




Student mobility and school segregation in an (un)controlled choice system: A counterfactual approach

Xavier Bonal^{a*} , Adrián Zancajo^b and Rosario Scandurra^a

^a*Universitat Autònoma de Barcelona, Spain;* ^b*University of Glasgow, UK*

This article explores the relationship between school choice, student mobility and school segregation in Barcelona. The case of Barcelona is particularly interesting because the school admissions policy combines a particular design of catchment area with a significant level of choice options. We work on students and school register datasets for the school year 2016–2017 to observe the association between the socioeconomic characteristics of the students and their residential and educational geographical distribution. The article tests whether recent reforms that have undermined the role of residential proximity in admissions policy have impacted on the school segregation of three groups of socially disadvantaged students (foreign students, students entitled to Free School Meals (FSM) and students who are Recipients of Social Allowances (RSA)). We explore different patterns of mobility between socially disadvantaged and non-disadvantaged students and the impact of opting out from neighbourhood schools on school segregation. By using a counterfactual approach that compares real enrolment with simulated school enrolment in proximity schools, we provide evidence of a significant reduction of school segregation for all socially disadvantaged students, showing the negative effects of the current high number of school choice options. In addition, our analysis shows that school choice boosts remarkably the inequality between public and private subsidised schools. The final section of the article reflects on the implications of our findings for potential reforms in the current definition of catchment areas and the overall school choice policy in Barcelona.

Introduction

Debates and discussions on the virtues or harms of school choice are among the central foci of education policies. They have gained momentum in recent years, as many countries have adopted market-oriented reforms that have increased school choice. The expansion of voucher systems, the increase in public funding to private schools, the growth of charter or independent schools and the greater flexibility given to schools over admission criteria are reforms that have boosted the market mechanisms of educational provision (OECD, 2017). In the past 25 years, as a result of these policies and other trends, most OECD education systems have experienced an expansion in school choice (Musset, 2012; OECD, 2019). All these reforms have increased concern over the potential effects of school choice on the quality and equity of education systems.

School choice advocates argue that increasing choice results in higher gains in quality and equity of education systems (Chubb and Moe, 1990; Hoxby, 2003). Quality

Corresponding author. Globalisation, Education and Social Policies (GEPS), Autonomous University of Barcelona, Bellaterra 08193, Barcelona, Spain. E-mail: xavier.bonal@uab.cat

benefits result from higher competition between schools. School choice gives power to the demand side (users have exit options), forcing schools to compete to attract and retain students, which is argued to be an incentive for increasing academic quality. Equity gains are associated with reduced effects of residential segregation on school segregation. Thus, school choice opens the possibility for poor families—especially those who are highly motivated—to escape from low-quality local schools and access higher-quality schools. It is assumed that improved quality and equity of education systems can be achieved by giving families the option to choose—through universal or targeted vouchers, for example (Hoxby, 1998; Merrifield, 2001; Lindbom, 2010).

In contrast, critics of school choice are concerned with the negative effects of school choice policies, because schools have incentives for *cream-skimming* to improve their academic reputation and attractiveness (van Zanten, 1996; Ball, 1998; West *et al.*, 2004) and because families of lower socioeconomic backgrounds have few possibilities to access the ‘best’ schools, either for financial reasons (when tuition add-ons are allowed) or information asymmetries (Gewirtz *et al.*, 1995; van Zanten, 1996; Allen, 2007; Elacqua *et al.*, 2013). These reasons explain why policies expanding school choice do not necessarily reduce school segregation but can, in fact, increase it. They facilitate *white flight* processes of the middle classes from neighbourhood schools and increase the isolation of the most vulnerable students (Butler and Robson, 2003; Boterman, 2013; Kye, 2018).

While reviews of the effects of school choice and education markets on education equity underline the predominance of negative effects (Waslander *et al.*, 2010; Musset, 2012; OECD, 2019; Wilson and Bridge, 2019), the relationship between choice and school segregation is far from homogeneous and varies among different education systems and cities. The configuration of the local education markets—or “lived markets” (Taylor, 2001; Felouzis *et al.*, 2013)—is crucial for understanding the dynamics of school segregation and the hierarchical position of schools. Factors such as admissions policy design (Bonal and Zancajo, 2018a; Bonal *et al.*, 2019), characteristics and size of the catchment areas (Saporito, 2017), relative presence of private providers (Alegre and Ferrer, 2010), expansion of autonomous schools (Gorard, 2014) and different rationalities of educational demand (Ben Porath, 2009; Bonal and Zancajo, 2018b) are some of the reasons for different interactions between school choice, mobility and school segregation.

This article explores the dynamics of school choice, mobility and segregation of socially disadvantaged students in the city of Barcelona. The particularities of Barcelona’s admissions policy, which combines catchment areas that are not completely closed with high levels of schooling options, makes the case particularly interesting. An interesting method to explore the effects of school choice on school segregation is to compare the *real* school segregation in a city or district with a simulated scenario in which students enrol in a school closer to their residence, a method recently used in several case studies (see the literature review in the next section). By using a counterfactual approach, we observe whether recent reforms that have expanded choice opportunities have increased or reduced the school segregation of three groups of socially disadvantaged students. We analyse patterns of mobility and school segregation of foreign students,¹ student beneficiaries of Free School Meals (FSM) and

students eligible as Recipients of Social Allowances (RSA), as proxies of low-income students in primary education.

The rest of this article is structured as follows. The next section reviews the main evidence regarding the relationship between school choice and school segregation, with a focus on studies that have used a counterfactual approach. The main characteristics of the school admissions policy and school choice in the Spanish quasi-market education system, including a description of the school catchment area system in Barcelona, are then presented. The research questions, data and methods used in the study are described, followed by the main results of our analysis. We then conclude on the study and open a discussion of the policy implications of our findings.

School choice and school segregation: Main trends and counterfactual approaches

School choice programmes are intended to broaden the possibilities of enrolment to schools beyond the area of residence. They are conceived as programmes to provide improved opportunities to all families and are often also planned as a strategy to potentially reduce the effects of residential segregation on academic, social or ethnic school segregation. Several studies have assessed the impact of policies that have expanded school choice on school segregation by comparing schools' composition by race, socioeconomic status or other proxies of socially disadvantaged students before and after the implementation of reforms.

As an example, Frankenberg *et al.* (2011) evaluated the school composition of charter schools in 40 states and other metropolitan areas in the USA and observed that the expansion of charter schools isolated students by race and social class at significantly higher levels than traditional public schools, a result that confirmed the findings of previous studies (Cobb and Glass, 2003; Garcia, 2008). In a longitudinal study that measured the evolution of school segregation in England between 1989 and 2014, Gorard and Siddiqui (2016) identified the expansion of grammar schools (schools that can select their students based on academic criteria) as the main factor causing increased school segregation in the country. In Sweden, Brandén and Bygren (2018) evaluated the effects of introducing a voucher system and the expansion of independent schools by comparing the evolution of 13 cohorts of students; they concluded from their study that increased choice led to increased school segregation between native and non-native students. In Chile, the universalisation of vouchers increased the socioeconomic social stratification of schools, not only between public and private schools but also within the private subsidised system itself (Hsieh and Urquiola, 2006; Elacqua, 2012).

An alternative method for assessing the impact of school choice on school stratification that has been increasingly used by several case studies involves comparing observed and counterfactual scenarios of school segregation. Counterfactual scenarios in the study of school choice and school segregation have generally been defined by using two different methods. The first is the method of proximity allocation. Students are allocated fictitiously to schools close to their area of residence. The inequality observed in the counterfactual scenario is then compared to the real inequality in a context of free or controlled school choice. The second method consists of comparing

changes in territories that have implemented reforms, increasing or reducing school choice possibilities (treatment group), with similar territories where the policy or programme has not been implemented (control group). The counterfactual scenarios and the methodological strategies used by different studies depend on the data available and the characteristics of the relationship between school choice and inequalities in each education system (Musset, 2012). These are factors that condition the choice of territorial units as well as the students' characteristics for which to analyse school segregation. In addition, differences in results can be affected by the geographical distribution of schools in the territory (the more schools are dispersed in the territory, the less reliable may be the counterfactual scenario as a proxy of proximity schooling) and by the specific admission policies.

