* as spaces that concentrate segments of society that suffer the negative effects of residential segregation, including those relating to the reproduction of poverty. In fact, the aforementioned authors argue that the concept of *favela* is inadequate. Nonetheless, our studies in the Metropolis Observatory, and work done by other researchers, show that this distinction is relevant, because it relates to different patterns of social interaction between *favela* inhabitants and the institutions of society and even other social groups. For example, a number of labour market studies based on data from the 2000 Population Census, including Ribeiro and Lago (2000) and Pero, Cardoso and Elias (2005), highlight the relationship between socio-territorial segmentation and income differences among workers of similar demographic and social characteristics. A case study by Andrade (2004) had already shown the adverse effects on personal income caused by living in a *favela*, owing to uncertain property rights, guaranteed by informal and local mechanisms outside official institutional frameworks. In the domain of political relations, Burgos (2005) analysed the way in which the exercise of citizenship among *favela* inhabitants is weakened even today by the persistence of cronyism practices that are ever present in their relations with public organizations and institutions.

This paper assumes that neither the trend towards differentiation between *favela* and city, and between different types of *favela*, nor the greater access of *favelas* to certain urban services eliminates the *favela*-city dichotomy as a distinctive feature of urban organization in Rio de Janeiro, since a highly hierarchical social interaction regime persists between one and the other. This assumption directs the empirical research presented below, particularly with regard to the construction of variables that characterize both the distinction between *favela* and city and the differentiation between *favelas* situated in different socio-spatial arrangements. Nonetheless, we also hope that the empirical results of our research show that our assumptions as to relevance of distinguishing between *favela* and city are appropriate.

⁹ Private land ownership in Brazil was instituted in 1850 through the Land Act (*Lei de Terras*). Until then a state paternalistic system had prevailed that regulated abandoned or uncultivated land areas. In the capital of the Kingdom and Empire, a large proportion of land plots fell into public ownership and were gradually incorporated into the market through illegal or fraudulent appropriation (a practice which in the vernacular is referred to as *grilagem*). As a forerunner of the emergence of *favelas*—whose chief characteristic is that the inhabitants only makes use of the land—there is an institutional framework of land ownership relations that lacks the effects of guarantee and protection of uncontested private rights. In addition, a vast patrimony of public land has been acquired by social protection institutes founded since 1930, with the aim of creating reserves of assets for managing retirement and other pension funds. Public lands and vaguely defined private properties allowed for the fact that, in the midst of rapid urbanisation and the emergence of working classes as potential protagonists in the political system, there emerged in the city a public policy of total tolerance towards all forms of private appropriation of urban land by those who already had power or who aspired to a social and political status in the nascent modern urban society. The unregulated occupation of urban land was certainly one way of solving disputes—both among the dominant classes and between them and low-income sectors—arising from the city's expansion. See Pechman (1985) for a discussion of the history of land ownership in Rio de Janeiro and how it relates to recent trends in the city's urban formation. See also Ribeiro and others (1985).

III

Methodology

1. Data

This study uses data from the 2000 Population Census. As in the other Population Censuses conducted since 1960, a sample of households was selected from each census sector, and detailed questions were asked on the characteristics of each household and its inhabitants. The sample questionnaire was applied to 10% of households (20% in small municipalities), and each census sector included a maximum of 350. For this reason, the Brazilian Geography and Statistical Institute (IBGE) only has micro-data on weighting areas that correspond to census sector conglomerates. In the case of certain large cities, including Rio de Janeiro, municipal planning agencies were consulted to jointly define the weighting areas, to ensure that they represented relatively homogeneous units. Moreover, definition of the weighting areas required a minimum number of questionnaires to be applied to the sample (least 400 occupied households) and for the set of grouped census sectors to be contiguous. The process of consulting municipal planning agencies helped to ensure that the weighting areas corresponded to subsets of the city to which the concept of neighbourhood is applicable. Secondly, the criterion of including a minimum number of households in the sample, together with the criterion of contiguousness, meant that small and medium-sized *favelas* were grouped together with non-*favela* census sectors for the purpose of defining weighting areas. This is particularly true of Rio de Janeiro, given the heterogeneous way in which the city's social space is organized. In this context, the *Metropolis Observatory* decided to define modified expansion areas representing more homogeneous units to facilitate the task of studying Population Census micro-data. For this purpose, the requirement that census sectors forming part of the modified expansion areas be contiguousness was relaxed. Census sectors considered subnormal (*favela* areas) were grouped together in 39 specific units, nonetheless representing the boundaries of neighbourhoods and administrative regions in the municipality. The geographic base created by the *Metropolis Observatory* was approved by the IBGE research department. In addition to the 39 areas mentioned, the database includes another 175 expansion areas, hereinafter referred to as "level-2 units".

