The Effect of Free Primary School Choice on Ethnic Groups – Evidence from a Policy Reform

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Abstract: In 2008, school catchment areas were abolished in North Rhine-Westphalia (NRW), the most populous German federal state. Critics have argued that free school choice will lead to increased segregation and educational disparities. The data used is from Wuppertal, a major city in NRW. Since the Turkish population is the largest minority in Germany, but also one of the least integrated, the focus of this paper is on the effect of the new school law on the school choice of Turkish (Muslim) versus non-Turkish (non-Muslim) families. Free school choice has led, in fact, to increased choice on the part of both advantaged and (to a lesser extent) disadvantaged families. Motives behind choice include proximity and the academic quality of the school. The effect of this increased choice on segregation is inconclusive.

Keywords: educational policy reform; school catchment areas; school choice; segregation

JEL classification: I20; H75; J15

1. Introduction

Until recently, school choice has not been a prominent issue in educational policy in Germany. It is commonly thought that there is no choice at the primary school level, with the focus of research thus lying more on choice in secondary schooling (Dustmann, 2004). But school choice at the primary school level has gained more attention since one federal state, North Rhine-Westphalia (NRW), decided – after an intense political debate – to abolish school catchment areas in 2008. While the proponents of the reform emphasized the benefits from more parental choice, opponents were worried about the adverse effects of choice on ethnic segregation. It is less known, however, that even before 2008 it was possible to opt out of one's assigned primary school (Kristen, 2005; Riedel et al., 2010). Thus, it is quite surprising that no substantial research on primary school choice in Germany has been conducted. We intend to contribute to the literature on school choice by analyzing the effects of a far-reaching educational policy experiment, i.e. the abolition of school catchment areas, on parental choice and ethnic segregation.

In the international literature, school choice has drawn considerable attention. Choice is thought to have a positive impact on competition between schools and might therefore increase the quality of schooling (Hoxby, 2003; Figlio and Hart, 2010). However, whether school choice does in fact increase student achievement remains a debated issue (Cullen, Jacob and Levitt, 2005). The main intention of increasing school choice by introducing charter school programs was to reduce racial and social segregation and to improve the educational opportunities of more disadvantaged groups (Hanushek, Kain, and Rivkin, 2009; Hastings and Weinstein, 2008; Fryer and Levitt, 2004). However, the results of many studies suggest the opposite, as increased school choice also has potentially negative effects (Lankfort and Wyckoff, 2001; Bifulco, Ladd and Ross, 2009). School choice tends to increase social and ethnic segregation rather than to decrease it (Burgess and Briggs, 2006). Walsh (2009) does not argue against these findings, but claims that even without choice, within-school heterogeneity is so low that cream-skimming of the remaining high-ability children would not have a sizable effect on those left behind. Urquiola (2005) points out that differences in the composition and distribution of students in public schools result not only from school choice, but also from the different number of school districts in any given metropolitan area. Increases in the number of districts in a metropolitan area result in a more

homogenous school district population (i.e. increased Tiebout choice), hence reducing private enrollment.

As Bourdieu (1986) argues, school choice is less common in disadvantaged families due to limited economic, cultural, and social resources. Accordingly, a number of studies have shown that choice is practiced primarily by socioeconomically advantaged, better-educated individuals. Low-income families, in contrast, attach higher value to proximity when choosing schools, because of the importance of travel costs (O'Shaughnessy, 2007). Confirming the findings of international studies dealing with Germany, we show that with existing assignment zones disadvantaged students are less likely to opt out of their assigned school (Riedel et al., 2010). In these cases, choice depends on the student's ethnicity and distance from school, the academic quality of the school, and the socioeconomic composition of the school.

Preferences for the school's social composition, however, also depend on the parents' ethnic status. It has often been shown that white parents are more likely to opt out of their children's assigned school if they live in an attendance zone with a high percentage of black students (Lankfort and Wyckoff, 2001; Söderström and Uusitalo, 2010; Bifulco et al., 2009). Black parents are more likely to choose schools with a higher concentration of students with the same ethnic background, rather than their children's assigned school (Booker et al., 2005).

Only few studies address the effect of changes in educational policy on choice and segregation. Söderström and Uusitalo (2010) analyze the change in the admission system of public upper secondary schools in Stockholm. Before 2000, proximity to school was the main criterion for being admitted to school. Since 2000, however, admission has been based on student ability. The results indicate that school segregation based on family background as well as immigrant status has increased significantly. However, the study does not determine whether this increased segregation is caused by parental choice and/or by the admission strategy of schools. Machin and Salvanes (2010) use evidence from a change in school choice policy in Oslo County to identify the impact of school quality on house prices. They confirm that parents do, in fact, value better-performing schools and are willing to pay higher prices for homes close to better schools. Once the system of rigid catchment areas was abandoned, however, the link between house prices and school performance was significantly weakened. Lavy (2010) evaluates a program in which inter-district busing integration was replaced by free school choice between schools within and outside of districts in Tel Aviv. Their findings

suggest that free school choice has led to an improved matching of student to school, resulting in increased achievement.

This paper aims to understand the effects of introducing free primary school choice in North Rhine-Westphalia in 2008. While advantaged groups might enjoy the positive aspects of increased choice, disadvantaged groups might not be able to fully benefit from the new rules. Hence, disadvantaged groups might suffer additional losses in terms of educational opportunity, resulting in further poverty (Fertig and Tamm, 2010). This supports the most frequently-cited argument against free school choice, namely the fear of increasing segregation and educational disparity in Germany. Since children of immigrant families are disadvantaged in the German education system anyway, our focus is on analyzing differences in school choice behavior over time and between groups – particularly in regard to Turkish children, who belong to the largest and least-integrated ethnic group in Germany. Because information on ethnicity is not readily available in the official statistics, we make use of the children's citizenship and denomination to distinguish between those who belong to advantaged groups and those who belong to disadvantaged groups. As the aim is to understand the choice behavior of Turkish (and, more generally, Arab) families, the information whether a student is Muslim or not serves as a proxy variable.

Our analysis is twofold. First, we look at changes in school choice behavior in Wuppertal, a major city in NRW, before and after the new legislation was introduced, using administrative data from official statistics, school statistics, and student records. The data used is readily available for all German communities. Hence, the study is easily replicable for other municipalities. Second, we analyze how the new school law has affected segregation, as the downside of increased choice might be a higher level of segregation. Our first finding is that school choice significantly increased after the reform was implemented. This applies to advantaged families as well as disadvantaged families. However, there are differences between the two groups. For instance, with regard to choice behavior, the two groups attach different levels of significance to composition and achievement characteristics. Using information about school size caps, we also discuss supply and demand effects on observed school choice. Interestingly, however, despite the increase in choice, the level of segregation did not significantly change in the first year after abolishing the school catchment areas.

The remainder of the paper is organized as follows: In Section 2, we give information on the institutional details of school choice in NRW. The data used in this study is described

in Section 3, and in Section 4 we explain our empirical strategy and present the results. We conclude in Section 5.

2. School choice in North Rhine-Westphalia: the situation before and after 2008

The German school system is characterized by a distinct federal structure (a comprehensive description of the German school system can be found in Lohmar and Eckardt (2010)). One common feature of the federal states' school systems is that at the age of six children enter primary school for four years. Before the 2008/2009 school year, choice in German primary schools appears to have been rather limited. Students were assigned to a public school (Gemeinschaftsgrundschule) in a school catchment area (Schulbezirk). However, choice was not as limited as it initially appears to be.

First, parents could apply for permission to attend a different school (§39 SchulG-NRW [NRW School Law]). They had to present a convincing argument, such as the presence of a childcare provider in another school catchment area. Neither school quality nor the social composition of the school was accepted as an argument. The parents' application was discussed by the principals of the chosen school and the principal of the assigned school. The final decision was made by the school authorities. To our knowledge, there is no research conducted before 2008 that analyzes the authorities' granting and denying of permission to attend a public primary school other than the one assigned.

Second, in NRW – and only in NRW – there are public denominational schools (öffentliche Bekenntnisschulen). Like the public schools, they do not charge tuition fees and are fully publicly funded. In the following, we simply label them public schools and denominational schools. In addition to the public and denominational schools, there is a rather small number of private primary schools, which will, however, be disregarded in this study.[1] Children in NRW have the right to attend a denominational school in their community or a neighboring community if the child belongs to that denomination (§26 SchulG-NRW). A child might also be admitted to a denominational school even if that child does not belong to the school's denomination, in cases where the parents wish their child to be educated according to that denomination. This is clearly a soft condition which is not verifiable.

