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groups affected by the new school  
law in NRW, Germany

*Kerstin Schneider, Claudia Schuchart,  
Horst Weishaupt and Andrea Riedel*

CESifo GmbH  
Poschingerstr. 5  
81679 Munich  
Germany

Phone: +49 (0) 89 9224-1410  
Fax: +49 (0) 89 9224-1409  
E-mail: [office@cesifo.de](mailto:office@cesifo.de)  
Web: [www.cesifo.de](http://www.cesifo.de)

Free primary school choice: How are ethnic groups affected by  
the new school law in NRW, Germany? <sup>†</sup>

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Kerstin Schneider  
University of Wuppertal and CESifo  
[schneider@wiwi.uni-wuppertal.de](mailto:schneider@wiwi.uni-wuppertal.de)

Claudia Schuchart  
University of Wuppertal  
[schuchart@uni-wuppertal.de](mailto:schuchart@uni-wuppertal.de)

Horst Weishaupt  
University of Wuppertal und DIPF  
[weishaupt@dipf.de](mailto:weishaupt@dipf.de)

Andrea Riedel  
University of Wuppertal  
[riedel@wiwi.uni-wuppertal.de](mailto:riedel@wiwi.uni-wuppertal.de)

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

**Keywords:** educational policy reform; 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 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 to abolish school districts in 2008 and to allow for parental choice. It is less known, however, that even before 2008 it was not uncommon to choose an unassigned school in NRW (Riedel et al, 2010). Thus, it is in fact 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 districts, on parental choice and ethnic segregation.

School choice has been analyzed in numerous international studies. Choice is thought to have a positive impact on competition between schools and might therefore increase the quality of schooling (Hoxby, 2003). Moreover, choice can give parents a chance to find the school which best suits their educational preferences (Clausen, 2006). The issue of school choice has drawn considerable attention in the US. There, the 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, & Rivkin, 2009, Fryer & Levitt, 2004). However, the results of many studies suggest the opposite, because increased school choice also has potentially negative effects (Lankfort & Wyckoff, 2001; Bifulco, Ladd & Ross, 2009). School choice tends to increase social and ethnic segregation rather than to decrease it (Burgess and Briggs, 2006). Walsh (2008) does not argue against these findings of increased segregation, 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. an increased Tiebout choice) and hence reduces private enrollment.

As Bourdieu (1983) 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. They also put less weight on academic quality (Hastings et al., 2005), because they face higher information costs that they are not able or not willing to pay. Confirming the findings of international studies for Germany, we show in Riedel et al. (2010) that disadvantaged students have a smaller likelihood of opting out of their assigned school. In these cases, choice depends on the distance to school, the academic quality of the school, and the socioeconomic composition of the school.

The preference for a certain school social composition, however, depends 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; moreover, white parents tend to avoid schools with substantial proportions of minority students (Lankfort & Wyckoff, 2001; Söderström & Uusitalo, 2005; Bifulco et al., 2009). In contrast, empirical studies demonstrate that black parents are more likely to choose schools with a higher concentration of students with the same ethnic background, rather than the assigned school (Booker et al., 2005).

School quality and school composition are often closely related. The preferences of advantaged parents for high-quality schools go hand-in-hand with a preference for schools with a high concentration of students from their own group. In contrast, parents of disadvantaged backgrounds may face a trade-off between the desire for high-quality schools and the desire for schools with students who share a similar background (Bifulco et al., 2009, Riedel et al. 2010).

However, few studies address the effect of changes in educational policy on segregation. In one such study, Söderström and Uusitalo (2005) 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. Söderström and Uusitalo's (2005) results indicate that school segregation by family background, as well as segregation between immigrants and non-immigrants, increased significantly. However, the study does not determine whether the increased segregation is caused by parental choice and/or by the admittance strategy of schools.

This paper aims to identify the effects of introducing free 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 further losses in terms of educational opportunity. This supports the most frequently-cited argument against free school choice, namely the fear of increasing segregation and educational disparities in Germany. Since children of immigrant families are disadvantaged in the German education system, our focus is on analyzing differences in school choice behavior over time and between groups - particularly Turkish children, who belong to the least integrated large 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 advantaged and disadvantaged groups. As the aim is to understand choice behavior of Turkish or Arab families, the information of 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 before and after the new legislation was introduced, using data from official statistics, school statistics, and student records. Second, we analyze how the new school law has affected segregation. Our first finding is that choice has significantly increased after the reform was implemented. This applies to advantaged as well as disadvantaged families. However, there are differences between the two groups. For instance, in regard to choice behavior, the two groups attach different levels of significance to composition and achievement characteristics. Interestingly, however, the level of segregation did not significantly change in the first year after abolishing the school districts.