As the Population Census data are cross-sectional, the results of this study should not be interpreted as unequivocal proof of causality relations. Nonetheless, there is ample evidence that the independent variables described below (income, mother's education, place of residence) already characterized the families before the occurrence of grade failure episodes, which are the main factors leading to school backwardness. In other words, despite the cross-sectional nature of the data, there are reasons to believe that the study has hardly been affected by problems stemming from the time sequence of the events considered in the models. Nonetheless, after examining school backwardness at the end of the primary school cycle (eighth grade) it was decided also to analyse fourth grade data. In this way, the cross-sectional nature of the data is less problematic, since there is less time between the social events in question and the time of measurement.

2. Variables

Data from the 2000 Population Census in Rio de Janeiro were firstly used to choose households with children and young people between seven and 17 years of age. The per-capita income of each of those households was then established and the per-capita income of level-2 units (i.e. each expansion area) was calculated. As the study aims to identify factors that raise the risk of school backwardness, target groups were subsequently chosen comprising students who were in fourth and eighth grade of primary school in the city of Rio de Janeiro in 2000. Two dependent variables were defined in each case, indicating school backwardness of one and two years, respectively. If the fourth grade student was 11 years of age or older on 31 July 2000, and the eighth grade student was 15 or older on the same date, the variable indicating one year of backwardness was coded as 1. Similarly, if the fourth grade student was 12 or more on 1 August 2000 and the eighth grade student was 16 or more on the same date, the variable indicating two years of backwardness was coded as 1.

The various educational networks operating in Brazil use different cut-off birth dates for a child to be able to enrol at the start of primary school. On 7 October 2005, the Minister of Education approved a

resolution of the National Education Council (CNE) requiring a child to be six years old before 1 March to be able to enter the nine-year primary school cycle (corresponding to the previous basic literacy class (*Classe de Alfabetização*)). For several years a similar regulation has been applied in the municipality of Rio de Janeiro, although until very recently it was very common for younger students to be registered through a ruling issued by the juvenile court. Even today, a variety of criteria are applied. In the municipal network of Belo

Horizonte and in the State network of Minas Gerais, for example, the cut-off date used in 2006 was 30 June. In private schools, there are no predetermined rules, but 31 July is the usual date. In this study, we use two variables to capture school backwardness, recognizing that the one-year variable overestimates backwardness, while the two-year variable underestimates it. Tables 1 and 2, respectively, contain a description and statistical data relating to the variables used in the constructed models.

TABLE 1

Municipality of Rio de Janeiro: variables used to capture school backwardness, 2000

Variables	Type	Description
<i>Dependent variables</i>		
Backwardness 1	Dichotomous	Indicates whether a student in eighth grade of primary school is behind by one or more years ((1= yes/ 0= c.c)
Backwardness 2	Dichotomous	Indicates whether a student in eighth grade of primary school is behind by two or more years ((1= yes/ 0= c.c)
<i>Explanatory variables</i>		
Level 1		
Male student	Dichotomous	Gender
Mulato student	Dichotomous	Mulato student (1= yes/ 0= otherwise)
Black student	Dichotomous	Black student (1= yes/ 0= otherwise)
Mother's education	Continuous	Years of schooling of the mother of the child living in the household.
Per capita family income	Continuous	Logarithm of per capita household income
Level 2		
Average family income in the zone	Continuous	Average of the logarithms of per capita household income
<i>Favela</i>	Dichotomous	Indicates whether the area is considered a <i>favela</i> (1= yes/ 0= otherwise)
<i>Favela</i> in wealthy zone	Dichotomous	Indicates whether the <i>favela</i> is in a wealthy zone (1= yes/ 0= otherwise)
<i>Favela</i> in low-income zone	Dichotomous	Indicates whether the <i>favela</i> is in a low income zone (1= yes/ 0= otherwise)

Source: Prepared by the authors on the basis of data from the 2000 Population Census.