[1] Private schools might charge a school fee and are often Waldorf schools, Montessori schools, or private denominational schools with a strong focus on religious education. Private denominational schools are partially funded by the respective Church, which is not the case with public denominational schools in NRW.

Moreover, children of a different denomination might be admitted to a denominational school if there is no school of the child's denomination within a reasonable distance from the child's home.

Since the 2008/09 school year, school catchment areas for primary schools have been abolished in NRW. Theoretically, this should give parents free choice of school; in practice, however, this is not necessarily the case. First, the amount of information given to parents is limited. Parents of school-age children receive a letter from the local school authority informing them that they have to enroll their child, and they are given the address of the nearest school. Most, but not all, primary schools have a homepage with information about the school; however, indicators of the achievement level of the schools are not published at all. Second, the schools are given legal guidelines on how to determine admission, with distance to the chosen school being the most important restriction. It is explicitly stated in the school law that students have the right to be admitted to the closest school of the chosen school type (public or denominational) if the capacity of the school permits (§ 46 SchulG). Interestingly – and this is not a result of the school reform – the NRW constitution explicitly rules out family background as a criterion for admission to a school (Art. 10 LV NRW). A third point to note is that, due to demographic change, the number of school children is decreasing in NRW, leaving more room for choice and also for increased competition between schools.

3. Description of data and summary of statistics

The present paper analyzes school choice in Wuppertal, one of the ten biggest cities in NRW. Wuppertal has about 350,000 inhabitants and 48 public primary schools, 11 public Catholic schools, and 2 public Protestant schools (cf. Figure 1). In addition to the public schools, Wuppertal has two Waldorf schools, one Catholic private school, one Greek primary school, and one private primary school. Since the private school sector is rather irrelevant, it has been disregarded in the following analysis.

-- about here Figure 1--

Wuppertal used to be a rich industrial city and is, like many such cities in NRW, now experiencing structural change. The unemployment rate in 2007 was 12.6 percent and the welfare dependency rate was 16.5 percent, which is higher than both the 2007 national and regional averages. As Figure 1 illustrates, Wuppertal is a city with a great deal of

socioeconomic diversity, which makes it an interesting city in which to study the effects of school choice. The immigrants are not equally distributed among the catchment areas, but are concentrated in the central (east-west) axis of the city around the Wuppertal Schwebebahn (suspension monorail), the city's best-known landmark and the most important element of its public transportation. The proportion of immigrants drops considerably if one moves away from the central axis in the valley to the outer, hilly regions of Wuppertal. A similar pattern occurs when looking at the distribution of welfare dependency rates and unemployment rates. Furthermore, the parts of Wuppertal close to the axis are more densely populated when compared to the outer city regions, which is also reflected by the distribution of primary schools. The density of schools is much higher in the valley than in the outer parts of the city. Note that the river Wupper is a fairly narrow, non-navigable river with a large number of bridges across it in Wuppertal. Hence, the river is not a natural boundary concerning school choice decisions.

The data used in this analysis is collected from different sources. We are able to combine data from official statistics with school statistics and information on student levels. Furthermore, the data is available for 2007 and 2008[2] and is summarized in Table 1. Significant differences in the sample means are in bold print. In columns (1) and (2), we summarize the data for all schools in the sample, and in (3) and (4) only public schools are included.

Since we are interested in understanding the school choice of different ethnic groups in Germany, we pursue two alternative strategies. First, we distinguish between the German and Turkish populations, since the latter constitute one of the largest groups of immigrants in Germany[3]. The Turkish population in Germany is not only the largest group of immigrants in the country, but also the least integrated of the major ethnic minorities (Berlin Institut für Bevölkerung und Entwicklung, 2009). Moreover, differences in the economic situation of ethnic Germans and first and second generation immigrants from Turkey are stunning (Algan et.al., 2010). To promote integration, the participation of minorities in education is essential. One problem with the data is that the Turkish population, Turkish children in particular, are

[2] Data from the official statistics is only available for 2007.

[3] The largest group is constituted by immigrants (resettlers) from Eastern Europe, followed by immigrants from Turkey. In 2008, the number of Turkish people living in Germany was about 1.7 million. This amounts to 24 percent of all immigrants in Germany. In NRW, one of the federal states with the largest Turkish population, the corresponding number of Turkish citizens is about 550 thousand, which means that 29 percent of the immigrants in NRW are Turkish citizens. The number of individuals of Turkish descent is 843 thousand. Thus 35percent of the ethnic Turks are German citizens. (Statistisches Bundesamt, 2010)

hard to identify from official statistics and school statistics. The data refers to the child's first citizenship, but children of immigrant families born after January 1, 2000, whose parents have been living legally in Germany for at least eight years, are automatically granted German citizenship. This problem is even worse in school statistics, as the relevant information is provided by parents and not cross-checked.

Because there is no reliable information on a given individual student's ethnic background in school statistics, we use information on the city block level to describe the ethnic composition of the students' local neighborhood. In our sample, the ratio of Turkish people per city block is less than five percent, which is less than the size of the ethnic Turkish population in Wuppertal. The information is nevertheless useful, as it also describes the percentage of Turkish people in a specific neighborhood relative to other neighborhoods. In the regression analysis, the absolute level is less important than the information on relative magnitudes. Hence, the percentage of Turkish people in a neighborhood might reflect the student's background even better than his/her own citizenship. The ethnic composition of a school catchment area is thus described by the percentage of Turkish people living there.

As noted above, citizenship has become a decreasingly reliable indicator when it comes to issues of ethnicity. Hence, we follow a second strategy to identify disadvantaged students by using information about student denomination, particularly whether the student is Muslim or not. The denomination 'Muslim' can be used as a proxy for ethnicity, as the large majority of the Turkish/Arab population is Muslim.[4] One remaining problem with that definition is the heterogeneity of the non-Muslim group, which includes other disadvantaged ethnic groups which are not well-integrated, such as immigrants from Eastern European or Southern European countries. To deal with this problem, we have only kept German, non-Muslim, and Muslim children (with and without German citizenship) in the sample.

–- about here Table 1 –

[4] The percentage of Muslims in Turkey is, according to the official statistics, 99 percent. About 98 percent of the population in Morocco, Iraq, and Iran are Muslims. The estimated number of Muslims in Germany is between 3.8 and 4.3 million, which amounts to between 4.6 and 5.2 percent of the population. The vast majority of the Muslims in Germany are ethnic Turks (between 2.5 and 2.7 million) and the other Muslims are from Southeastern Europe, the Middle East and North Africa (predominantly Morocco). The percentage of Muslim Turkish families in German is unknown. Survey data suggests that 81.4 percent of the ethnic Turkish population in Germany is Muslim. The number of native German Muslims is (roughly) estimated to be between 13,000 and 100,000. (Federal Office for Migration and Refugees, 2009).

Participation in this study was voluntary for the schools concerned, and not every school provided data on its students' denomination and citizenship. Moreover, some schools were about to be closed or did not have enough applications in 2008 to form a first grade (cf. Figure 1). The final data comprises only schools that supplied citizenship and denomination information in 2007 and 2008, which is true for 42 schools (33 public, 8 Catholic, 1 Protestant).[5]

The number of students in the sample is 8991. There are 7012 students in 2007, which includes all students in grades 1 to 4, i.e. all students enrolled in primary school at that time. Hence, the figures in 2007 are a four-year average. For 2008, the first year with free school choice, we use data on 1979 first-graders only. Restricting the sample to public schools reduces the number of students to 5583 in 2007 and 1574 in 2008. The remaining students attended a denominational school at these times.

The percentage of Muslim students in our sample increases from 21 percent (2007) to 23 percent (2008), which is a common trend in NRW (Makles and Schneider 2011); moreover, there are some other differences between 2007 and 2008. For instance, the percentage of Turkish people in the neighborhood as well as in the school catchment area increases from 2007 (the average of the four grades) to 2008 (the first grade). This also applies to the welfare dependency rate, which goes up from 16 percent in 2007 to 17.8 percent in 2008. The changing ethnic composition of the school catchment area and the neighborhood is the result of changes in the structure of the school-age population, which is common in larger cities in NRW.

Since we have information about the students' addresses, we also know their assigned public school. Using the address information, we calculated the Euclidian distance from the students' home to their assigned school.[6] Here we report the distance to his/her assigned public school. In 2008, the distance to the assigned school was about 633 m, which does not differ significantly from 2007 (642 m).