All available studies that have used the counterfactual method find—with no exception—higher levels of school segregation in real scenarios in comparison with the counterfactual simulations that allocate students using different proximity-based systems (e.g. nearest school, catchment areas, municipalities, districts). In the USA, Sohoni and Saporito (2009) analysed racial segregation in the 22 largest school districts in elementary, middle and high schools. The authors compared the percentage of white students enrolled in traditional public schools with those living in each school's catchment area and showed that the average percentage of white students enrolled in schools was lower than the percentage living in the catchment area. This difference is greater in areas that have similar proportions of white and non-white students, meaning that the higher the heterogeneity of the catchment area, the higher the probability that white students opt out (to a public school outside the catchment area or to a private school). The authors also found higher levels of school segregation in those areas with a higher presence of private, magnet and charter schools, showing a negative effect of higher levels of choice on school segregation. Bifulco *et al.* (2009) used a similar methodology for a study of Durham (North Carolina) and also found that schools are more segregated by race and class with broadened school choice programmes than in simulations where all students attended their geographically assigned schools. According to the authors, school choice programmes favour out-group avoidance (*white flight*) and neutral ethnocentrism (seeking out educational environments of similar social background) and these effects are higher than the potential to liberate vulnerable families from residential constraints (Archbald, 2003). In other words, with the introduction of school choice policies, the white flight effect is stronger than the integrative movement of less advantaged students towards schools with more socially advantaged students. This combination of effects increases class and racial segregation.

Allen (2007) showed how the secondary school choice policy in England produced a stratified education system. She compared observed and counterfactual scenarios for all Local Education Authorities (LEAs) of the country. Allen's (2007) methodological innovation is a model that combines socioeconomic variables with variables that capture the characteristics of the local education markets across different LEAs. Allen (2007) found that pupil mobility in a LEA depends on the ability of parents to access a non-local school, which in turn depends on aspects such as population density, social composition of the area or the presence of grammar or voluntary-aided schools (which can use oversubscription criteria to enrol students). By iterating

student allocation based on proximity and available places, Allen (2007) concluded that the counterfactual scenario significantly reduces school segregation by ability and social class. Similar results were found by Burgess *et al.* (2007). They compared the choices available to different families by considering the number of secondary schools within their proximity area. Their analysis shows that school segregation is considerably higher than residential segregation in those geographical areas with more school choice. Also, in the UK, Allen *et al.* (2013) assess student sorting after changes in the school admissions reform in Brighton and Hove. The authors evaluate whether the introduction of lotteries for oversubscribed places—as an alternative to allocation based on student preferences—reduced school segregation. The authors found a general reduction in school segregation, though the results depended largely on the specific design of catchment areas.

In Sweden, Söderström and Uusitalo (2016) compared the academic, socioeconomic and ethnic school segregation in municipalities which suppressed the proximity criteria in the school admissions policy, with municipalities which did not introduce the reform. Their findings show that school segregation increased in those municipalities that favoured school choice. Yang Hansen and Gustafsson (2016) also found an increase in between-school segregation with respect to migration and educational achievement in a context of reforms that increased decentralisation and school choice in Sweden. By creating fictitious schools of 16-year-old students sharing the same residential area, they compare the evolution of segregation indices between 1998 and 2011. Remarkably, the increase in the difference between the real and the counterfactual scenarios coincides with an increase in the proportion of students enrolled in independent schools. Östh *et al.* (2013) used a counterfactual approach to assess whether school choice increases between-school variation in academic performance of secondary-school graduates. They found that increasing performance gaps between schools are not the result of changes in residential patterns, but rather of the increasing number of students attending voucher-financed independent schools.

Riedel *et al.* (2010) found that the likelihood of opting out of the neighbourhood school in Wuppertal (Germany) is significantly higher for a higher ratio of immigrants in the school district. They also identified that the segregating effects are both the result of choices made by advantaged families living in areas with a higher presence of immigrants and the choices made by the migrant families themselves. The overall result is a higher level of school segregation in the real than in the counterfactual scenario.

For the case of Chile, Santos and Elacqua (2016) also used a counterfactual approach to compare socioeconomic school segregation in public, privately subsidised and independent private schools in the metropolitan area of Santiago. They show how parental preferences and economic barriers to accessing private schools increases the homogeneity of school composition. The higher the number of available private schools practicing academic selectivity with high fees, the greater the difference between observed segregation and counterfactual proximity-based segregation.

Interestingly, despite different institutional designs in school choice and school admissions policies and variations in the use of counterfactual simulations, the evidence available shows that school segregation is always higher than residential segregation, revealing mostly negative effects of school choice policies on education equity.

Available school choices may be determined by regulations that allow families to choose beyond their area of residence and/or because the system increases its diversity by expanding private or public schools with higher levels of autonomy. Barcelona is an interesting case study because it meets the two conditions. In 2012, the educational authority of the city—*Consorci d'Educació de Barcelona* (CEB)—introduced a reform that expanded the available school choice. In addition, the educational system is highly diverse, with 56.6% of families opting for a private subsidised school, 41.4% for a public school and only 2% a private independent school. The following section describes the particularities of Barcelona's school admissions policy, as an interesting case of controlled choice.

School admissions policy in Barcelona

Barcelona has a particular and rather exceptional school admissions policy compared to other cities in Spain. Most families apply for a school place in pre-primary education during the year in which their child turns 3 years old.² Parents may express a set of school preferences, including any public or subsidised private schools in the city, and students are allocated using an immediate acceptance algorithm (also known as the Boston mechanism).³ Although families are free to apply to any public or privately subsidised school in the city, in case of oversubscription, applications are prioritised using three main criteria that were already established by the 8/1985 Education Reform Act on the Organic Law of the Right to Education. These criteria include residential proximity, the enrolment of siblings at the school and household income.⁴

The inclusion of both public and private subsidised schools in the same system of school choice responds to the long-standing dual character of the Spanish education system. The historical inhibition of the state in education consolidated a private education sector which has retained a significant share of the education market, even following a progressive increase in the quality and quantity of public education since the democratic transition (Bonal, 2012). Most private subsidised schools are Catholic (72.1%); in some regions they account for more than 85% of all private subsidised schools.⁵ In Barcelona, in particular, the proportion of children in compulsory schooling attending private subsidised schools is 56.6%, while 41.4% of students attend public schools, with only 2% enrolled in private independent schools (CEB, 2017). Private subsidised schools' costs and school ethos are very diverse. Some of them are similar to public schools and are open to all students, but others charge *de facto* high school fees⁶ (in the form of voluntary contributions), which prevent most low-income students from attending. Despite these differences, all private subsidised schools are under the same regulations as public schools regarding school admissions, curriculum obligations and other requirements and standards regarding material resources, facilities and teaching staff (Bonal *et al.*, 2019).

The peculiarity of Barcelona's school admission system lies in the way the proximity priority is established. There are 29 catchment areas or school districts in the city. All residents have the proximity priority for all public and subsidised private schools within their catchment area of residence. However, in 2006, the CEB, the public

body in charge of the city's educational planning, established a unique system of school choice: a minimum common number of schools was approved to balance available choice for all families. While each family could choose all the schools located within the catchment area, a minimum of six schools (three public and three private subsidised) was guaranteed as 'proximity' schools, even if these schools were located outside the catchment area of the student's residence. In this way, the system ensured a minimum but balanced choice availability for all, with the possibility for families living in 'border zones' to access schools closest to their homes. Therefore, student residence and the number of available public and subsidised private schools in the catchment area determined each student proximity choice set.

In 2012, a new reform was approved to make the system even more choice friendly. For each cluster of houses, proximity schools were assigned following these criteria:

1. All schools located in the same catchment area where the cluster of houses is located.
2. The three public schools and three privately subsidised schools closest to the cluster of houses.
3. All schools less than 500 m from the cluster of houses.
4. If necessary, all closest schools to achieve a minimum choice set of six public schools and six privately subsidised schools.

As a consequence of these new criteria to ascribe proximity priority, and considering the oversupply of schools in certain areas of the city, the estimated average of proximity schools per family increased from 7.9 to 16.7 in 2012 (CEB, 2012). By shifting school choices through these criteria, the CEB tried to compensate for the unequal internal distribution of the different catchment areas, which differ both in the overall number of schools and in public and privately subsidised provision.

While a minimum number of 12 choices were guaranteed with the new admissions policy, the implementation of the new criteria produced significant geographical inequalities in the choice options. Figure 1 reflects differences in the number of schools available per cluster of houses as a result of implementing the above-mentioned criteria. While the average of proximity schools is currently 18.5, available options range from 12 schools to more than 40 in certain locations. This unequal geographical distribution of school supply, with some catchment areas having a high supply and others with fewer school places, explains these differences in families' available choices. Wealthier districts in the centre and northwest part of the city have many schools (most of them are subsidised private schools), which results in higher choice options for their residents. Poorer districts in the periphery offer lower choice possibilities. Figure 2 shows that the location of privately subsidised schools (which enrol 56.6% of the student population in compulsory education) is one of the main reasons for inequalities in students' available choices.