TABLE 2

Municipality of Rio de Janeiro: descriptive statistics of the variables used, 2000

Variables	Eighth grade		Fourth grade	
	Mean	Standard deviation	Mean	Standard deviation
Backwardness 1	0.51	-	0.50	-
Backwardness 2	0.25	-	0.25	-
Male student	0.49	-	0.51	-
Mulato student	0.33	-	0.37	-
Black student	0.08	-	0.09	-
Mother's education	8.46	4.60	7.53	4.68
Per capita family income	2.37	0.64	2.18	0.74
Average family income in the zone	2.54	0.33	2.54	0.33
<i>Favela</i>	0.19	-	0.19	-
<i>Favela</i> in wealthy zone	0.06	-	0.06	-
<i>Favela</i> in low-income zone	0.12	-	0.12	-

Source: Demographic Census 2000.

3. Analytical focus

Given the hierarchical or pyramidal nature of the data (children and young people living in certain areas), the correct way to study the effects of place of residence on the risk of school backwardness entails constructing multi-level models. Specifically, the data analysis was undertaken through multilevel logistic regression models: children/young people and place of residence (Raudenbush and Bryk, 1992). Studies based on logistic regression models frequently present their results as a function of the coefficient of each of the regressors, where the value of the coefficient associated with a variable represents a probability ratio. When the event represented by the dependent variable is unusual, the probability ratio directly quantifies the risk associated with the category change in the explanatory variable. Unfortunately this is not the case of school backwardness in Brazil or in Rio de Janeiro. Table 2 shows that school backwardness affects 25% of fourth-year students and 51% of eighth grade students in the sample analysed. For this reason the results of this study are presented as a function of relative risk (RR), which measures the ratio between the probabilities of school backwardness in the response categories of the explanatory variable.

This research differs from usual studies on the neighbourhood effect, because the phenomenon being studied here —school backwardness— can occur in a school located outside the student's zone of residence, given the social relations that exist between actors living in different neighbourhoods. This can be seen by noting that almost 20% of school age young people were living in *favelas* in 2000, but only a few dozen of the 1,034 municipal schools were located inside those settlements. This shows that school backwardness —above all resulting from grade failure— occurs outside the zone of residence of the youngsters in question, i.e. outside the *favelas*, and, at least partly, as a function of the social relations that these students establish with other

students and teachers who generally do not live in their neighbourhoods. We shall return to this topic later. Before presenting and analysing the results, we describe the sequence of the models constructed.

Continuing with a more descriptive than deductive approach, the first model constructed only included the variable indicating level-2 *favelas*. This model simply indicates the risk of school backwardness associated with that variable, without characterizing the differences between inhabitants of *favelas* and other areas of the city (model 1). Also with a descriptive focus, model 2 replaces the *favela* variable with two others, for the purpose of comparing the reference category (non-*favela*) with *favelas* located in wealthy social settings and those in low- income ones. This additional specification is justified by the type of phenomenon being studied, which involves social relations between inhabitants of different neighbourhoods. In this setting, one would expect the effects to be different in *favelas* located in different social settings —but this needs to be proven empirically. Next, models were estimated that included control variables relating to the student and his or her family (models 3 and 4); and lastly, the per-capita income of level-2 units was added to these variables (models 5 and 6).¹⁰

The results of the estimated models are described below. This sequence of six models was applied to eighth and fourth grade students, both in relation to the dependent variable indicating one or more years of school backwardness and in relation to the dependent variable indicating at least two years of backwardness. We again stress that the continuous variables are centred on their respective means and that the analysis made use of the sample size.

¹⁰ An analysis of variation in the coefficients between level-2 units showed that only the intercept changed, so the coefficients on the other variables were fixed.

IV

The results and their analysis

Table 3 shows the relative risk in terms of the variables included in the six models constructed to measure school backwardness of one or more years. The lower part of the table shows the variance for each model, and this is compared with the variance of the unconditional model.

Model 1 only estimates the risk that a student living in a *favela* is behind by one or more years (i.e. he or she is 15 years or older by 31 July 2000 and in eighth grade) compared to the risk of a student that does not live in a *favela*. The relative result (RR= 1.51) shows that the risk for the former group is 51% higher than for the latter.