The data also provides information on the availability of alternatives and their costs, as measured by the distance to an alternative school. Our measure of the density of schools close

[5] We also conducted the analysis using data on schools that supplied data for only one year. The qualitative results did not change.

[6] Burgess et al. (2006) discuss the use of various measures of distance and conclude that, despite some drawbacks, the Euclidian distance is reasonably accurate.

to the student's home is simply the number of schools within a radius of 1 and 2 km. In 2007, for instance, the average number of schools within a radius of 1 km was 2.4, while the average number of schools within a radius of 2 km was 7.5. Note that the number of alternative schools increases slightly when compared to 2007. This is not due to new schools in the city, but rather to a shift in the school-age population to the more densely populated and less wealthy parts of Wuppertal. Assuming that the composition of socially advantaged and disadvantaged students is an indicator of school quality, a variable measuring distance to the nearest school with a more favorable composition can be constructed. Here, we use distance to the nearest school where the proportion of students with non-German ethnic backgrounds is at least five percentage points lower than that of the assigned school[7]. The average distance to a school with a more favorable composition in 2007 is 2.5 km for the total sample and 2.9 km for children who attend a public school.

While the ethnic composition of a school might be one factor behind school choice, the level of academic achievement (i.e. school quality) might be equally important. School quality is clearly hard to assess: while student achievement, one possible indicator of school quality, is measured and published in other countries, Germany lacks comparable information. Hence, we follow a different strategy to gather information on academic achievement, namely using schools' transfer rates to the academic track. After primary school (usually at the age of 10), German students receive a (more or less binding) teacher recommendation for a secondary school. In NRW the alternatives consist of a basic track school, an intermediate track school, an academic track school, and a comprehensive school, which has an internal streaming system. The most prestigious of these tracks is the academic track school. Students graduating from an academic track school (i.e. those holding the Abitur) are entitled to study at a university.

Schools in Wuppertal vary widely with respect to the percentage of students transferring to the academic track. The average transfer rate per school in Wuppertal between 2003 and 2006 ranges from 10.6 percent to 66.8 percent. Protestant schools have the highest average transfer rates, whereas Catholic schools in Wuppertal only exhibit average performance. In our sample, the average transfer rate is 35.2 percent in 2007. Note that the transfer rate at assigned schools could be used as an alternative measure of quality. However, the transfer rate at assigned schools is highly correlated with the social composition of the

[7] If there was no school with an immigrant ratio five percentage points lower, the distance to the school with the lowest percentage of immigrants was chosen.

school catchment area, thus resulting in collinearity; therefore, it is hard to disentangle the effects of quality and social composition. To calculate a proxy variable for the availability of a higher quality school, we use the distance to the nearest school where the transfer rate to the academic track is five percentage points higher.[8] In our 2007 data sample the average distance to a higher quality school is about 1.5 km for all schools and about 1.7 km for public schools.

–- about here Table 2

Table 2 summarizes the data by denomination. Muslims live in school catchment areas with a substantially higher percentage of Turkish people, which is to be expected. This difference is even more striking when looking at city blocks, i.e. the neighborhoods where students live. We also see remarkable differences in welfare dependency rates between the two groups. Muslim families live in neighborhoods with about 27 percent welfare dependency, compared to 14 percent for the non-Muslim sample. The data also shows that Muslims tend to live in school catchment areas with lower achievement levels (not reported). If Muslim families exercise school choice, the difference between the transfer rates to the assigned and chosen schools is not as large as it is for non-Muslim families. The average transfer rate at attended schools is about 26 percent for Muslim students and about 37 percent for non-Muslim students. Thus, either (a) academic achievement is a weaker motive for school choice in Muslim families, or (b) academic achievement is assessed differently in Muslim families than in non-Muslim families, or (c) Muslim families simply do not have access to higher quality schools. Finally, Muslim children live closer to their assigned schools, as well as to alternative schools with less non-native Germans. Moreover, they have more alternative schools within a radius of 1 or 2 km. This is due to the higher density of schools in the parts of Wuppertal close to the axis, which are more densely populated and which are inhabited by a larger proportion of economically disadvantaged families (cf. Figure 1).

Table 3 is concerned with families exercising choice; here we summarize percentages by denomination and year. As Table 3 shows, choice was already substantial in 2007 and does, in fact, increase further in 2008. In 2007, 34 percent of all primary school students

[8] If there was no school with an academic track transfer rate five percentage points higher, the distance to the school with the highest transfer rate was chosen.

attend a school other than the one assigned. This number rises to 40 percent in 2008. However, public and denominational schools are not equally affected by the new legislation. Within the sample of public schools, the percentage of students who opt out of their assigned school rises from 15 percent to 24 percent. This is a substantial increase, and one that basically accounts for practically all of the overall increase in school choice. The denominational schools did not benefit from increased school choice.

–- about here Table 3

In columns (2) and (3) we compare Muslim and non-Muslim families. In 2007, 34 percent of non-Muslim students attended a school other than the one assigned. Only 28 percent of all Muslim families chose a non-assigned school. After abolishing school catchment areas, Muslims and non-Muslims alike more frequently chose a school other than the one assigned. While Muslims still exercised school choice less often than non-Muslims in 2008, the relative increase was even stronger for Muslims. At first glance this is surprising. However, before 2008 denominational schools presented a less bothersome alternative for many parents who wanted to opt out of their children's assigned school without going to the trouble of applying to a different school. Since 2008, however, families have not needed to present a coherent reason for opting out. Hence, Muslims might particularly benefit from the new school law. They might have had strong preferences regarding education before 2008, but decided not to exercise choice when this implied attending a Christian denominational school.[9] The data, however, does not fully support this view. 19 percent of Muslims in Wuppertal attended a Catholic school in 2007. This percentage rises to 21 percent in 2008. As expected, however, the largest increase for this group is observed for public schools.

Due to better choice options, the composition of the denominational schools changes. However, the direction of change is noteworthy. The percentage of Muslim students in Catholic schools increases from 25 percent in 2007 to 29 percent in 2008. In public schools, the percentage of Muslim students is lower. It increases from 21 percent in 2007 to 23 percent in 2008. The two Protestant schools start with only 7 percent Muslim students in 2007 and end up with only 3 percent in 2008. Thus, in particular the Catholic schools become a more attractive option for Muslim students in Wuppertal.

[9] The importance of religion and religiosity for school choice is analyzed using US data in Cohen-Zada and Sander (2008).

4. Comparing choice with and without catchment areas

Analytical strategy

Our analytical strategy is twofold. First, we analyze the data in a regression framework to better understand the motives behind school choice and how the new legislation has affected school choice decisions. According to the literature presented above, we expect that choice (i.e. opting out of one's assigned school) is generally driven by school characteristics such as student composition and school quality. However, preferences differ according to background: we expect the choice of non-immigrant parents to be driven by preferences for high-quality schools and favorable student composition. In contrast, immigrant parents face a trade-off between high-quality schools and schools with a high proportion of students from their own ethnic background. Second, we study the effect of free school choice on segregation. In general, we expect segregation to be higher after the abolition of school catchment areas than before. Non-immigrant (i.e. advantaged) parents should benefit more from the new law than immigrant (i.e. disadvantaged) parents.

The models to be estimated are based on the following considerations. Parents will not choose their assigned school if choosing another school is more attractive, i.e. if the benefits of choice outweigh the costs. Choice is a binary variable, i.e. the dependent variable y_{is} is 1 if the student chooses a non-assigned school and zero otherwise. The underlying probability that student *i* will not attend his/her assigned primary school depends on the costs and benefits of opting out. As such it is a function of explanatory variables $\mathbf{X}_{is}$, such as family preferences regarding education, distance between a student's home and the assigned public school, and characteristics of the student's neighborhood. Besides individual characteristics, choice is also a function of the characteristics of the school catchment area, as well as specific school characteristics such as the ethnic composition and academic achievement of the school. School catchment area variables reflect the socioeconomic composition of assigned schools in the absence of choice. If the assigned school is located in a school catchment area with a high percentage of families with a non-German ethnic background, this suggests that the assigned school exhibits an unfavorable socioeconomic composition, which might induce families to send their children to schools with a more favorable composition.