Regarding the type of educational institution, the average number of proximity public schools by cluster of houses is 9.0, whilst in the case of privately subsidised schools it increases to 9.6. However, the possibilities for accessing a public or a private school are clearly unevenly distributed geographically. Figure 3 shows the ratio of public/private schools available as proximity schools for each cluster of houses.

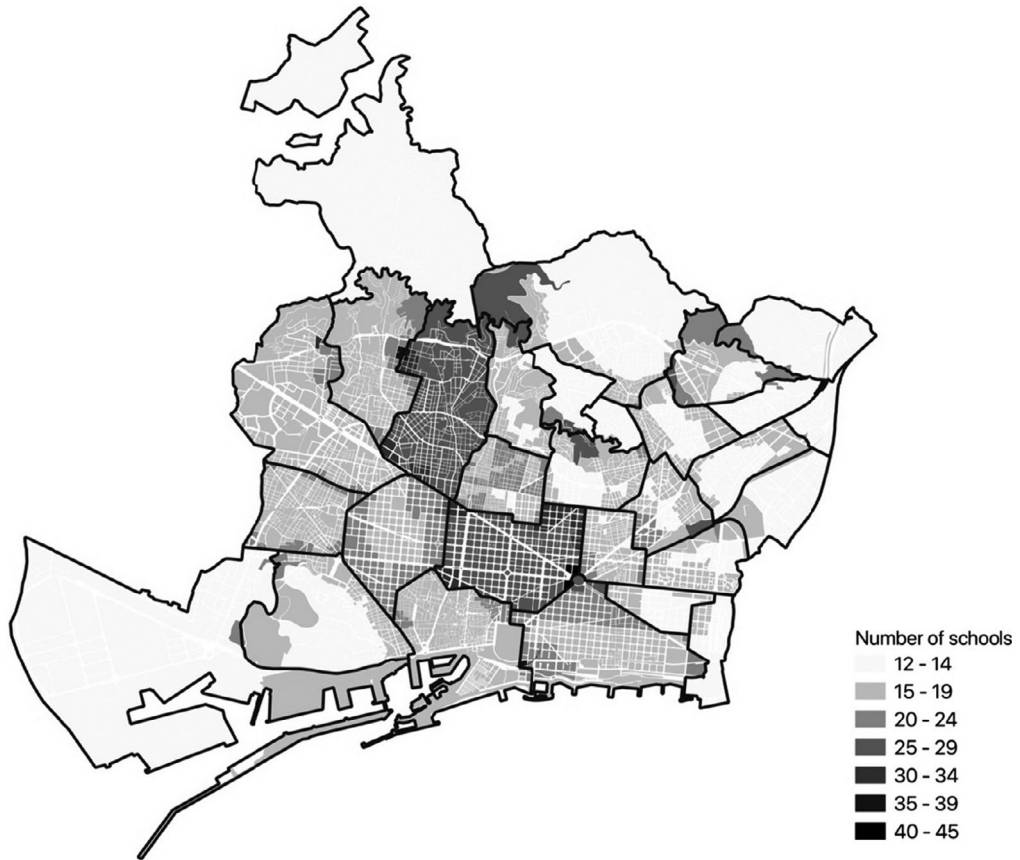


Figure 1. Choice set per block of houses and catchment areas, Barcelona, school year 2016–2017.
Source: Authors' elaboration based on CEB dataset.

Values above 1 indicate higher availability of public options, while values below 1 reflect a higher number of subsidised private school options. The map clearly identifies some central areas in the city (the wealthier areas) with a clear oversupply of private schools and others with more public-school options in the periphery.

The admissions policy reform adopted in 2012 was presented by the conservative government as a strategy to reduce the supposed strong relationship between residential and school segregation (Bonal and Verger, 2013). By allowing more choice, it was expected that students' mobility would increase, so families living in poorer neighbourhoods of the city would not be restricted to accessing only local schools, thus reducing the overall school segregation. However, although a specific impact evaluation of the effects of extending school choice was not commissioned, research suggests that school segregation of foreign students in Barcelona remained stable between 2006 and 2016 (rather than reducing), and even increased slightly in some districts (Sindic de Greuges, 2016).

This unique school admissions policy design, which combines the existence of catchment areas that cannot be considered as completely closed spaces with broader school choice, generates dynamics of enrolment that are highly contextually and

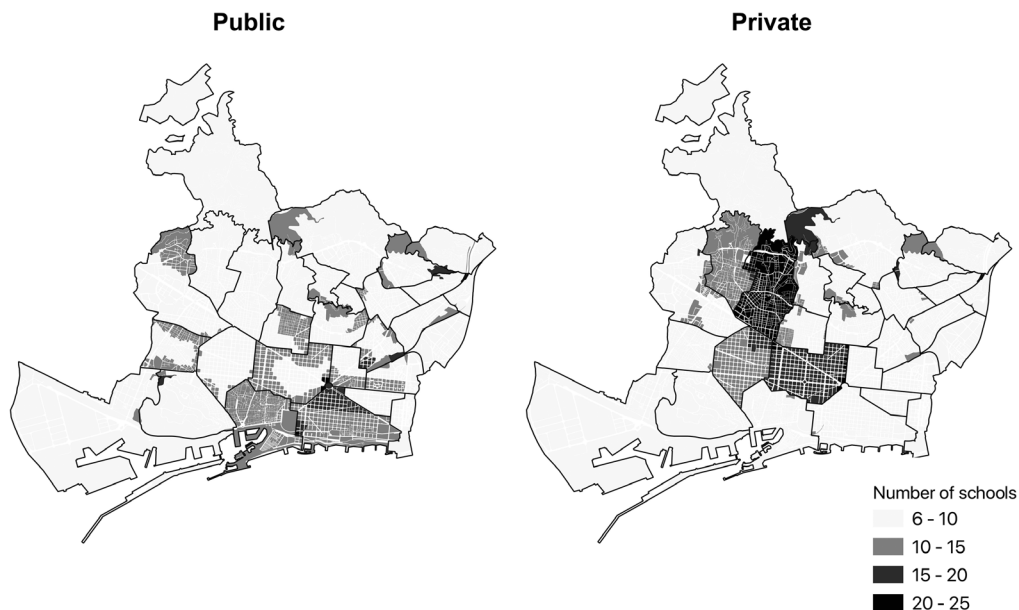


Figure 2. Choice set for public and private subsidised schools per block of houses, school year 2016–2017. *Source:* Authors' elaboration based on CEB dataset.

geographically driven. That is, whether families opt for their children to attend a neighbourhood school, a school in the catchment area or commute to a school outside their area depends on the interaction of several factors. In particular, the geographical distribution of schools in the city (the closeness to each catchment area), the spatial distribution between public and private schools, the level of oversubscription of proximity schools and parental preferences for a certain type of school are all factors affecting the strategies of different types of families (Bonal *et al.*, 2019). These factors and decisions, in turn, affect the overall level of school segregation in the city and among catchment areas.

Research questions, data and methods

In the context of the described system of controlled choice, this research explores whether students' geographical mobility resulting from school choice affects the school segregation of three groups of socially disadvantaged students: (a) students with foreign nationality; (b) FSM beneficiaries; and (c) RSAs.⁷ If the effects of the 2012 reform were as foreseen, we would expect higher levels of mobility of socially disadvantaged students, which could reduce school segregation. To achieve this objective, this research addresses two questions:

1. How does the current system of controlled choice affect the mobility of socially disadvantaged students? That is, do socially disadvantaged students opt out of local schools more than non-disadvantaged students?
2. How would school segregation of disadvantaged students change if the available choices were reduced and students enrolled in schools close to their homes?