Model 2 is an alternative specification. Once again it compares the risk of backwardness among students living in *favelas* with the risk for students that do not live in *favelas*; but this time a distinction is made between *favelas* located in neighbourhoods occupied by high socioeconomic groups and those near to low-income neighbourhoods. The results show that the inhabitants of both types of *favela* run a greater risk of school backwardness than students living in other zones. The specific estimation of the risk for inhabitants of *favelas* in wealthy neighbourhoods (RR= 1.59) was higher than that for inhabitants of *favelas* bordering on low-income

neighbourhoods (RR= 1.47). This means that the risk for young people from *favelas* that are next to wealthy zones and low-income neighbourhoods, respectively, is 59% and 47% greater than for young people living in other areas. The relevant tests show that the difference between the relative risks estimated is non-zero.

No statistical controls have been applied in the models presented thus far, so the estimated risks could merely be a consequence of individual differences between *favela* inhabitants and those of other city neighbourhoods. Accordingly, models were constructed that included variables controlling for the student and his or her family, to estimate the potential effect of social processes arising from the organization of the city's social space.

The results of model 3 show that the risk of backwardness for male students is 1.17. The results for mulato (i.e. a person of mixed African-European descent) and black students are RR = 1.14 and RR = 1.26, respectively, indicating a risk of backwardness that is 14% and 25% higher for mulato and black students than for white students. These risks are controlled for by the other variables included in the model, including place of residence, mother's education, and per capita

TABLE 3

Municipality of Rio de Janeiro: multi-level model measuring the risk of at least one year of school backwardness among eighth grade primary school students, 2000

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Level 1</i>						
Male student			1.17***	1.17***	1.17***	1.17***
Black student			1.26***	1.26***	1.26***	1.26***
Mulato student			1.14***	1.14***	1.14***	1.14***
Mother's education			0.93***	0.94***	0.94***	0.94***
Per-capita income			0.90***	0.90***	0.90***	0.90***
<i>Level 2</i>						
Average family income				1.00		1.00
<i>Favela</i>	1.51***		1.21**	1.20**		
<i>Favela</i> in wealthy zone		1.59***			1.30***	1.30***
<i>Favela</i> in low-income zone		1.47***			1.16*	1.16*
<i>Variance</i>						
Unconditional model	0.231***	0.231***	0.231***	0.231***	0.231***	0.231***
Models 1 - 6	0.112***	0.111***	0.018*	0.018*	0.016*	0.016*

Source: Prepared by the authors using data from the 2000 Population Census.

* Significant at 5%; ** significant at 1%; *** significant at 0.1%.

family income. With respect to the two latter variables, the results ($RR = 0.93$ and $RR = 0.90$, respectively) show that when the mother's level of schooling increases by one year, the risk of school backwardness decreases by 7%; and when the logarithm of per-capita income rises by one unit, the risk declines by 10%. Model 3 also shows that if the social composition of eighth grade students in 2000 is held constant, the fact of living in a *favela* raises the risk of school backwardness by 21%. Model 4, in addition to considering the risk for individuals of a similar social profile, also implements an additional control for the mean per-capita income of the demographic expansion areas. The results in this case are not significantly different from the previous model.

Model 5 includes the level-1 controls, distinguishing between the situation of *favelas* close to wealthy zones and those bordering on low-income neighbourhoods. The result is similar to that of model 3 in terms of the risk relating to level-1 variables. The specific calculation of the risk for inhabitants of *favelas* located nearby high-status zones was greater than for inhabitants of *favelas* close to low-income areas ($RR = 1.30$ and $RR = 1.16$, respectively). These figures show that, when social origin variables are controlled for, the risk of school backwardness stemming from place of residence is 30% and 16% greater for inhabitants of *favelas* near wealthy neighbourhoods and low-income neighbourhoods, respectively. As in the other models estimated, the relative risks are different from the statistical standpoint.

Lastly, estimation of model 6 included a variable to control for the average per-capita income of the demographic expansion regions. The results were identical to those of model 5.

To summarize, the estimated models show that the risk of school backwardness is greater for youngsters living in *favelas* than for their peers who live in other neighbourhoods (model 1), and that the risk is partially reduced by including sociodemographic variables relating to the students and their families (model 3). The additional control on the average per-capita income of the zone of residence did not affect this result (model 4). It was also seen that the risk associated with living in a *favela* close to wealthy neighbourhoods is higher than that related to residence in a *favela* close to low-income neighbourhoods (model 2). This result is only partly diminished when sociodemographic control variables relating to students and their families are considered (model 5); and it remains unaltered when an additional control is included for the mean per-capita income of the zone of residence (model 6).