School quality is yet another important predictor of parental choice. One available indicator of quality is the transfer rate to the academic track. Higher transfer rates correspond

to higher academic achievement, and hence also reflect the academic level of the school's peer group. Thus, schools with higher transfer rates are more often chosen. To avoid potential endogeneity problems – school composition is affected by choice, and choice affects transfer rates – we use lagged values of the academic track transfer rate. There are two alternatives to control for the transfer rate in our regression analysis. First, one could use the transfer rate of the assigned school. However, the transfer rate and the ethnic composition of the school catchment area are highly correlated, and it is not possible to disentangle the effects of school quality and ethnic composition. Second, one could use the transfer rate at the school attended. We interpret a positive coefficient for the academic track transfer rate of the attended school as evidence that school quality has a positive impact on choice. If the transfer rate at the attended school is high, it will be more likely that the school is not the one assigned.

Moreover, choice also depends on the availability of alternatives. Hence, we control for the number of accessible primary schools. If no alternative primary school is located within a reasonable distance, allowing for choice will not affect actual choice behavior. The availability of better alternatives can be measured, for instance, by the distance to the next school with a more favorable composition and/or a higher transfer rate to the academic track. It is expected that the availability of alternatives increases the probability of opting out.

Since school catchment areas were abolished in 2008, school choice behavior might have changed in the meantime. Hence, a time dummy, *T*, which is 1 if the data is from 2008 and 0 otherwise, has been included. We also control for differences in school choice behavior between the two sub-groups, the Muslim and the non-Muslim populations, by introducing a dummy variable M_{is}, which is 1 if the student is Muslim and 0 otherwise. And finally, since the policy change might have affected Muslim and non-Muslim students differently, an interaction term $T \times M_{is}$ is included in the model.

Our data contains information on the school catchment area level as well as individual student/neighborhood data. While the sample of school catchment areas can be treated as a random sample, the students in each school catchment area clearly do not constitute a random sample of the student population. Due to residential segregation, students in different catchment areas will differ with respect to socioeconomic and ethnic background. Thus clustering occurs at the school catchment area level, and errors will be correlated within clusters, but not across clusters. Since our data is a cluster sample, in which a cross section of individuals is part of a school catchment area, we need to account for the possible correlation of observations within a cluster. Hence, we estimate the linear probability model

$$y_{is} = \beta \mathbf{X}_{is} + \gamma_1 M_{is} + \gamma_2 T + \gamma_3 T \times M_{is} + \alpha_s + e_{is}, \quad (1)$$

where e_{is} is the error term and α_s is the school catchment area-specific effect. If the school catchment area effect is correlated with the explanatory variables, the fixed effects transformation can be used to estimate (1), while a more efficient random effects model ought to be estimated if the school catchment area effect is uncorrelated with the explanatory variables. While the fixed effects estimator is more robust, the main drawback of using fixed effects is that the coefficients of the cluster invariant variables cannot be estimated. In this study, this applies to the coefficients of school catchment area variables like socioeconomic composition. Since the usual Hausman test is not valid in the presence of heteroskedasticity, we use the robust version of the Hausman test to test the fixed effect versus random effects model (Wooldridge, 2002).[10]

In 2008 an entirely new school choice policy was introduced. Including a time dummy might not be sufficient to capture the effect of this policy change. Therefore, we also estimate the interacted model as specified in (2) and test the coefficients on the interaction terms and the time dummy:

$$y_{is} = \beta \mathbf{X_{is}} + \gamma_1 M_{is} + \gamma_{20} T + \gamma_{21} T \times \mathbf{X_{is}} + \gamma_3 T \times M_{is} + \alpha_s + e_{is} \quad (2)$$

Finally, the models are estimated separately for the group of Muslim and non-Muslim students.

In the second part of our analysis, we calculate the effect of increased choice on the level of segregation in schools. There is a vast body of literature on the measurement of segregation, with various indices in use. The most widely-used measure of segregation is the dissimilarity index, D (Duncan and Duncan, 1955). The dissimilarity index between group *a* and *b* is computed as

$$D = \frac{1}{2} \sum_{i=1}^{N} \left| \frac{a_i}{A} - \frac{b_i}{B} \right|, \quad (3)$$

where a_i and b_i are the number of individuals in group *a* (i.e. Muslim students) and *b* (i.e. non-Muslim students) in school catchment area *i*. A and B are the total number of individuals in group *a* and *b*. The main criticism of the recent school reform is the fear of increasing segregation in primary schools due to expanded choice. More choice might help advantaged groups, but not disadvantaged groups, to find the best suited school. Politically speaking, this

[10] The alternative model, a conditional logit model, was not chosen, because heteroskedasticity in clustered samples cannot be dealt with in the conditional logit model and leads to biased parameter estimates (Greene, 2004).

is a highly relevant issue. However, since limited school choice also existed before 2008, as described above, the old situation might already have constituted an equilibrium; it would then follow that the new school choice policy does not necessarily have a further detrimental effect on ethnic segregation. To test whether the level of segregation remains constant over time, we compute a Wald test, as suggested by Ransom (2000) and Allen, Burgess, and Windmeijer (2009).

As known from the literature (Carrington and Troske, 1997), the most common indices of segregation with small group sizes and small minority ratios indicate substantial segregation even when the population is randomly allocated across units.[11] Hence the standard dissimilarity index reflects random as well as systematic segregation. Following Carrington and Troske (1997) we control for random segregation by computing the index of systematic segregation

$$\hat{D} = \frac{(D - D^*)}{(1 - D^*)}. \qquad (4)$$

In (4) D^* is the expected dissimilarity index implied by a random allocation of students to schools in Wuppertal. Here we compute the expected dissimilarity index as the mean of the dissimilarity index from 100 randomly allocated samples. The resulting systematic dissimilarity index $\hat{D}$ is the extent to which the sample is more dissimilar than random allocation would imply, expressed as a fraction of the maximum amount of excess dissimilarity $(1 - D^*)$.

Results

Determinants of choice

Tables 4 to 7 summarize the results of the regression analyses. Using administrative data from official statistics and school statistics allows us to work with data that has not been contaminated by a selectivity bias. Moreover, the data allows us to control for changes over time, and our approach should be easily replicable for other municipalities with similar data. Note that the coefficients posited in this paper cannot be interpreted as strictly causal. For instance, the closure of schools in 2008 (and hence changed supply of schooling), the declining number of students, or unobserved changing educational preferences might also

[11] For an analysis of segregation and the direction of bias in NRW see Makles & Schneider (2011).

explain changes in school choice. However, since we can control for the number of schools near the students' homes, and preferences might be fairly stable over the short period of time, we can, despite these limitations, place some confidence in our estimates.

Table 4 summarizes the regression results from estimating equations (1) and (2). Since the Hausman test is significant, only the results from fixed effects models are reported. In column (1) we estimate equation (1) with all schools included in the sample[12]. Being Muslim reduces the probability of exercising school choice by as much as 8 percentage points , and choice increases significantly by 4 percentage points in 2008, when school catchment areas were abolished. The interaction effect between those two variables is not significant. Thus Muslims and non-Muslims appear to be affected in a similar way by the new policy. The hypothesis that the decision to choose a non-assigned school positively correlates with distance to the assigned school is confirmed. Thus, if distance to the assigned school increases by 100 m, the probability of choosing another school increases by 1.2 percentage points. The greater the distance to the assigned school, the more likely it is that parents opt out. Having more schools close by increases choice significantly. The academic track variable has the expected positive effect on choice, i.e. if parents exercise school choice, the chosen school is one with a higher level of academic achievement. Looking at the availability of alternatives with a higher transfer rate, it turns out that the closer the preferred alternatives are, the more likely it is that students will choose another school. However, the effect is not significant. The percentage of Turkish inhabitants in the city block is not significant, which might be explained by the correlation between the Muslim variable and the percentage of Turkish inhabitants in the students´ neighborhood. So far, the results confirm our conjectures, that choice does, in fact, depend on a student's ethnicity, distance to school, academic achievement level, and family background. Also, choice increases significantly after catchment areas had been abolished.

–- About here Table 4 –-

To find out which variables are driving the significant increase in 2008, we interact the time dummy with the other explanatory variables as suggested in equation (2). The results are shown in column (2). Compared to specification (1), the results on the non-interacted

[12] We estimated logit and conditional logit models as well. The results are qualitatively the same; hence, we report the heteroskedasticity-robust linear models only.

variables are similar. The 2008 dummy is now insignificant. However, parents in neighborhoods with a large Turkish population more often choose a non-assigned school in 2008 than they did earlier with defined catchment areas. This might indicate increased exercise of choice by less advantaged families. The other interaction effects are not significant.