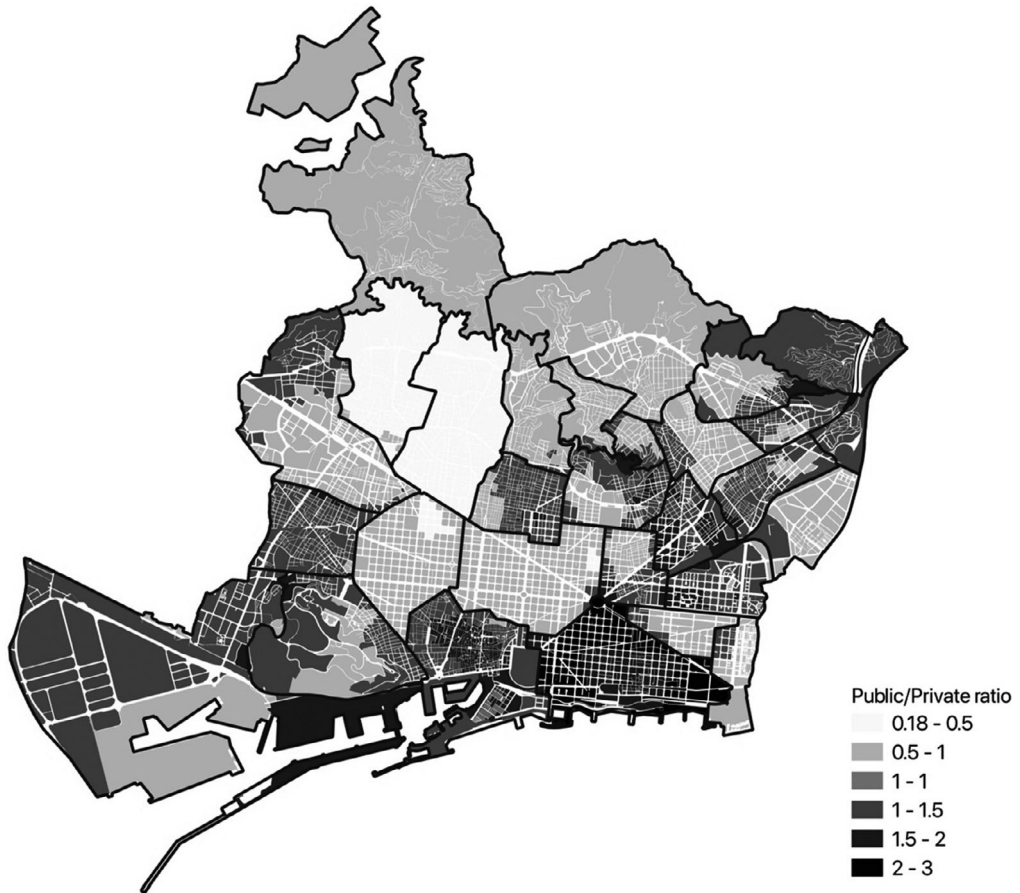


Figure 3. Ratio public/private schooling options included in the choice set by block of houses, school year 2016–2017. *Source:* Authors' elaboration based on CEB dataset.

The evidence presented is based on the secondary data analysis of two datasets provided by the CEB,⁸ which contain information for the school year 2016–2017:

1. **Students' register**, which contains information on all students regarding the school they are enrolled in, the geographical coordinates of their residence, their grade, their nationality and whether FSM or RSA beneficiaries.
2. **Schools' register**, a dataset providing information on all city schools: type of institution (public or private subsidised), education levels provided and the geographical coordinates of their location.

Since the new system of school choices was introduced during the academic year 2012–2013, only students who accessed the education system when the new system was already in place were selected. The analysis therefore included students enrolled between the first grade of pre-primary education and the second grade of primary education. Table 1 summarises the main characteristics of the final sample of students analysed, including the number of socially disadvantaged students in each subgroup and the total number of public and privately subsidised schools.

Table 1. Basic characteristics of the sample, school year 2016–2017

	<i>n</i>	%
Students	58,487	100.0
Socially disadvantaged students	17,259	29.5
FSM	11,329	19.4
RSA	5,117	8.7
Foreign	9,928	17.0
Schools	331	100.0
Public	167	50.5
Private subsidised	164	49.5

Note: Some students may belong to more than one category of disadvantage, which explains why the total of socially disadvantaged students does not correspond to the sum of each category.

Source: Authors' elaboration based on CEB dataset.

By applying geographical information system techniques, location variables were generated, including identification of the catchment area of residence and schooling of students, the nearest school to the residence of each student and in which catchment area each school was located.

As a measure of school segregation, we used the dissimilarity index. This index is particularly relevant in the case of school segregation, because it reflects an estimation of the percentage of disadvantaged students that should be located in a different school to achieve a perfectly equal distribution among schools. The index is calculated as follows:

$$D = \frac{1}{2} \sum_{i=1}^n \left| \frac{x_i}{X} - \frac{y_i}{Y} \right|,$$

where x_i is the number of each group of socially disadvantaged students in school i , X is the total number of disadvantaged students in the city, y_i is the number of non-disadvantaged students in the school and Y is the total number of non-disadvantaged students in the city or catchment area. Students' residential segregation was estimated following the same procedure but using census tracts⁹ as spatial subunits of analysis (i) instead of schools. The dissimilarity index varies between 0 and 1 and higher values indicate higher levels of school segregation.

Students' mobility and school segregation

In Barcelona, inequalities between districts and neighbourhoods have increased significantly after the rapid growth of migration, which was particularly acute at the beginning of the twenty-first century. Income inequality widened in the wake of the economic crisis, and the residential segregation of both foreign and poor populations increased after 2009 (Nel-lo and Blanco, 2015). The oldest city centre and two districts in the two extremes of the city concentrate the poorest inhabitants and also have the highest presence of foreign population (Galeano and Bayona, 2015).

In addition to residential inequalities, school choice plays an important role in the reproduction of school segregation. Figure 4 shows the relationship between residential and school segregation for the 29 catchment areas of the city and for each subgroup of socially disadvantaged students. The three graphics show that in most catchment areas, school segregation is significantly higher than residential segregation (all those points that are above the 45° line). This pattern is observable for the three subgroups of disadvantaged students. There are a few exceptions to this rule, particularly in the case of RSAs, who have higher residential segregation than school segregation in five catchment areas. This could be explained by the particular geographical characteristics and distribution of school supply in these areas.

The greater disparity in distribution of students in schools than residential territories is the result of patterns of school choice (by both families of socially disadvantaged and non-disadvantaged students). These choices are conditioned by available choices, systems of preferences and choice restrictions in specific local education markets (Alegre *et al.*, 2010; Bonal *et al.*, 2019). Differences in the patterns of mobility of different subgroups of students reflect how these opportunities, restrictions and preferences interact to produce specific circuits of schooling (Ball *et al.*, 1995), generating a significant distance between residential and school segregation.

Mobility of socially disadvantaged and non-socially disadvantaged students

As a result of the new system of school choice, students' mobility can be classified into three different patterns: (1) attending a school located in their catchment area of residence; (2) attending a school located outside their catchment area of residence, but considered as a proximity school, resulting from the extended proximity criteria established by the new choice scheme; and (3) attending a school outside their catchment area of residence but not classified as a proximity school, thus opting out of the local schools assigned by the system. Table 2 shows the prevalence of each of these three patterns for all the students included in the analysis. While one out of three students (33.5%) are not enrolled in a school located in their catchment area of residence, only half of them opt out of proximity schools and the other half are enrolled in proximity schools.

When these patterns of choice are broken down by the type of institution, generally students leaving their catchment area are more likely to enrol in privately subsidised

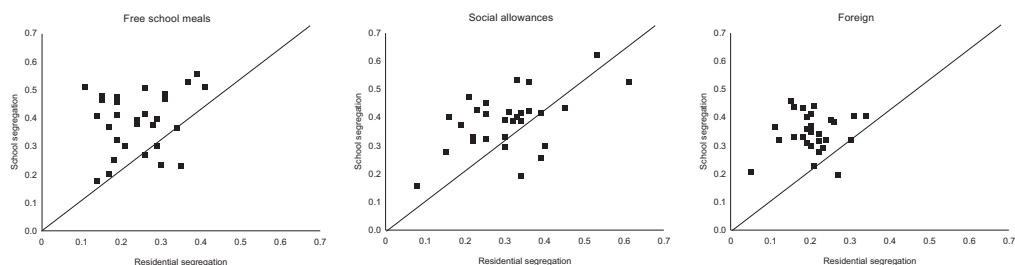


Figure 4. Residential vs school segregation by catchment areas (dissimilarity indices), school year 2016–2017. *Source:* Authors' elaboration based on CEB dataset.

schools. Commuting to a privately subsidised school is primarily the preferred option of those students opting out of proximity schools. Beyond any particular school choice scheme, the presence of private schools in the city acts as a strong predictor of students' mobility and school segregation, which has also been demonstrated in other Spanish cities (Bonal *et al.*, 2019; Gortázar *et al.*, 2020).

From a geographical point of view, opportunities to leave the catchment area of residence by using the extended proximity provided by the new scheme of school choice are also affected by its particular design, which gives more possibilities of leaving the catchment area to those students inhabiting border zones. Figures 5 and 6 include two maps displaying enrolment outside the catchment areas, the former for those attending proximity schools outside their catchment area of residence and the latter for those opting out of proximity schools. Figure 5 shows how students living in border zones are more likely to access schools outside the catchment area (for which they also obtain the maximum proximity points). Figure 6 reveals a more heterogeneous spatial distribution of the real opting out of proximity schools.