The lower part of table 3 shows the variance of the intercept in each model, which is compared with the variance of the intercept in the unconditional model. It can be seen that the variance decreases as stricter controls are applied. At the end of the process, the variables included in the model explain 93% of the variance.

Table 4 sets out the results of the models developed to study the risk of two or more years' school backwardness.

In general, the results obtained for the models whose dependent variable is two or more years' school backwardness are similar to those described previously; accordingly, they are merely summarized here, and only the main difference from the previous results is highlighted. Figure 1, which is based on model 6, shows the most important differences between the models estimated for the different dependent variables, and it facilitates the comparison.

The key difference is the lower risk associated with the variable "*Favela* in a wealthy zone", when the dependent variable is at least two years of school backwardness. As indicated in table 4, the risk associated with living in a *favela* is the same whether the *favela* is in a wealthy or low-income zone. A possible explanation for this result is school dropout, which could be more prevalent among young people living in *favelas* close to wealthy neighbourhoods. To investigate this hypothesis, an additional model was constructed, in which the dependent variable indicates school dropout among 14-17 year-old students who have not completed primary (i.e. eighth grade). The other specifications of this model are identical to those of model 6, as shown in table 4. The estimated result shows that the risk of dropout among students living in *favelas* bordering on wealthy and low-income neighbourhoods, respectively, is 74% and 57% higher than the risk of dropout among those who do not live in *favelas*. This result not only explains lower risks of school backwardness shown in table 4 and also in figure 2 below, but also highlights the greater risk for residents of *favelas*, particularly those bordering on wealthy neighbourhoods, as a result experiencing a situation of extreme school failure that leads them to drop out of school before completing primary.

Table 5 shows the risks estimated for the variables included in models relating to fourth grade students, with school backwardness of one or more years as the dependent variable.

As table 5 shows, under model 1 the risk that a fourth grade student living in a *favela* in 2000 is at least one year behind is 58% higher than in the case

TABLE 4

Municipality of Rio de Janeiro: multi-level model measuring the risk of at least two years of school backwardness among eighth grade primary school students

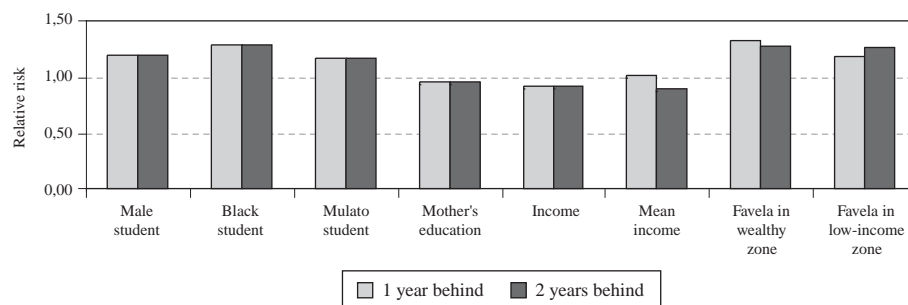
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Level 1</i>						
Male student			1.20***	1.20***	1.20***	1.20***
Black student			1.21***	1.21***	1.21***	1.21***
Mulato student			1.15***	1.15***	1.15***	1.15***
Mother's education			0.94***	0.94***	0.94***	0.94***
Per-capita income			0.94***	0.94***	0.94***	0.94***
<i>Level 2</i>						
Average family income				0.92***		0.92***
<i>Favela</i>	1.41***		1.17**	1.15*		
<i>Favela</i> in wealthy zone		1.42***			1.17**	1.15*
<i>Favela</i> in low income zone		1.41***			1.17**	1.15*
Intercept	0.43***	0.43***	0.41***	0.43***	0.41***	0.43***
<i>Variance</i>						
Unconditional model	0.249***	0.249***	0.249***	0.249***	0.249*	0.249***
Models 1 - 6	0.140***	0.141***	0.060*	0.059*	0.062*	0.061*

Source: Prepared by the authors on the basis of data from the 2000 Population Census.

*Significant at 5%; ** significant at 1%; *** significant at 0.1%.

FIGURE 1

Municipality of Rio de Janeiro: risk factors for at least one or at least two years of school backwardness among eighth grade primary school students, 2000



Source: Prepared by the authors on the basis of data from the 2000 Population Census.

of a student not living in a *favela*. Model 2 shows that the risk of backwardness for a fourth year student living in a *favela* close to a wealthy neighbourhood or a *favela* in a low-income setting is, respectively, 71% and 52% higher than the risk for a student who does not live in a *favela*.