In models (3) and (4) only public schools are included, as they are the ones predominantly affected by the new school law. Compared to the results for all schools, proximity to the assigned school and transfer rate are less important, but the 2008 dummy is larger. Thus there is additional evidence that the new enrollment policy has changed parental school choice, particularly in regard to public schools. As was expected, being Muslim is less important, though still significant, in the restricted sample. The other variables have a qualitatively similar effect on school choice as in model (1), but the effects tend to be less pronounced.

Including the interaction effects in (4) shows that introducing free school choice affects the choice of public schools via different channels. Being from a neighborhood with a large percentage of Turkish inhabitants significantly reduces the probability of choosing a school.[13] The distance to the assigned school and the number of schools nearby are significantly more important for parental choice in 2008 than in earlier years.

In Table 5 we report the estimation results of equations (1) and (2) separately for the sample of Muslim and non-Muslim students. This allows us to focus on differences in choice behavior between the two groups. As before, we distinguish between the sample of all schools and the restricted sample with public schools only. The results for non-Muslims in column (1) and Muslims in column (2) do, in fact, exhibit some differences. Generally, the model explains the school choice of the Muslim population better than that of non-Muslim families in the unrestricted sample. However, there are also noteworthy differences between the estimated coefficients. While both groups choose more often in 2008, the effect is larger and significant only for the non-Muslim families. Muslim families do not choose significantly more often after free school choice has been introduced. Distance to one's assigned school is more important for Muslim students, but the number of available alternative schools matters significantly for non-Muslim families. The distance to schools with a higher transfer rate is

[13] Note that we estimated alternative specifications, including different variables describing the socio-economic characteristics of the neighborhood. However, since all available characteristics like unemployment, long term unemployment, the percentage of non-German inhabitants, and the welfare dependency rate are highly collinear, the results are fairly robust with respect to the specification of the model and are not reported here.

significant only for Muslim families. Thus only if a higher quality school is nearby, are the Muslim families more likely to choose. Note that in column (2) – the regression for the Muslim sample – the distance to a school with fewer immigrants is not included because of collinearity between the two distance variables.[14] We excluded the immigrant variable and not the transfer-rate variable, as this slightly increases the within-R^2. As an alternative explanatory variable for the social composition of the neighborhood we now include the welfare dependency rate instead of the percentage of Turkish inhabitants in the model. The welfare dependency rate is highly correlated with the percentage of Turkish inhabitants but, given the separate regressions for Muslims and non-Muslims, the welfare dependency rate is better suited to explain choice of families in socially deprived neighborhoods with a small percentage of Turkish families. In the sample of all schools, however, the welfare dependency rate in the neighborhood does not explain school choice.

In columns (3) and (4) the fixed effects results of the interacted models are reported. In the regression with the non-Muslim sample in column (3) the year dummy is insignificant and we observe only small and insignificant changes in the determinants of choice over time. More can be said for the group of Muslim students. Distance to the assigned school has a stronger impact on choice in 2008. Moreover, in 2008 the transfer rate to the academic track is a better predictor for choice than under the old school law with catchment areas.

Columns (5) and (6) report the results for the sample of public schools only. For the sake of brevity we only report the results of the interacted model. The first thing to note is that the model fit is poorer. The within-R^2 drops from 0.24(0.39) to 0.16(0.10). Non-Muslim families continue to base their decision on the academic quality of a school. This is different for Muslim families. If only public schools are considered, the transfer rate, i.e. the academic quality of the school, does not explain the school choice of Muslim parents. However, the welfare dependency rate in the city block explains choice for both groups. Families from poorer neighborhoods tend to opt out less often. The availability of alternative schools nearby becomes more important for the school choice of non-Muslim families in 2008. In the sample of Muslim students, the distance to one's assigned school is a more important predictor of school choice in 2008 compared to the years with catchment areas in place.

–- About here Table 5 –-

[14] Collinearity is not a problem in the non-Muslim sample. The coefficients are stable regardless of whether only one or both variables are included.

One clear drawback of this analysis is that observed school choice not only depends on the choices made by families – the demand for schooling – but also on whether or not schools decide to accept any given applicant. Thus, some cream skimming might occur among schools with more applicants than places, and the endogeneity of supply and demand might lead to biased estimates. To address this issue, we use information about maximum school capacity, which is determined by the school authority. More precisely, the local school authority decides on the number of classes per grade and school. The maximum number of students per class is set by the state school authority. In NRW, there is a maximum of 30 students per primary school class. The minimum class size is 18 students, and the recommended class size is 24 students. Therefore, schools cannot grow if demand is high. Schools can, however, shrink. If enrollment is too low, fewer classes are formed. If not even one class can be formed, the school might be closed in the near future. Schools are obliged to admit students as long as the school's capacity is not fully exhausted. Since we know the capacity of the schools in our data, we are able to determine whether school choice is restricted by school capacity. In 2008, as it turns out, only 4 schools have a free capacity of less than 2 students per class. 16 schools have a free capacity of less than 6 students per class, resulting in class sizes between 24 and 30. The average free capacity is 7.7 students.

If the capacity of the school is not fully exhausted, we do not expect families to be constrained in their choice. In Table 6 we summarize the results for the different subsamples. First, we include schools that have room for at least 2 more students in each class. Second, we look at schools where classes are not larger than the recommended class size of 24 students. Finally, the last sample is restricted to schools with average class sizes of at least 25 students, i.e. schools with a low free capacity.

–- About here Table 6 –-

If the 4 schools with a free capacity of less than 2 students (high demand schools) are excluded (columns (3) and (4), the results are still quite similar to the fixed effects model (columns (1) and (2) of Table 6). Hence, families appear not to be constrained in their choice of school. When only schools that have average class sizes below the recommended size of 24 students (low demand schools) are included, the results change (columns (5) and (6)). The welfare dependency rate is negative and significant for both groups. However, since the schools are not restricted by their capacity, this cannot be explained by their decision to accept a student. The impact of the student's socioeconomic background on school choice is

particularly relevant if school choice is not constrained by supply but, in fact, depends on demand. Even if choice is possible, the less advantaged families choose less often.

The last two columns in Table 6 show the model with only high demand schools included. Interestingly, high demand schools are often chosen rather than assigned schools. In the full sample, 34 percent of students attend a school other than the one assigned. This number rises to 43 percent if only high demand schools are included. About 55 percent of Muslim students who attend a high demand school have chosen that school. The ratio of non-Muslim students who attend a high demand school and who have chosen that school is 40 percent. But, as expected, Muslim students are underrepresented in high demand schools. While the proportion of Muslim students in the sample of all schools is 21.3 percent, this drops to 17.6 percent in high demand schools. In the sample confined to public schools the percentage of Muslim students in high demand schools is, with 13 percent, even lower. Hence the schools with less free capacity, and therefore larger classes, are more frequently attended by advantaged students rather than by disadvantaged students.[15]

While observed choice is still reasonably predicted by the model in columns (7) and (8), the within-R^2 drops considerably compared to the other samples of schools. The coefficients tend to be smaller and less significant. Only the transfer rate remains a significant predictor for school choice of both groups. The year dummy is positive and significant only for non-Muslim students. Thus after abolition of catchment areas non-Muslim families choose high demand schools significantly more often than in earlier years.

So far, the analysis has shown that school choice patterns of both groups changed after the new school choice policy was implemented. The option to freely choose a public school other than the one assigned (given sufficient school capacity) is being utilized by parents. The percentage of children who do not attend their assigned school increased between 2007 and 2008. Proximity and school quality, as well as socioeconomic background, are important factors determining whether this increased school choice is utilized. However, the school types (public and denominational schools) are affected differently by the new policy.

Choice and Segregation

[15] See West & Wößmann (2006) for a discussion of sorting of students in small classes.

In the political debate on free school choice, the most important argument against increased choice is the fear of a corresponding increase in ethnic segregation in schools. Riedel et al. (2010) show that – even before 2008 – school choice in NRW created a level of segregation within schools higher than that corresponding to the level of residential segregation in the school catchment area. In what follows we will look at segregation and how it has evolved over time.