To assess whether different patterns of choice impact on the school segregation of socially disadvantaged students, we compared their patterns of mobility with those of the non-disadvantaged students. Current regulations on school choice may result in similar or different patterns of enrolment in proximity and non-proximity schools, which may reveal who makes greater use of the broader school choice. Table 3 shows differences in the spatial patterns of enrolment between socially disadvantaged and non-disadvantaged students. In all cases, non-disadvantaged students are more likely to leave the catchment area than disadvantaged students. Higher differences are observable for RSAs, followed by foreign students and recipients of FSMs. The table also shows that while non-disadvantaged students who leave the catchment area are more likely to opt out of neighbourhood schools (enrolling in non-proximity schools), most disadvantaged students who leave their catchment area of residence are enrolled in proximity schools.

Table 4 shows that patterns of mobility of disadvantaged and non-disadvantaged students are highly related to their enrolment in public or privately subsidised schools. It shows that the real opting out usually has privately subsidised schools as the main destination: 71.9% of students who leave their catchment area and are enrolled in non-proximity schools attend privately subsidised schools and only 28.1% go to public schools. Table 4 also presents patterns of mobility of the three subgroups of disadvantaged students. As expected, the level of enrolment of disadvantaged students in public schools is significantly higher than for the rest of the students. In addition, and in contrast to the patterns of mobility of the overall population, for all

Table 2. Distribution of students depending on their area of schooling, school year 2016–2017

	Students (%)	Public	Private subsidised
Catchment area	66.5	53.0	47.0
Extended proximity	16.8	46.0	54.0
Non-proximity schools	16.7	28.1	71.9

Source: Authors' elaboration based on CEB dataset.

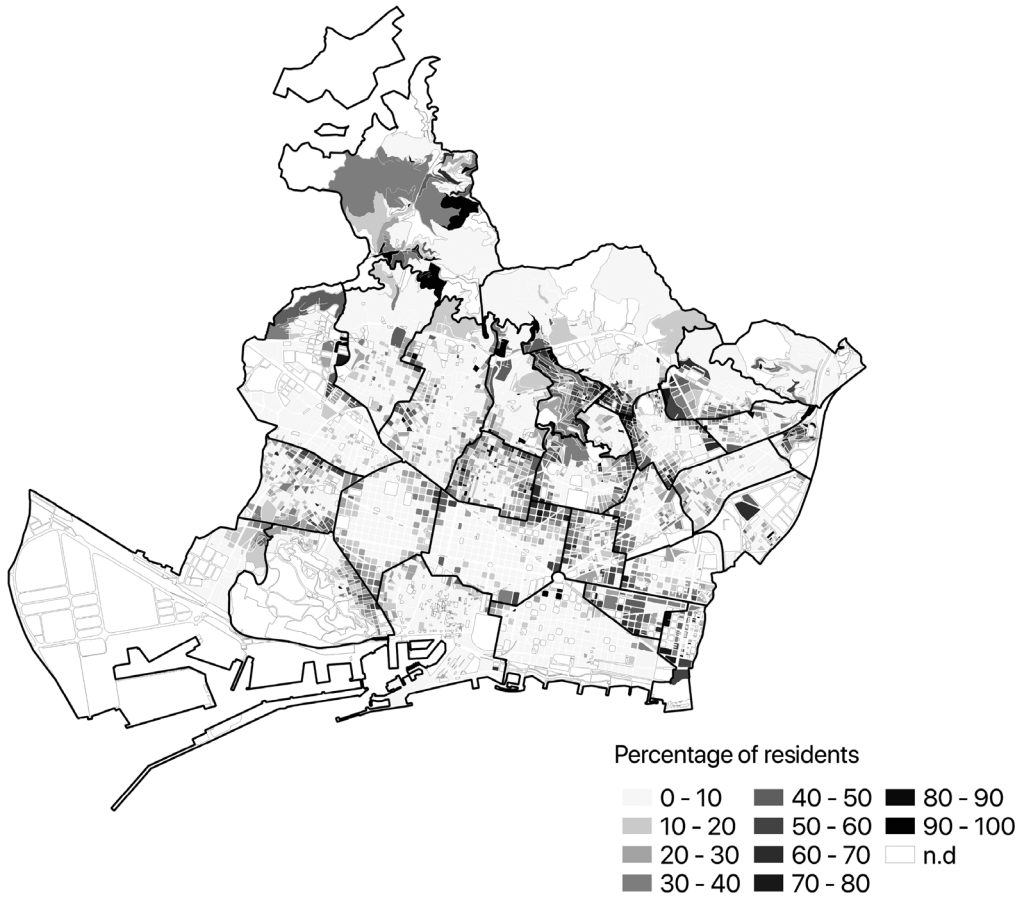


Figure 5. Percentage of residents enrolled in proximity schools outside the catchment area of residence, by block of houses, school year 2016–2017. *Source:* Authors' elaboration based on CEB dataset. *Note:* No data (n.d.) refers to those blocks of houses with no students residing.

subgroups the cases of non-proximity options are higher in public than in privately subsidised schools. The differences are especially acute in the case of FMS and RSA beneficiaries, while the real opting out of foreign students is more balanced between public and privately subsidised schools.

School segregation is also affected by the different patterns of enrolment of disadvantaged and non-disadvantaged students in proximity schools. Table 5 shows that 17.2% of students attend the nearest school to their home. In all cases, socially disadvantaged students are more likely to attend the nearest school.

To analyse to what extent these different patterns of mobility between disadvantaged and non-disadvantaged students are statistically significant, we present the odds ratios of enrolling in proximity schools (catchment areas and other criteria of proximity established by the CEB) and those of enrolling in the nearest school to their home (Figure 7). Since the different conditions of disadvantage overlap for some students, the odds ratios were estimated using a logistic regression, which avoids coincidence between different students' characteristics. Both graphs clearly show that the

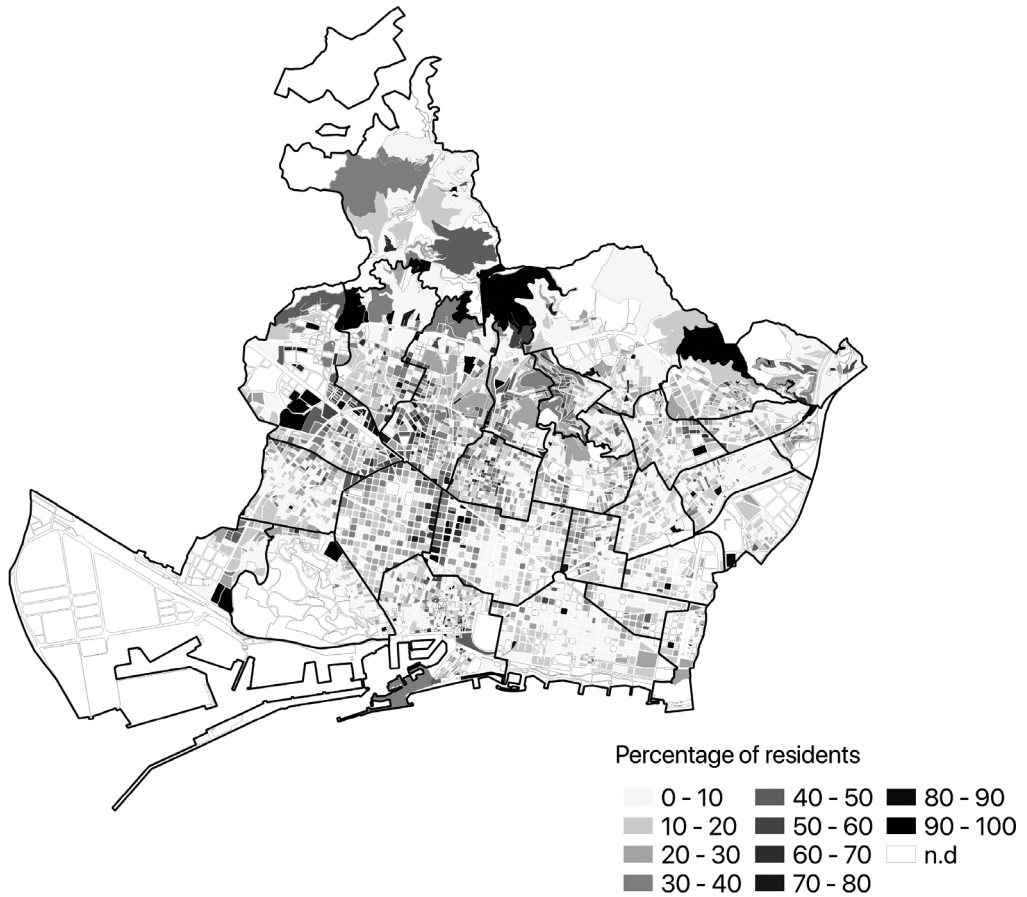


Figure 6. Percentage of residents enrolled in non-proximity schools outside the catchment area, by block of houses. *Source:* Authors’ elaboration based on CEB dataset. *Note:* No data (n.d.) refers to those blocks of houses with no students residing.