Model 3 considers control variables relating to the student and his or her family (level 1) and shows that the risk of backwardness is 18% greater for male than for female students. In the case of mulato and

black students, the risk is respectively 23% and 32% higher than for white students. A one-year increase in the mother's level of schooling reduces the risk by 7%, and when the logarithm of per capita household income rises by one unit, the risk of backwardness declines by 15%. Moreover, when the social composition of fourth-grade students in 2000 was held constant, the risk of school backwardness for those living in a *favela* was 16% higher than for other students. Model 4 controls for an additional variable: the mean per-capita income

TABLE 5

Municipality of Rio de Janeiro: Multi-level model measuring the risk of at least one year of school backwardness among fourth-grade primary school students, 2000

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Level 1</i>						
Male student			1.18***	1.18***	1.19***	1.19***
Black student			1.32***	1.32***	1.32***	1.32***
Mulato student			1.23***	1.22***	1.23***	1.23***
Mother's education			0.93***	0.93***	0.93***	0.93***
Per-capita income			0.85***	0.85***	0.84***	0.85***
<i>Level 2</i>						
Average family income				0.94		0.92
<i>Favela</i>	1.58***		1.16*	1.14*		
<i>Favela</i> in wealthy zone		1.71***			1.33**	1.30**
<i>Favela</i> in low-income zone		1.52***			1.07	1.04
<i>Variance</i>						
Unconditional model	0.381 ***	0.381 ***	0.381 ***	0.381 ***	0.381 ***	0.381 ***
Models 1 - 6	0.218***	0.214***	0.043**	0.042*	0.030*	0.029+

Source: Prepared by the authors on the basis of data from the 2000 Population Census.

+ Significant at 10%, * significant at 5%, ** significant at 1%; significant at 0.1%.

of level-2 units. The results in this case are similar to those obtained with the previous model, although the relation between residents in a *favela* and school backwardness is weakened somewhat. In the case of risks relating to level-1 variables, there is almost no difference between models 3 and 4.

Models 5 and 6 again distinguish between types of *favela*, according to their setting. These models show that living in a *favela* close to a wealthy neighbourhood is associated with a higher risk of school backwardness compared to students that do not live in *favelas*. In the case of students living in *favelas* close to low-income neighbourhoods, after controlling for their and their families' demographic characteristics, the additional risk associated with place of residence no longer persists. The hypothesis of a difference between the two types of *favela* was also tested, and the result showed a statistically significant difference. The lower part of table 5 shows the variance of the intercept of each model, and this is compared with the variance of the intercept of the unconditional model. When additional control variables are included, the variance gradually declines. The explanatory variables ultimately account for 92% of the variance. In model 6, the remaining variance is only marginally different from zero from the statistical standpoint ($p < 0.10$), which means that the variables included in the model explain the different probabilities of school backwardness in the different zones of the city.

Table 6 shows the results of the models estimated for the risk of two or more years of school backwardness.

An analysis of table 6 shows that the results obtained for the models used to estimate two or more years of school backwardness are similar to those shown previously in table 5. Figure 2, which is based on the relative risks for model 6, as shown in tables 5 and 6, makes it possible to compare the risk factors associated with each of the dependent variables. Two aspects should be noted. The first is the closer relation between an increase in the per-capita income of the zone of residence and a reduction in the risk of school backwardness when the dependent variable is two or more years of backwardness. Secondly, once again there is a relative reduction in the risk associated with the variable "Favela in a wealthy zone", when the dependent variable is "Two or more years of backwardness". Although dropout rate in the city of Rio de Janeiro was low for children between 10 and 14 years of age (2.5% of children in this age bracket left school without completing fourth grade), the risk of dropout among children living in *favelas* was nonetheless calculated. The result of this complementary analysis showed that the risk associated with living in *favelas* close to wealthy and low-income neighbourhoods, respectively, is 98% and 92% higher than the risk among students who do not live in a *favela*. The complementary analysis of the risk of school dropout used the same statistical

TABLE 6

Municipality of Rio de Janeiro: multi-level model measuring the risk of at least two years of school backwardness among fourth grade primary school students