The dissimilarity index is calculated using data from school statistics on primary schools in NRW, which yield information about the ethnic composition of the schools. In particular, we use data from the 2007/08 (grade 4) and 2008/09 (grades 1 to 4) school statistics. Thus, we have data for enrollment spanning 5 years (grades). Children who entered school in 2004 are fifth-graders in 2008 (grade 4 in the 2007/08 school statistics); children who entered school in 2005 are in the fourth grade, and so on. Note that children in grade 2 and above are not affected by the new legislation concerning school catchment areas. Only those students entering the first grade in 2008/09 are no longer restricted in their choice by existing school catchment areas. In order to assess the effect of the abolition of school catchment areas, we use the allocation of students in grades 2-5 as a benchmark against which to compare segregation in grade 1. An increase in segregation in grade 1 in 2008/09, combined with a stable level of segregation (or a less pronounced increase) in grades 2-5, can be interpreted as evidence for the hypothesis that the new school choice policy increases segregation. Since segregation might follow a time trend that is unrelated to the existence of school catchment areas, it clearly does not suffice to only compare, for instance, first and second grade. The time path of segregation must also be accounted for.

Moreover, the abolition of school catchment areas was not the only factor that might have potentially affected segregation from 2004 to 2008. First, the number of Turkish students reported in the official statistics is decreasing, because the majority of children of non-German ethnicity born in Germany after January 1, 2000 are German citizens.[16] Hence, there is an expected drop in the number of Turkish children reported in the official statistics for the 2006 and 2007 school years, i.e. students in grades 2 and 3. Our second indicator of ethnicity – being Muslim or not – is more reliable when the family's ethnic origin is of interest. However, as noted earlier, Muslims in Germany are quite heterogeneous in regard to issues of integration and educational preferences. Unlike citizenship, however, religious

[16] This confirms a general trend in NRW (School statistics NRW) . The percentage of Muslim students rose from 13 in 2005 to 14 in 2008, whereas the percentage of Turkish (non-German) students fell from 8 (15) in 2005 to 6 (13) in 2008.

denomination is a stable characteristic of minority families. While the number of Turkish students decreases over time, the number of Muslim students remains fairly stable. Moreover, the proportion of Muslim students is even growing from 18 to 20 percent of all students, because the number of non-Muslim students is decreasing. The proportion of Turkish students has decreased from 10 percent in grade 5 to less than 6 percent in grade 1.

Second, the cutoff date for entering school was changed from June 30 to July 31 in 2007. Thus, children born in July 2007 were enrolled in school in addition to the regular cohort of 12 months for that year. Compared to first grade, there are about 8 percent more children in grade 2. This amounts to a sizable increase in the number of students in second grade, which might also affect segregation in either direction.

Both changes, the new citizenship law and cutoff date, affect group size as well as minority ratios in grades 3 and 2. As noted earlier, the dissimilarity index is quite sensitive with respect to these changes. Hence we also compute the expected dissimilarity index implied by a random allocation of students to schools and the index of systematic segregation that accounts for changes in expected dissimilarity.

Figure 2 summarizes the results. In panels (a) and (b) we first consider the sample of all schools, both public and denominational. Panel (a) shows the segregation indices between Muslim versus non-Muslim students. The dissimilarity index (observed segregation) is stable at high values of about 0.42. Hence, an equal distribution of Muslim and non-Muslims students requires removing 42 percent of the sample. Only in the second grade does the index drop to 0.38; it increases again to 0.43 in 2008. At first glance this is surprising, as it cannot be explained by changes due to the abolition of the school catchment areas one year later. This result could, however, be due to the new cutoff-date, which means that the number of students is larger in the second grade than in the first grade. Given that the dissimilarity index is quite sensitive for small group sizes and small minority ratios, it is not surprising that it changes in this way. The direction of change, however, is interesting, as the distribution of Muslim students among schools has become more uniform rather than less. The small differences between the dissimilarity indices are not significant. Hence, there is no evidence thus far that segregation of the Muslim and non-Muslim populations has increased after school catchment areas were abolished.

The values for random or expected segregation D^* are around 0.13 for all grades, including grade 2. Systematic segregation as defined in (4) is 0.33 for all grades, except for grade 2, where expected segregation is 0.29. Thus the drop in the dissimilarity index cannot

be simply explained by the changing group size. The allocation of the additional students in grade 2 was not random and led to a lower level of segregation between Muslims and non-Muslims.

-- About here Figure 2--

A different situation becomes apparent if we study segregation of the Turkish and non-Turkish student populations. D (0.39) is significantly lower in grade 3 than in grade 1 (0.48). However, the increase between grade 1 and 2 is again moderate in size and insignificant. Recall, though, that in the second grade there are more students to be enrolled due to the change of the cutoff date. Unlike the dissimilarity index between Muslims and non-Muslims, the dissimilarity index for Turkish students increases significantly over time. However, only part of that increase is due to systematic segregation. Random segregation increases as well, reducing the differences in systematic segregation between grades 3 and 1. The systematic dissimilarity in grade 3 is 25 percent. This value increases to 32 percent in grade 2 and 31 percent in grade 1. Hence, Turkish children are distributed less equally among schools over time. However, this cannot be driven by the abolition of the school catchment areas, but rather is the result of the cutoff date.

These findings confirm our earlier interpretation of the regression results. We presume that the group of Muslim families is heterogeneous and that some Muslim families use the new school law as an opportunity to choose a school that best suits their educational preferences. The group of Turkish students, however, is likely to be first-generation immigrants. Either way, it is not surprising that a more pronounced increase in segregation is observed for the group of Turkish families than for the group of Muslim families. In any case, the evidence obtained so far on segregation tendencies after the abolition of school catchment areas is rather inconclusive and does not support the hypothesis that free school choice increases segregation.[17]

As shown in panels (c) and (d) in Figure 2, the results are similar when restricting the sample to public schools only. The dissimilarity index for Muslims and non-Muslims is, again, fairly constant and about as large as in the full sample. None of the differences in the index are statistically significant. However, the index for Turkish and non-Turkish students is higher in the first grade than in grades 3, 4 or 5, and the increase of 5 percentage points is

[17] Using data from the school statistics for all municipalities, Makles & Schneider (2011) confirm that systematic segregation has not significantly increased in NRW after abolishing school districts. Thus Wuppertal is not an exception in NRW.

sizable, though not significant. Hence, the existence of denominational schools cannot explain the high levels of segregation in Wuppertal. Segregation remains at a high level, regardless of whether denominational schools are included in the sample or not.

5. Conclusions

In 2005, the government of NRW decided to allow for more school choice by abolishing school catchment areas. The 2008/2009 school year was the first in which every community had to enforce this new legislation. In this paper, we have addressed the differences in school choice behavior before and after the abolition of school catchment areas, using data from Wuppertal, a major city in NRW. More specifically, we have focused on two questions: first, we were interested in the changes in school choice behavior of Muslim and non-Muslim parents over time. Second, we looked at school choice and its effect on ethnic segregation.

On average, the percentage of parents who choose a non-assigned public school increased significantly in 2008. Although Muslim families and/or families of Turkish ethnicity in Germany constitute a socioeconomically disadvantaged group with less access to education, they have also benefited from increased choice. School choice gives both groups a chance to find the school that best suits their educational preferences. However, non-Muslim parents have exercised school choice more often than Muslim parents, both before and after 2008, and the two groups differ with respect to the motives underlying school choice. Hence, increased school choice might not actually reduce educational disparities. Moreover, without knowing the direction of choice, the effect of choice on segregation is not clear, and our analysis of school composition is still inconclusive. The dissimilarity index, our measure of segregation, increases over time when looking at the allocation of Turkish students versus non-Turkish students. However, we find no differences in segregation before and after the abolition of school catchment areas when comparing Muslim and non-Muslim students.

In 2010, a new state government was elected in NRW, and the new government plans to re-establish school catchment areas, giving the municipalities the option to do so. Currently, it is too early to assess the effect of this latest policy change and the increased variation in regard to school choice in NRW which it will make possible, but the debate on segregation and free school choice will no doubt continue to be on the agenda.