Table 3. Students enrolled outside the catchment area, school year 2016–2017

		Students leaving their catchment area				Student distribution	
		%	<i>n</i>	% Extended proximity	% Opting out	% Extended proximity	% Opting out
FSM	No	35.0	16,507	17.2	17.8	49.1	50.9
	Yes	27.3	3,093	15.3	12.0	56.0	44.0
RSA	No	34.5	18,416	17.2	17.3	49.9	50.1
	Yes	23.1	1,184	13.0	10.1	56.3	43.7
Foreign	No	34.9	16,966	17.3	17.7	49.4	50.6
	Yes	26.5	2,634	14.6	12.0	54.9	45.1

Source: Authors’ elaboration based on CEB dataset.

Table 4. Proximity and non-proximity enrolment in public and private subsidised schools, school year 2016–2017

	All students		FSM		RSA		Foreign	
	Public	Private subsidised	Public	Private subsidised	Public	Private subsidised	Public	Private subsidised
All students	47.7	52.3	76.9	23.1	82.7	17.3	68.0	32.0
Catchment area	53.0	47.0	78.3	21.7	83.7	16.3	70.9	29.1
Extended proximity	46.0	54.0	74.9	25.1	82.2	17.8	63.5	36.5
No proximity	28.1	71.9	71.5	28.5	76.4	23.6	55.4	44.6

Source: Authors' elaboration based on CEB dataset.

Table 5. Percentage of students enrolled in the nearest school to their home, school year 2016–2017

	Nearest school	
All students	17.2	
FSM	No	16.0
	Yes	22.4
RSA	No	16.5
	Yes	25.3
Foreign	No	16.1
	Yes	23.0

Source: Authors' elaboration based on CEB dataset.

use of proximity schooling is significantly higher for socially disadvantaged students, in particular for foreign students, who are 40% more likely to enrol in proximity schools compared to native students.

School choice opportunities and school segregation: counterfactual analysis

To respond to whether students' mobility increases or reduces school segregation (the second research question), we completed a counterfactual approach that compares the actual enrolment of socially disadvantaged and non-disadvantaged students with enrolment that would take place in two hypothetical scenarios, one with reduced school choice and another based on proximity allocation. The two simulated scenarios were estimated as follows:

1. *Catchment area.* All students were assigned to the school situated in their catchment area of residence. Students already attending a school located in their catchment area of residence were retained in the same school. Students enrolled

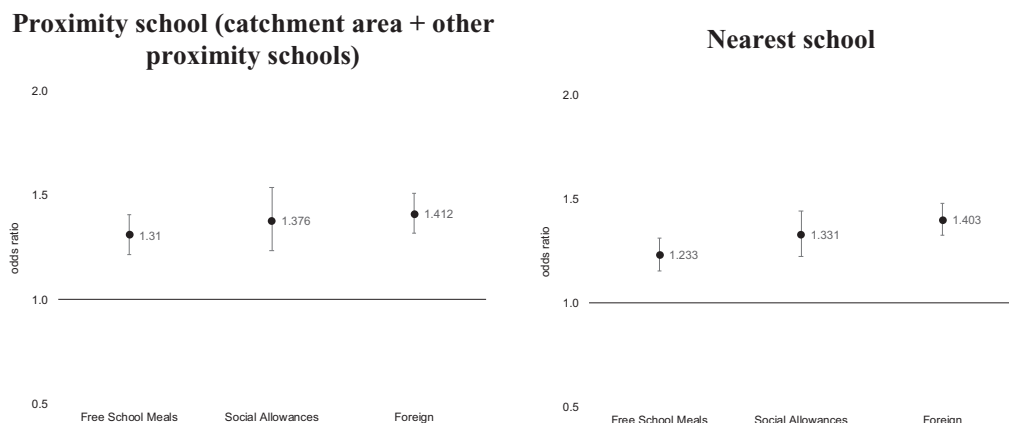


Figure 7. Odd ratios in two scenarios of proximity schooling for the three subgroups of vulnerable students. *Source:* Authors' elaboration based on CEB dataset.

outside their catchment area were assigned to one of the schools situated in their catchment area using an equal probability function.

2. *Nearest school.* All students were assigned to attend the nearest school to their place of residence. To simulate this scenario, the Euclidean distance between the students' residence and all city schools was calculated and each student was assigned to their nearest school.

While both methods of allocation may incur the potential problem of oversubscription of some schools (which could make the counterfactual scenarios less realistic), this problem can be practically ignored in the case of Barcelona, since there is a significant oversupply of school places in the city. This means that in most cases, both schools and catchment areas would have the possibility to absorb the educational demand of the students' area of residence.¹⁰

We estimated the dissimilarity indices for the real scenario and the two simulated scenarios for each group of socially disadvantaged students (Table 6). As the table shows, school segregation decreases significantly in both simulated scenarios. For FSM beneficiaries, segregation reduces by 21.6% in the catchment area scenario and by 33.3% in the case of the nearest school scenario. A similar reduction is observed in the case of foreign students. However, in the case of RSAs, the reduction is less acute: 16.7% in the catchment area scenario and 25.9% in the nearest school scenario. This can be explained by the fact that the residential segregation of RSAs is higher than for the other two subgroups of disadvantaged students.¹¹

The simulated scenarios may also be an interesting tool of analysis to observe how social stratification between public and privately subsidised schools could change by restricting school choice. Table 7 shows the ratio between the percentage of each one of the three subgroups of disadvantaged students enrolled in public and private subsidised schools as an indicator of the stratification between the two sectors. Higher stratification values indicate a higher proportion of disadvantaged students attending public schools, relative to a perfectly balanced distribution between public and private subsidised schools. In both simulated scenarios, stratification between public and private schools is significantly reduced. In the catchment area scenario, the reduction of

Table 6. Dissimilarity index for the three subgroups of socially disadvantaged students in real and simulated scenarios, school year 2016–2017

	Real scenario	Catchment area	Nearest school	%Δ Catchment area vs real scenario	%Δ Nearest school vs real scenario
FSM	0.51	0.40	0.34	−21.6	−33.3
RSA	0.54	0.45	0.40	−16.7	−25.9
Foreign	0.45	0.34	0.28	−24.4	−37.8

Source: Authors' elaboration based on CEB dataset.

Table 7. Stratification between public and private schools for the three subgroups of socially disadvantaged students in real and simulated scenarios (ratios public/private), school year 2016–2017

	Real scenario	Catchment area	Nearest school	%Δ Catchment area vs real scenario	%Δ Nearest school vs real scenario
FSM	3.7	2.4	1.3	−35.4	−66.0
RSA	5.2	3.2	1.3	−39.0	−74.8
Foreign	2.3	1.8	1.1	−22.6	−52.2

Note: A ratio of 1 means that the distribution between public and private subsidised schools is perfectly balanced. Ratios above 1 indicate that disadvantaged groups are over-represented in public schools.

Source: Authors' elaboration based on CEB dataset.

social stratification varies between 22.6% in the case of foreign students and 39.0% for RSAs. However, differences in the enrolment of disadvantaged students between public and private sectors would be particularly reduced in the nearest school scenario. While the rate of reduction is particularly significant for FSM beneficiaries (66.0%) and RSAs (74.8%), in the case of foreign students, the nearest school scenario leads to almost a complete balance between the public and private sectors (an index of stratification of 1.1). Interestingly, the counterfactual approach shows that student sorting between public and private schools is influenced more by the school choice opportunities given by the current policy rather than by students' residential segregation or the geographical distribution of private subsidised schools.

To sum up, the counterfactual analysis shows how higher restrictions on families' school choices would reduce school segregation of socially disadvantaged students, as well as the social stratification between public and private schools. The policy shift of 2012, which expanded the choices, seems to have failed both in terms of reducing education inequalities and enhancing the mobility of the most disadvantaged students. In contrast, non-disadvantaged families have used the increased school choices to opt out of proximity schools.

Conclusion and discussion

Research on the effects of school choice has consistently demonstrated a trade-off between increasing families' choice and equity, particularly regarding school

segregation and social stratification between schools. Indeed, this analysis is in line with the findings of a recent OECD (2019: 80) comparative report, which asserts that ‘relaxed residence-based admission regulations are related to an increase in social segregation across schools’. The case of Barcelona is particularly interesting because in recent years, the education authorities have progressively increased families’ school choices, reducing the role of proximity as a criterion for accessing schools.