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**

Before the school year of 2008/2009, choice appears to have been rather limited in German primary schools. Students were assigned to a public school (Gemeinschaftsgrundschule) in a school district. 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 [school law NRW]). They had to present a convincing argument, such as the presence of a child care provider in another school district. Neither school quality nor the social composition of the school were accepted arguments. The parents' application was discussed by the principals of the chosen school and the principal of the assigned school in the school district of residency. The final decision was made by the school authority. To our knowledge, there is no research conducted before 2008 that analyzes permission to attend a public primary school other than the one assigned.

Second, there are public denominational schools (öffentliche Bekenntnisschulen). Public schools and public denominational schools do not charge tuition, 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 small number of private primary schools, which will, however, be disregarded in this study. 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 church, which is not the case with public denominational schools in NRW. 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). They might also be admitted to a denominational school even if the children do 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 and hence leaves room for interpretation. 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 districts for primary schools have been abolished in NRW. Theoretically, this should give parents a free choice of school; in practice, however, this is not 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. Indicators of the achievement level of the schools are not published. Second, the schools are given fairly strict 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 the number of school children is decreasing in NRW, leaving more room for choice and also for increased competition between schools.

### **3. The description of the data and summary 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).<sup>1</sup> Wuppertal used to be a rich industrial city and is, like many such cities in NRW, now experiencing structural change and suffering from severe economic problems. The unemployment rate in 2007 was 12.6 percent and the welfare dependence rate was 16.5 percent, which is higher than both the national and regional averages. As Figure 1 illustrates, Wuppertal is a city with a great deal of socioeconomic diversity. The immigrants are not equally distributed among the school districts, but are concentrated in the central (east-west) axis of the city around the famous Wuppertaler Schwebebahn (suspension railway), 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 suspension line in the valley to the outer, mountainous 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 also 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.

The data used in this analysis is collected from different sources. We are able to combine data from official statistics with the school statistics and information on the student level.<sup>2</sup> Furthermore, the data is available for 2007 and 2008; this data is summarized in Table 1. Significant differences in the sample means are marked with stars. In columns (1) and (2), we summarize the data for all schools in the sample, and in (3) and (4) only public schools are

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<sup>1</sup> Wuppertal has two Waldorf schools, one Catholic private school, one Greek primary school, and one private primary school.

<sup>2</sup> Data from the official statistics is only available for 2007.

included. Since participation in this study was voluntary for the schools, not every school provided data. 57 out of 61 primary schools are in the 2007 sample, whereas this number drops to 54 for the 2008 sample. One school was not included in the 2008 sample because enrollment there was not sufficient to form a 1<sup>st</sup> grade class. The total number of students in the sample is 11,976 in 2007, and includes all students in grades 1 to 4, i.e. all students enrolled in primary school at that time. For 2008, the first year with free school choice, we use data on 2,695 first-graders only. Restricting the sample to public schools reduces the number of students to 9,494 in 2007 and 2,146 in 2008. The remaining students attended a denominational school at these times. The percentage of students at denominational schools remained fairly stable from 2007 (20.7 percent) to 2008 (20.4 percent).

For about 92 percent of the primary students in Wuppertal, we have address information and hence also information about their assigned public school. Moreover, we also know whether the student attends his/her assigned public school or has chosen a school other than the one assigned. As Table 1 shows, choice was already substantial in 2007 and does, in fact, increase further in 2008. In 2007, 32.5 percent of all primary school students attend a school other than the one assigned. This number rises significantly in 2008, to 37 percent. 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 14.9 percent to 20.8 percent. This is a substantial increase, and one which basically accounts for the overall increase in school choice. The denominational schools did not benefit from increased school choice.