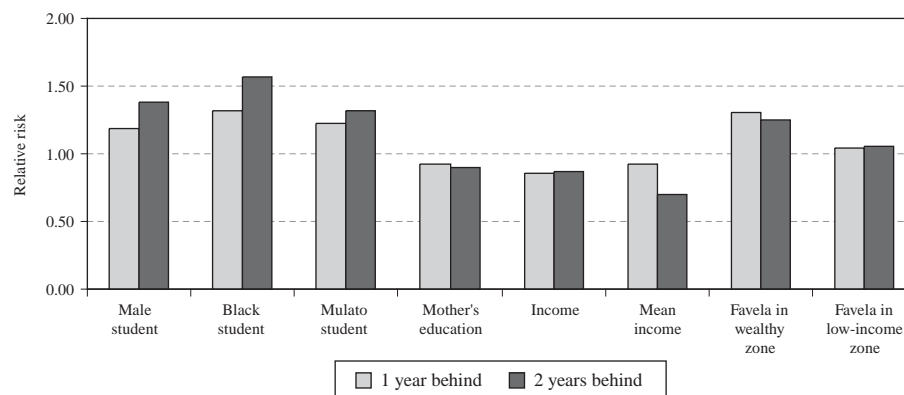
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Level 1</i>						
Male student			1.37***	1.37***	1.38***	1.38***
Black student			1.57***	1.56***	1.59***	1.57***
Mulato student			1.33***	1.32***	1.34***	1.32***
Mother's education			0.87***	0.88***	0.88***	0.90***
Per-capita income			0.86***	0.86***	0.85***	0.87***
<i>Level 2</i>						
Average family income				0.71***		0.70***
Favela	1.90***		1.24*	1.13+		
Favela in wealthy zone		2.00***			1.38**	1.25+
Favela in low-income zone		1.86***			1.19+	1.05
<i>Variance</i>						
Unconditional model	0.341 ***	0.341 ***	0.341***	0.341 ***	0.341 ***	0.341 ***
Models 1 - 6	0.188***	0.190***	0.036*	0.033*	0.035*	0.032+

Source: Prepared by the authors on the basis of data from the 2000 Population Census.

+ Significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%.

FIGURE 2

Municipality of Rio de Janeiro: risk factors for at least one or at least two years of school backwardness among fourth grade primary school students, 2000



Source: Prepared by the authors on the basis of data from the 2000 Population Census

controls as model 6 for evaluating the risk of school backwardness. Considering the result obtained for the risk of backwardness using the dependent variable “Two or more years of backwardness”, and examining this result in the light of the analysis of school dropout, it

was found that the relatively lower risk of backwardness associated with residence in *favelas* near wealthy zones reflects the higher risk of school dropout among children living in those settlements.

V

Conclusions

Given the cross-sectional nature of the data used, one could reasonably argue that the available information does not ensure that the socially negative outcome (i.e. school backwardness) is caused by living in a *favela* or in a certain type of *favela*. It is possible to put forward hypotheses in which families with prior problems, including those relating to the educational history of their children, move into *favelas*. To study hypotheses of this type, school backwardness was firstly investigated among eighth grade primary school students, and afterwards among fourth graders. The aim of using dependent variables for different years was to reduce the time elapsing between events that could generate the socially negative outcome (i.e. grade failure experiences), and the collection of data on school backwardness and place of residence (2000). The consistency of the results strengthens the idea that, apart from documenting relations between place of residence and school backwardness, place of residence exerts an influence. Nonetheless, this subject will need to be studied using data that make it possible to reach more robust conclusions on the causality relation.

This paper demonstrates not the relation between living in a *favela* and the higher risk of school backwardness, and also the particularly higher risk of school backwardness and dropout among students from *favelas* located next to wealthy neighbourhoods. This result is important, because these *favelas* are considered to offer certain advantages, such as better access to jobs and various urban services.¹¹

An exhaustive analysis of mechanisms explaining this result is beyond the scope of this study, which was based exclusively on data from the 2000 Population Census. Nonetheless, two potentially complementary lines of argument can be advanced. The first would stem from the social, and even residential, segregation, which might occur in the school, as children and young people from *favelas* near to wealthier zones could be

more easily identified as students who do not conform to model that schools and teachers would desire for their student body; and, as such, they might perceive this and feel stigmatized. The education literature has argued that certain informal evaluation mechanisms in schools operate on a discriminatory basis, with serious consequences for grade failure (Freitas, 2002). This type of mechanism finds theoretical support in the notion of urban space as the materialization of the social space with its hierarchies, segmentations and social distinction practices, as described by Bourdieu (1993) and Wacquant (1997).