As our findings have shown, students’ patterns of commuting to school differ significantly between socially disadvantaged and non-disadvantaged students. Disadvantaged students are not only less likely to opt out of their neighbourhood schools, but also the extended proximity opportunities provided by the reformed school choice system in 2012 are less used by disadvantaged than non-disadvantaged students. Likewise, even among those students enrolled in proximity schools, disadvantaged students are more likely to attend the nearest school to their residence than non-disadvantaged students. Beyond the analysis of the differences in students’ mobility, the counterfactual analysis has shown that more restricted choice scenarios would have the potential to reduce both the school segregation of disadvantaged students and the social stratification between public and private schools.

While the 2012 school choice reform was justified as a means to reduce school segregation, we argue that the expansion of school choices did not benefit disadvantaged students in Barcelona. Rather, it resulted in non-disadvantaged students exiting neighbourhood schools at a higher rate than disadvantaged students. A reform initially designed to constrain the relationship between residential and school segregation produced the unintended effects of increasing geographical inequalities of schooling in the city.

Our analysis underlines the existence of two factors that can help us to understand the different patterns of mobility. First, while the reform ensured a common minimum number of proximity schools, it could not avoid significant differences in the available school choices between the different areas of the city. The schools’ geographical distribution heightens the heterogeneity in the available choices open to different families. Second, the distribution of public and private schools in the city is very unequal, with a much larger presence of private schools in the wealthier areas. However, as our counterfactual analysis has proven, despite this unequal geographical distribution, differences in social stratification between public and private schools would drastically reduce in scenarios of more proximity schooling. School choice expansion seems to encourage non-disadvantaged students to opt out of proximity schools, increasing the polarisation of the two sectors.

There are certainly other unexplored factors that might impinge on differences in the patterns of mobility between disadvantaged and non-disadvantaged students. These include, for instance, the particular characteristics of local education markets, with lower or higher number of quality schools and the geographical isolation of certain city neighbourhoods, which limit the possibilities of commuting to non-local schools. In any case, what appears clear is that the aggregate result of reducing residence-based admission is an increase in the school segregation of socially disadvantaged students.

Our findings invite a review of the current system of (un)controlled choice to reduce school segregation of socially disadvantaged students. Although replications

of the analysis carried out would be necessary to check whether mobility patterns are relatively stable across different school years, based on our findings public authorities may have at least three options to reduce school segregation between disadvantaged and non-disadvantaged students. The first and less ambitious policy change would be to try to equalise not only the minimum choice set for all families but also the maximum number of proximity schools. The current system is unequal, with extreme ranges from 12 to more than 40 schools, depending on the cluster of houses of residence. The impact of such a policy change on school segregation would need to be assessed, but at least this measure would be more coherent with the spirit of a reform that tries to equalise school choices.

A second reform of the current institutional design could be to redefine the catchment areas, making them demographically balanced, socially heterogeneous and defining them as ‘closed’ spaces of access to proximity schools. This reform would also require reducing the current minimum number of schools as proximity schools, especially in some areas that might have fewer schools available. While the number of choices might not be perfectly balanced, an adequate planning of school supply would compensate for these differences. Such a reform would ensure higher levels of proximity schooling, which would situate school segregation closer to residential segregation. Considering the relatively lower levels of residential segregation of southern European cities (Arbaci, 2019; Boterman *et al.*, 2019) and the differences observed between residential and school segregation in our study, such a reform would most probably reduce spatial inequalities in education.

Finally, a third potential reform might combine some of the previous policies with an efficient and ambitious system of school place reservations for socially disadvantaged students in all schools. While this policy is already in place in Spain (students with physical, psychological or socioeconomic needs have reserved seats in ordinary schools), it can clearly be improved by extending the minimum number of reserved seats and adapting it to the needs of different territories (catchment areas, for instance). The CEB is currently developing this third policy option, which might ensure a more balanced distribution of disadvantaged students if they choose to access those schools where they have reserved seats. While this policy may certainly contribute to reduce school segregation, it should probably be combined with other policy reforms to minimise the current opting out of some non-disadvantaged families.

There are many non-spatial policies that may also help to achieve higher levels of equity in the education system, in particular compensatory policies addressing the most marginalised schools, which might contribute to attracting educational demand. Nevertheless, these policies are perfectly compatible with a policy reform of the current institutional design, which generates school segregation by allowing high levels of school choice.

NOTES

¹ We use ‘foreign’ students as a category of vulnerable students for two main reasons. First, there is no reliable data on students’ country of origin, which would provide a more accurate category of vulnerability. Second, because of the recent migration waves, most students with foreign nationality in Spain proceed from developing countries. Other studies about school segregation in Catalonia have also used foreign nationality as a category of vulnerability (Síndic de Greuges, 2016).

- ² In Spain, compulsory education starts at the age of 6, when children begin primary education. However, most applications take place at the age of 3, since the system provides universally 3 years of pre-primary education. Indeed, the net enrolment rate for the 3-year-old population in Catalonia is 94.2% according to the Catalan Institute of Statistics (IDESCAT, 2020).
- ³ The immediate acceptance algorithm or ‘Boston mechanism’ is a student placement procedure through which students (families) list their preferences. Given the reported preferences, the allocation of school places follows an algorithm that maximises students’ preferences, subject to the pre-specified priorities of students at each school: places at each school are allocated based on students’ rank calculated from the algorithm (Cantillon, 2017).
- ⁴ While these general criteria are set as a national regulation, regional and local educational authorities can establish their own indicators to define residential proximity and thresholds for household income.
- ⁵ Data from ‘Datos y cifras de la Educación Católica. Curso 2016–2017’, available online at www.escuelascatolicas.es/wp-content/uploads/2018/02/Estadistica20162017.pdf (accessed 19 September 2020).
- ⁶ A recent study carried out in the city of Barcelona estimates that despite formal gratuity, most publicly subsidised private schools and many public schools charge *fees* to parents (in the form of voluntary contributions). The average private cost of schooling in the wealthiest district of Barcelona is €1,640, while this cost is €634 in the poorest district (with a reduced presence of publicly subsidised private schools) (Bonal and Zancajo, 2019).
- ⁷ RSAs include students in a situation of severe poverty, who receive cash transfers from the City Council.
- ⁸ The students’ and schools’ register datasets proceed from the administrative records of Barcelona’s local educational authority (CEB). All student information is reported by schools to the CEB through an online platform for administrative purposes.
- ⁹ In Spain, census tracts (*secciones censales*) are the smallest administrative units. Barcelona is divided into 1,068 census tracts, which range between 1,000 and 2,500 inhabitants.
- ¹⁰ In addition, we did not have access to data on changes in the number of units (classrooms) per school for the academic year 2016–2017. In Barcelona, there are frequent changes in the final number of units offered by the schools, especially after the increase of newly arrived migrant students in the last two decades.
- ¹¹ Dissimilarity indices of residential segregation are 0.31 for RSAs, 0.24 for FSM beneficiaries and 0.21 for foreign students.

References

- Alegre, M.À. & Ferrer, G. (2010) School regimes and education equity: Some insights based on PISA 2006, *British Educational Research Journal*, 36(3), 433–461.
- Allen, R. (2007) Allocating pupils to their nearest secondary school: The consequences for social and ability stratification, *Urban Studies*, 44(4), 751–770.
- Allen, R., Burgess, S. & McKenna, L. (2013) The short-run impact of using lotteries for school admissions: Early results from Brighton and Hove’s reforms, *Transactions of the Institute of British Geographers*, 38(1), 149–166.
- Arbaci, S. (2019) *Paradoxes of segregation: Housing systems, welfare regimes and ethnic residential change in southern European cities* (Oxford, Wiley).
- Archbald, D.A. (2003) School choice, magnet schools, and the liberation model: An empirical study, *Sociology of Education*, 77, 283–310.
- Ball, S.J. (1998) Big policies/small world: An introduction to international perspectives in education policy, *Comparative Education*, 34(2), 119–130.
- Ball, S.J., Bowe, R. & Gewirtz, S. (1995) Circuits of schooling: A sociological exploration of parental choice of school in social class contexts, *The Sociological Review*, 43(1), 52–78.
- Ben-Porath, S.R. (2009) School choice as a bounded ideal, *Journal of Philosophy of Education*, 43, 527–544.
- Bifulco, R., Ladd, H.F. & Ross, S.L. (2009) Public school choice and integration evidence from Durham, North Carolina, *Social Science Research*, 38(1), 71–85.
- Bonal, X. (2012) Education policy and school segregation in Catalonia: The politics of non-decision making, *Journal of Education Policy*, 27(3), 401–421.
- Bonal, X. & Verger, A. (2013) *L’agenda de la política educativa a Catalunya: una anàlisi de les opcions de govern (2011–2013)* (Barcelona, Fundació Jaume Bofill).
- Bonal, X. & Zancajo, A. (2018a) Demand rationalities in contexts of poverty: Do the poor respond to market incentives in the same way?, *International Journal of Educational Development*, 59, 20–27.