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Figure 1. *The location of schools in Wuppertal*

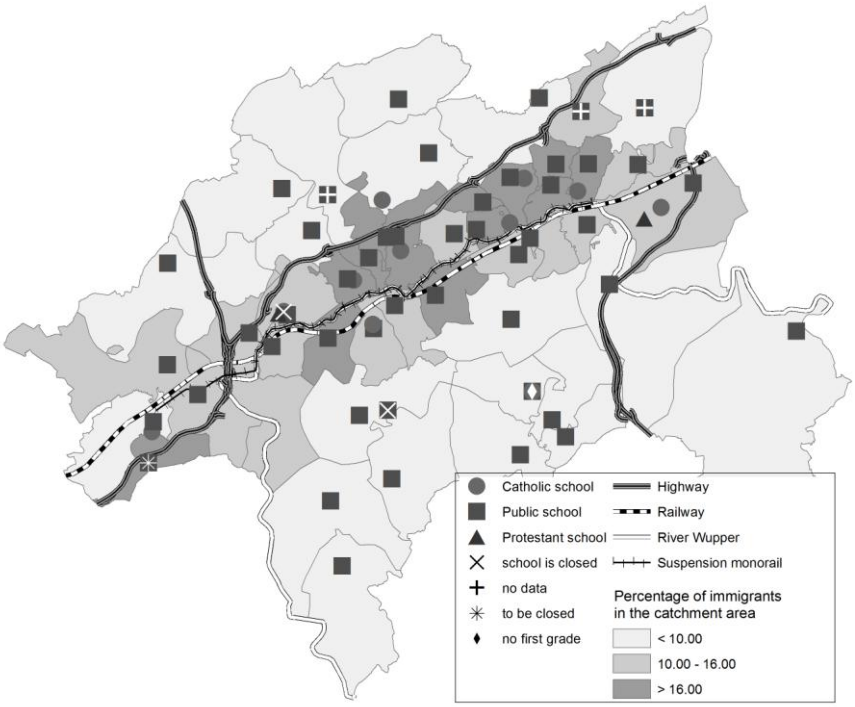
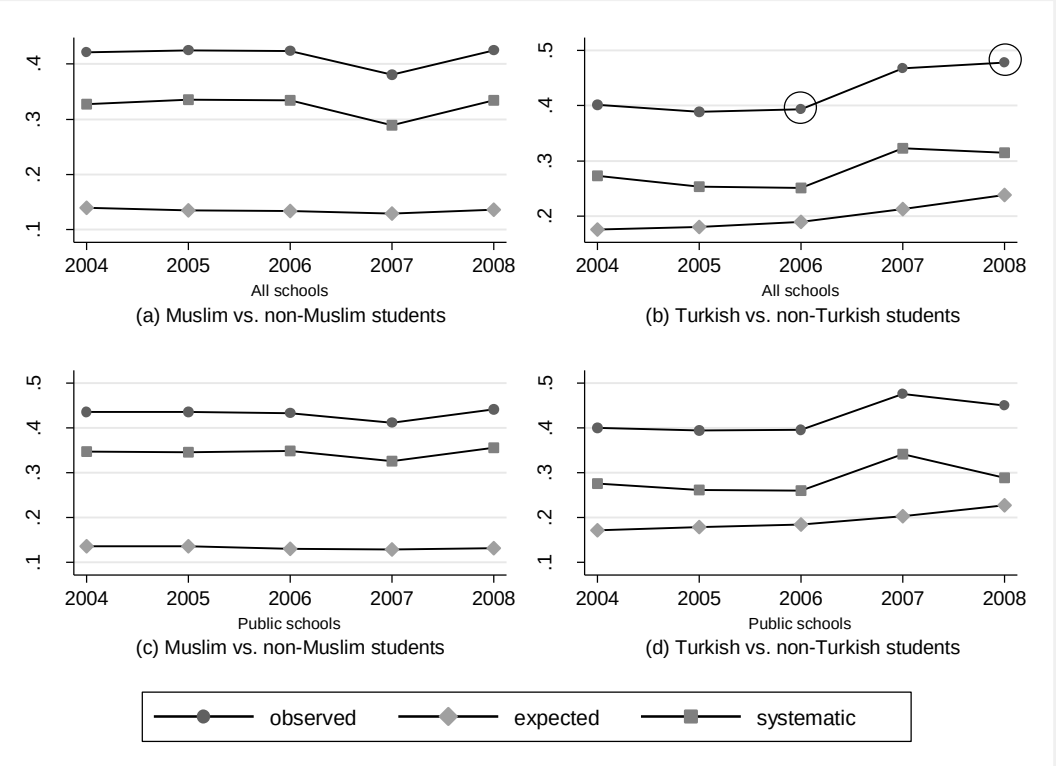


Figure 2. *Observed, expected, and systematic segregation*



Notes: The hollow circles in panel (b) indicate a significant change based on a Wald test (significance level 0.05).
Data source: School statistics NRW.

Table 1. *Sample description*

	All		Public Schools	
	2007	2008	2007	2008
% Turkish inhabitants, city block	**4.149**	**4.861**	**3.996**	**4.489**
	(6.300)	(6.702)	(6.497)	(6.721)
% Turkish inhabitants, school district	**3.392**	**3.732**	**3.133**	**3.451**
	(2.843)	(3.129)	(2.867)	(3.180)
Student is Muslim	**0.208**	**0.232**	0.207	0.229
	(0.406)	(0.422)	(0.405)	(0.420)
% Welfare dep. rate city block	**15.97**	**17.76**	**14.76**	**16.25**
	(13.44)	(13.72)	(13.29)	(13.51)
Distance to assigned school (in m)	642.1	633.1	611.8	606.1
	(495.1)	(505.4)	(495.8)	(499.7)
Schools within a radius of 1 km	**2.427**	**2.522**	**2.188**	**2.304**
	(1.478)	(1.539)	(1.405)	(1.500)
Schools within a radius of 2 km	**7.505**	**7.705**	6.952	7.127
	(3.855)	(3.783)	(3.875)	(3.803)
% Transfer rate to academic track chosen school	**35.17**	**33.94**	**35.90**	**34.64**
	(13.28)	(13.22)	(13.86)	(13.87)
Distance to school with 5 PPT higher transfer rate (in m)	**1,504.3**	**1,420.8**	**1,693.3**	**1,596.3**
	(1,497.1)	(1,379.6)	(1,592.9)	(1,466.7)
Distance to school with 5 PPT less immigrants (in m)	**2,493.6**	**2,262.2**	**2,884.7**	**2,608.7**
	(2,976.6)	(2,719.3)	(3,189.2)	(2,928.0)
Number of students	7,012	1,979	5,583	1,574

Notes: 42 schools are included. Standard deviations are in parentheses. Significant differences between 2007 and 2008 are in bold.
Data source: Official statistics from Wuppertal, the schools statistics for NRW, student record data.

Table 2 *Sample description by denomination*

	Non-Muslims		Muslims	
	2007	2008	2007	2008
% Turkish inhabitants, city block	**2.645**	**3.327**	9.888	9.939
	(4.278)	(5.254)	(8.933)	(8.296)
% Turkish inhabitants, school district	**2.844**	**3.116**	5.483	5.771
	(2.514)	(2.758)	(3.050)	(3.409)
% Welfare dep. rate city block	**13.27**	**14.87**	26.28	27.33
	(12.48)	(12.75)	(11.88)	(12.41)
Distance to assigned school (in m)	669.0	669.2	539.6	513.5
	(511.6)	(522.8)	(410.6)	(421.9)
Schools within a radius of 1 km	2.226	2.307	3.192	3.235
	(1.442)	(1.511)	(1.359)	(1.410)
Schools within a radius of 2 km	**6.874**	**7.146**	**9.915**	**9.556**
	(3.777)	(3.762)	(3.132)	(3.224)
% Transfer rate academic track chosen school	**37.45**	**36.33**	26.49	26.02
	(12.99)	(13.06)	(10.50)	(10.36)
Distance to school with 5 PPT higher transfer rate (in m)	1,677.3	1,588.9	843.9	864.4
	(1,595.4)	(1,488.1)	(728.8)	(687.2)
Distance to school with 5 PPT less immigrants (in m)	**2,844.0**	**2,608.9**	1,156.4	1,114.2
	(3,209.2)	(2,983.3)	(1,056.1)	(835.2)
Number of students	5,556	1,520	1,456	459

Notes: See Table 1

Table 3. *Choice by denomination*

Choice		All	Muslim	Non-Muslim
All	2007	33.66	28.43	33.77
	2008	39.57	35.08	40.92
Public	2007	15.42	10.02	16.84
	2008	24.02	17.22	26.03
Catholic	2007	15.7	18.82	14.88
	2008	16.88	21.13	15.59
Protestant	2007	5.68	1.65	5.47
	2008	3.59	0.44	5.54