The second possible explanation relates to the effects of residential segregation on the social capital of poor population groups, which in turn affects the relevant results. Consistent with our findings, which identify a higher risk of school backwardness and dropout among inhabitants of *favelas* close to wealthy neighbourhoods, Small (2004, pp.175 and 176) stresses that urban sectors that concentrate poverty should not be viewed as homogeneous realities:

Can it be claimed that ghettos and housing complexes are socially isolated entities? Or that they lack social capital? [. . .] Questions such as these have often been answered in the affirmative [. . .] and ghettos have been assumed to be basically similar to each other[. . .]. Villa Victoria suggests that if we restrict our studies to approaches of this type, we will find it hard to understand several of the mechanisms through which neighbourhood poverty affects individuals. [. . .] The case of the Villa brought several of these conditioning factors to light. Some of them operate at the neighbourhood level, such as the availability of resources in the neighbourhood, the characteristics of the boundaries (well or less well defined) between the poor zone and the surroundings, the ethnic and class composition of the zone in which they live and of adjacent zones, and the characteristics of the resident cohort.

Small thus puts forward two arguments that are important for our study. The first is that the neighbourhood effect not only depends on interactions between inhabitants of the zone, but also on the social

¹¹ Proximity to the city's wealthy neighbourhoods is also apparently an advantage with respect to public safety. Zaluar (2000) shows that the likelihood of a young person who lives in the Cantagalo *favela*, located in Ipanema, dying for political reasons or rivalries in drug economy is less than among inhabitants of *favelas* in the northern zone of the city and the suburbs. The greater invisibility of *favelas* located in low-income neighbourhoods tends to exacerbate violence.

capital generated from social interactions made possible by the type of boundary and the degree of heterogeneity between the poor zone and adjacent neighbourhoods. The second argument, only hinted at in the foregoing quote, but developed throughout the study, is that clearly defined boundaries and great social distance between neighbouring zones are elements that contribute to the rarefaction of social capital. The empirical results of this study coincide with that view: the social distance between *favelas* close to less wealthy zones of the city and adjacent low-income neighbourhoods is less, and the boundaries and distinctive features of those *favelas* and adjacent zones are less well-defined than in the wealthier areas of the city. To appreciate the significance for educational results of the territorial arrangement of the complex formed by the *favela* and adjacent neighbourhoods, it is worth considering some of the data on the city of Rio de Janeiro and the relative importance of the public school system: 76% of primary school enrolment is concentrated in public schools, and 20% of primary school students live in *favelas*; most public school students therefore do not live in *favelas*. Although the percentage of students living in *favelas* varies from one school to another, only a few serve *favela* residents almost exclusively (of the 1,034 primary schools in existence, only 20 are located within such settlements). The mixing of *favela* and non-*favela* students at school is the rule rather than the exception in the public school network of Rio de Janeiro. Youngsters living in *favelas* located in the wealthier areas of the city end up studying in schools where there is a higher concentration of *favela* residents, than inhabitants of *favelas* close to low-income neighbourhoods, because family in the latter

neighbourhoods have less chance to enrol their children in private schools than the inhabitants of wealthy neighbourhoods. This configuration and the social relations that it generates form the hypothesis that gives meaning and consistency to our result in terms of the higher risk of school backwardness among children and young people living in *favelas* generally and in *favelas* adjacent to wealthy neighbourhoods, in particular.

Lastly, the higher risk of school backwardness among children living in *favelas* in a wealthy neighbourhood disappeared when the dependent variable used was two or more years of school backwardness. In view of this result, the most positive scenario for those students would be a lower likelihood of multiple grade failures. Nonetheless, the empirical evidence shows that alleviation of the effect is explained by the higher risk of school dropout among students living in *favelas*, particularly those located in wealthy neighbourhoods. This could be due to the following: (i) a higher chance of multiple grade failure episodes; (ii) greater opportunities for paid work for these youngsters, which encourages them to drop out of school; (iii) the existence of a specific economy within the *favela* and its surroundings, which by nature — unskilled services in some cases serving the needs of the *favela* population — is based more on integration into local networks than on school achievement; (iv) the locational advantages stemming from greater income opportunities in wealthier areas translate into greater competition in the labour market in *favelas*, and thus in more precarious housing (especially high levels of overcrowding), which can also adversely affect the performance of children and young people.

(Original: Portuguese)

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