- Bonal, X. & Zancajo, A. (2018b) School segregation in the Spanish quasi-market, in: X. Bonal & C. Bellei (Eds) *Understanding school segregation: Patterns, causes and consequences of spatial inequalities in education* (London, Bloomsbury), 201–220.
- Bonal, X. & Zancajo, A. (2019) *Equivalència territorial en la planificació educativa a Barcelona* (Barcelona: Consorci d'Educació de Barcelona). Available online at: https://www.edubcn.cat/rcs_gene/extra/01_documents_de_referencia/Equivalencia_BCN_final_v2_20190320.pdf (accessed 11 September 2020).
- Bonal, X., Zancajo, A. & Scandurra, R. (2019) Residential segregation and school segregation of foreign students in Barcelona, *Urban Studies*, 56(15), 3251–3273.
- Boterman, W.R. (2013) Dealing with diversity: Middle-class family households and the issue of “black” and “white” schools in Amsterdam, *Urban Studies*, 50(6), 1130–1147.
- Boterman, W., Musterd, S., Pacchi, C. & Ranci, C. (2019) School segregation in contemporary cities: Socio-spatial dynamics, institutional context and urban outcomes, *Urban Studies*, 56(15), 3055–3073.
- Brandén, M. & Bygren, M. (2018) *School choice and school segregation: Lessons from Sweden's school voucher system* (Norrköping, Institute for Analytical Sociology).
- Burgess, S., McConnell, B., Propper, C. & Wilson, D. (2007) The impact of school choice on sorting by ability and socioeconomic factors in English secondary education, in: L. Woessmann & P. Peterson (Eds) *Schools and the equal opportunity problem* (Cambridge, MA, MIT Press), 273–292.
- Butler, T. & Robson, G. (2003) Plotting the middle classes: Gentrification and circuits of education in London, *Housing Studies*, 18(1), 5–28.
- Cantillon, E. (2017) Broadening the market design approach to school choice, *Oxford Review of Economic Policy*, 33(4), 613–634.
- CEB (2012) *Inici del curs escolar 2012–2013. Dossier de premsa* (Barcelona, Consorci d'Educació de Barcelona).
- CEB (2017) *La població escolar a la ciutat de Barcelona. Breu de dades* (Barcelona, Consorci d'Educació de Barcelona).
- Chubb, J.E. & Moe, T. (1990) *Politics, markets & America's schools* (Washington, D.C., The Brookings Institution).
- Cobb, C.D. & Glass, G.V. (2003) *Arizona charter schools: Resegregating public education?*, paper presented at the *Annual Meeting of the American Educational Research Association*, Chicago, IL.
- Elacqua, G. (2012) The impact of school choice and public policy on segregation: Evidence from Chile, *International Journal of Educational Development*, 32(3), 444–453.
- Elacqua, G., Montt, P. & Santos, H. (2013) *Evidencias para eliminar – gradualmente – el Financiamiento Compartido* (Madrid, Instituto de Políticas Públicas).
- Felouzis, G., Maroy, C. & van Zanten, A. (2013) *Les marchés scolaires: Sociologie d'une politique publique d'éducation* (Paris, Presses Universitaires de France).
- Frankenberg, E., Siegel-Hawley, G. & Wang, J. (2011) Choice without equity: Charter school segregation, *Educational Policy Analysis Archives*, 19(1), 1–96.
- Galeano, J. & Bayona, J. (2015) Segregación territorial y transformación del espacio residencial al inicio del siglo XXI: el caso del Área Metropolitana de Barcelona, in: J. de la Riva, P. Ibarra & M. Rodrigues (Eds) *Análisis espacial y representación geográfica: innovación y aplicación* (Zaragoza, Universidad de Zaragoza-AGE), 119–128.
- García, D.R. (2008) The impact of school choice on racial segregation in charter schools, *Educational Policy*, 22(6), 805–829.
- Gewirtz, S., Ball, S.J. & Bowe, R. (1995) *Markets, choice, and equity in education* (London, Open University Press).
- Gorard, S. (2014) The link between academies in England, pupil outcomes and local patterns of socio-economic segregation between schools, *Research Papers in Education*, 29(3), 268–284.
- Gorard, S. & Siddiqui, N. (2016) *Grammar schools in England: A new approach to analyzing their intakes and outcomes*. Project Report (Durham, Durham University).
- Gortázar, L., Mayor, D. & Montalbán, J. (2020) *School choice priorities and school segregation: Evidence from Madrid*. Iseak Working Paper 2020/1.

- Hoxby, C.M. (1998) What do America's 'traditional' forms of school choice teach us about school choice reforms?, *Economic Policy Review*, 4(1), 47–59.
- Hoxby, C.M. (2003) *The economics of school choice* (Chicago, IL, University of Chicago Press).
- Hsieh, C.T. & Urquiola, M. (2006) The effects of generalised school choice on achievement and stratification: Evidence from Chile's voucher program, *Journal of Public Economics*, 90(8–9), 1477–1503.
- IDESCAT (2020) www.idescat.cat/tema/educa (accessed 11 May 2020).
- Kye, S.H. (2018) The persistence of white flight in middle-class suburbia, *Social Science Research*, 72, 38–52.
- Lindbom, A. (2010) School choice in Sweden: Effects on student performance, school costs, and segregation, *Scandinavian Journal of Educational Research*, 54(6), 615–630.
- Merrifield, J. (2001) *The school choice wars* (Lanham, MD, Rowman & Littlefield).
- Musset, P. (2012) School choice and equity: Current policies in OECD countries and literature review, *OECD Education Working Papers*, 66, 1–51.
- Nel-lo, O. & Blanco, I. (2015) *La segregació urbana a la regió metropolitana de Barcelona*. Available online at: <https://pemb.cat/public/docs/41lc12.pdf> (accessed 30 September 2020).
- OECD (2017) *School choice and school vouchers: An OECD perspective* (Paris, OECD).
- OECD (2019) *Balancing school choice and equity: An international perspective based on Pisa* (Paris, OECD).
- Östh, J., Andersson, E. & Malmberg, B. (2013) School choice and increasing performance difference: A counterfactual approach, *Urban Studies*, 50(2), 407–425.
- Riedel, A., Schneider, K., Schneider, C. & Weishaupt, H. (2010) School choice in German primary schools: How binding are school districts?, *Journal for Educational Research Online*, 2(1), 94–120.
- Santos, H. & Elacqua, G. (2016) Segregación socioeconómica escolar en Chile: Elección de la escuela por los padres y un análisis contrafactual teórico, *Cepal Review*, 119, 133–148.
- Saporito, S. (2017) Irregularly-shaped school attendance zones and racial integration, *Social Science Research*, 64, 299–318.
- Síndic de Greuges (2016) *La segregació escolar a Catalunya (I): La gestió del procés d'admissió de l'alumnat* (Barcelona, Síndic de Greuges de Catalunya).
- Söderström, M. & Uusitalo, R. (2010) School choice and segregation: Evidence from an admission reform, *Scandinavian Journal of Economics*, 112(1), 55–76.
- Sohoni, D. & Saporito, S. (2009) Mapping school segregation: Using GIS to explore racial segregation between schools and their corresponding attendance areas, *American Journal of Education*, 115(4), 569–600.
- Taylor, C. (2001) The geography of choice and diversity in the 'new' secondary education market in England, *Area*, 33(4), 368–381.
- van Zanten, A. (1996) Fabrication et effets de la ségrégation scolaire, in: S. Paugam (Ed.) *L'exclusion, l'état des savoirs* (Paris, La Découverte), 281–291.
- Waslander, S., Pater, C. & van der Weide, M. (2010) *Markets in education: An analytical review of empirical research on market mechanisms in education*. OECD Education Working Paper No. 52 (Paris, OECD).
- West, A., Hind, A. & Pennell, H. (2004) School admissions and 'selection' in comprehensive schools: Policy and practice, *Oxford Review of Education*, 30(3), 347–369.
- Wilson, D. & Bridge, G. (2019) School choice and the city: Geographies of allocation and segregation, *Urban Studies*, 56(15), 3198–3215.
- Yang Hansen, K. & Gustafsson, J.-E. (2016) Causes of educational segregation in Sweden – school choice or residential segregation, *Educational Research and Evaluation*, 22(1–2), 23–44.