Table 4. *Decision to not attend assigned public school*

	All Schools		Public Schools	
	(1)	(2)	(3)	(4)
Student is Muslim	-0.0784**	-0.0714**	-0.0430*	-0.0380*
	(-3.01)	(-2.73)	(-2.36)	(-2.06)
Year=2008	0.0432*	-0.0983	0.0608**	-0.0644
	(2.08)	(-1.23)	(3.53)	(-0.94)
2008 ×Student is Muslim	0.0029	-0.0190	-0.0325	-0.0487+
	(0.10)	(-0.64)	(-1.13)	(-1.78)
Distance to assigned school (in 100 m)	0.0122**	0.0114**	0.0099**	0.0088**
	(4.22)	(4.09)	(4.40)	(3.89)
Schools within a radius of 1 km	0.0329**	0.0300**	0.0155	0.0094
	(3.04)	(2.83)	(1.60)	(1.03)
Schools within a radius of 2 km	0.0172	0.0172	0.0180	0.0180
	(1.33)	(1.31)	(1.22)	(1.21)
% Transfer rate academic track chosen school	0.0244**	0.0240**	0.0161**	0.0158**
	(6.04)	(5.84)	(3.79)	(3.71)
Distance to school with 5 PPT higher transfer rate (in 100m)	-0.0041	-0.0037	0.0010	0.0012
	(-1.23)	(-1.12)	(0.41)	(0.48)
Distance to school with 5 PPT less immigrants (in 100m)	0.0005	0.0004	-0.0032	-0.0031
	(0.13)	(0.11)	(-1.12)	(-1.10)
% Turkish inhabitants city block	-0.0011	-0.0023	-0.0024+	-0.0028*
	(-0.67)	(-1.29)	(-1.92)	(-2.15)
Intercation effects				
2008 × Distance to assigned school		0.00003		0.00005*
		(1.47)		(2.15)
2008 × Schools within a radius of 1 km		0.0140		0.0309*
		(1.22)		(2.61)
2008 × Schools within a radius of 2 km		0.0008		-0.0019
		(0.20)		(-0.50)
2008 × % Transfer rate academic track chosen school		0.0019		0.0012
		(1.24)		(0.94)
2008 × Distance to school with 5 PPT higher transfer rate		-0.00002		-0.00002
		(-1.60)		(-1.36)
2008 × Distance to school with 5 PPT less immigrants		0.00001		0.000007
		(1.38)		(1.00)
2008 × % Turkish inhabitants city block		0.0049*		0.0017
		(2.06)		(0.86)
Number of students	8991	8991	7157	7157
Within R^2	0.2835	0.2858	0.1466	0.1498

Notes: Linear probability, fixed effects models; the dependent variable is the binary indicator for whether the student attends the assigned public school; t-values in parenthesis are based on robust standard errors adjusted for clustering within school districts; $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 5. *Decision to not attend assigned public school by denomination*

	All Schools				Public schools	
	Non-Muslim	Muslim	Non-Muslim	Muslim	Non-Muslim	Muslim
	(1)	(2)	(3)	(4)	(5)	(6)
Year=2008	0.0437*	0.0378	-0.0371	-0.3052**	-0.0235	-0.2635**
	(2.17)	(1.51)	(-0.41)	(-2.89)	(-0.27)	(-2.94)
Distance to assigned school (in 100 m)	0.0118**	0.0224**	0.0119**	0.0188**	0.0101**	0.0081*
	(3.97)	(5.33)	(4.20)	(4.20)	(4.45)	(2.32)
Schools within a radius of 1 km	0.0369**	0.0026	0.0340**	0.0000	0.0146	0.0017
	(3.28)	(0.16)	(3.08)	(0.00)	(1.38)	(0.15)
Schools within a radius of 2 km	0.0173	-0.0021	0.0171	-0.0009	0.0196	-0.0031
	(1.32)	(-0.25)	(1.28)	(-0.12)	(1.26)	(-0.43)
% Transfer rate academic track chosen school	0.0226**	0.0331**	0.0224**	0.0320**	0.0164**	0.0123
	(5.64)	(6.03)	(5.46)	(5.73)	(3.84)	(0.90)
Distance to school with 5 PPT higher transfer rate (in 100m)	-0.0032	-0.0099**	-0.0028	-0.0096*	0.0019	-0.0060+
	(-1.03)	(-2.74)	(-0.93)	(-2.54)	(0.75)	(-1.71)
Distance to school with 5 PPT less immigrants (in 100m)	-0.0003		-0.0006		-0.0040	
	(-0.10)		(-0.17)		(-1.37)	
% Welfare dep. rate city block	-0.0007	0.0003	-0.0008	0.00003	-0.0016*	-0.0014*
	(-1.05)	(0.30)	(-1.21)	(0.03)	(-2.02)	(-2.37)
Interaction effects						
2008×Distance to assigned School			-0.00002	0.0001**	0.00002	0.0002**
			(-0.23)	(3.03)	(0.48)	(4.09)
2008×Schools within a radius of 1 km			0.0125	0.0263	0.0310*	0.0324
			(0.92)	(1.17)	(2.52)	(1.55)
2008×Schools within a radius of 2 km			0.0023	0.0026	0.0018	-0.0029
			(0.48)	(0.35)	(0.40)	(-0.47)
2008×% Transfer rate academic track			0.0009	0.0053**	0.0003	0.0042
			(0.54)	(2.98)	(0.21)	(1.52)
2008×Distance to school with 5 PPT higher transfer rate			-0.00002	-0.0000	-0.00002	-0.000007
			(-1.55)	(-0.01)	(-1.20)	(-0.20)
2008×Distance to school with 5 PPT less immigrants			0.00001		0.00001	
			(1.53)		(1.22)	
2008×% Welfare dep. rate city block			0.0005	0.0007	-0.0007	0.0004
			(0.50)	(0.56)	(-0.61)	(0.32)
Number of students	7076	1915	7076	1915	5639	1518
Within R^2	0.2416	0.3782	0.2434	0.3870	0.1551	0.1012

Notes: See Table 4

Table 6. *Decision to not attend assigned public school: High and low demand schools*

	Non-Muslim	Muslim	Non-Muslim, slack>=2	Muslim, slack>=2	Non-Muslim, slack>=6	Muslim, slack>=6	Non-Muslim, slack<6	Muslim, slack<6
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year=2008	0.0437*	0.0378	0.0444+	0.0385	0.0294	0.0104	0.0365*	-0.0085
	(2.17)	(1.51)	(1.99)	(1.59)	(1.63)	(0.43)	(2.46)	(-0.53)
Distance to assigned school (in 100 m)	0.0118**	0.0224**	0.0091**	0.0209**	0.0057**	0.0028	0.0062	0.0116
	(3.97)	(5.33)	(3.11)	(4.69)	(2.71)	(0.72)	(1.63)	(1.38)
Schools within a radius of 1 km	0.0369**	0.0026	0.0440**	0.0028	0.0349**	0.0051	0.0259	0.0094
	(3.28)	(0.16)	(3.72)	(0.17)	(3.07)	(0.34)	(1.31)	(0.66)
Schools within a radius of 2 km	0.0173	-0.0021	0.0207	0.0031	0.0069+	0.0115	0.0008	-0.0170
	(1.32)	(-0.25)	(1.53)	(0.35)	(1.97)	(1.27)	(0.08)	(-1.56)
% Transfer rate academic track chosen school	0.0226**	0.0331**	0.0233**	0.0333**	0.0312**	0.0322**	0.0160**	0.0217*
	(5.64)	(6.03)	(5.16)	(5.93)	(5.54)	(3.86)	(2.70)	(2.11)
Distance to school with 5 PPT higher transfer rate (in 100m)	-0.0032	-0.0099**	-0.0042	-0.0076+	0.0043	0.0008	-0.0006	-0.0091
	(-1.03)	(-2.74)	(-1.15)	(-2.01)	(1.55)	(0.24)	(-0.14)	(-1.24)
Distance to school with 5 PPT less immigrants (in 100m)	-0.0003		0.0042		-0.0036		0.0023	
	(-0.10)		(1.04)		(-1.34)		(0.51)	
% Welfare dep. rate city block	-0.0007	0.0003	-0.0003	0.0004	-0.0020**	-0.0010*	0.00004	-0.0009
	(-1.05)	(0.30)	(-0.41)	(0.55)	(-2.69)	(-2.05)	(0.04)	(-0.91)
Number of students	7076	1915	6152	1816	3938	1244	3138	671
Within R^2	0.2416	0.3782	0.2449	0.3933	0.3562	0.3910	0.2494	0.2878

Notes: See Table 4.