-- about here Table 1 --

Using address information, we calculated the distance (straight-line distance) from the student's home to school.<sup>3</sup> Here we report the distance to his/her assigned public school. In 2008, the distance to the assigned school was about 617 m, and does not differ significantly from 2007 (584 m). 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 the Turkish populations, since Turkish people constitute the largest group of

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<sup>3</sup> Burgess et al. (2006) discuss the use of various measures of distance and conclude that, despite some drawbacks, the straight line method is reasonably accurate.

immigrants in Germany<sup>4</sup>. The Turkish population in Germany is not only the largest group of immigrants in Germany, but also the least integrated of the major ethnic minorities (Berlin Institut für Bevölkerung und Entwicklung, 2009). To further integration, the participation of minorities in education is essential. One problem with the data is that the Turkish population, Turkish children in particular, are hard to identify from the official statistics and from the school statistics, as the data refers to the child's first citizenship, and children of immigrant families born after January 1<sup>st</sup>, 2000 are German citizens. The problem is even worse in the school statistics, as this information is provided by parents and not cross-checked.

Since there is no reliable information on a given individual student's ethnic background in the school statistics, we use information on the city block level to describe the ethnic composition of the students' local neighborhood. In our sample the amount of Turkish people per city block is less than five percent, which underestimates the size of the Turkish ethnic population in Wuppertal. The information is nevertheless useful, as it also describes the percentage of Turkish people in a neighborhood relative to other neighborhoods. In the regression analysis, the absolute level is less important than the information on the relative magnitudes. Hence, the percentage of Turkish people in the neighborhood might even better reflect the student's background than his/her citizenship. The ethnic composition of the school district is described by the percentage of Turkish people in the school district, which (at 3.8 percent) is lower than the city block average.

The data also provides information on the availability of alternatives and their costs, as measured by the distance to an alternative school. Assuming that the composition of socially advantaged and disadvantaged students is an indicator of school quality, a variable measuring the distance to the next school with a more favorable composition can be constructed. Here, we use the straight-line distance to the next school where the proportion of students with non-German ethnic backgrounds is at least five percentage points lower than that of the assigned school<sup>5</sup>. The average distance to a school with a more favorable composition is 2 km for the total sample and about 2.3 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

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<sup>4</sup>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.

<sup>5</sup>If there was no school with a rate of immigrants five percentage points lower, the distance to the school with the lowest percentage of immigrants was chosen.

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, German students get a (more or less binding) teacher recommendation for a secondary school. In NRW, the alternatives are a basic track school, an intermediate track school, an academic track school, and a comprehensive school, which has an internal tracking system. The most prestigious of these tracks is the academic track school. After graduation from an academic track school (Abitur), academic track students are entitled to study at a university. The schools in Wuppertal vary widely with respect to the percentage of students transferring to the academic track. The average transfer rate between 2003 and 2006 is 34 percent, with values for individual schools ranging 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. To calculate a proxy variable for the availability of a higher quality school, we use the distance to the next school where the transfer rate to the academic track is five percentage points higher.<sup>6</sup> In our sample, the average distance to a higher quality school is about 1.4 km in the sample of all schools and about 1.5 km in the sample of public schools.

As noted above, citizenship has become an increasingly less reliable indicator when it comes to issues of ethnicity. As children in families of Turkish descent are mostly born in Germany, they are German citizens and are not counted as immigrants in the official statistics. Hence, we follow an alternative strategy to identify disadvantaged students by using information about student denomination, particularly whether the student is Muslim or not. One drawback of this strategy is that we do not have the information for each school in the sample. The number of students from the remaining 53 schools drops to 9,611 in 2007 and 2,619 in 2008 (last two columns in Table 1). The percentage of Muslim students in our sample increases slightly, from 19.7 percent in 2007 to 21.3 percent in 2008. Compared to the first two columns, we now find more pronounced and significant differences between 2007 and 2008. For instance, the percentage of Turkish people in the neighborhood as well as in the school district increases from 2007 to 2008. Moreover, the average transfer rate at the chosen school is significantly lower in 2008. While the change in the average transfer rate at the chosen school might be the effect of increased choice, the changing ethnic composition of the school district and the neighborhood is the result of changes in the socioeconomic structure of the school-age population.

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<sup>6</sup> If there is no school with an academic track transfer rate which is five percentage points higher, the distance to the school with the highest transfer rate is chosen.

Table 2 summarizes the data by denomination. In 2007, 34 percent of non-Muslim students attended a school other than the one assigned. Only 25 percent of all Muslim families choose a non-assigned school. After abolishing school districts, Muslims and non-Muslims alike more often choose a school other than the one assigned. While Muslims still exercised school choice less often than non-Muslims in 2008, the relative increase is stronger for Muslims than for non-Muslims. This increase in choice amounts to 4 percentage points for non-Muslim students and 5 percentage points for Muslim students. At first sight, this is surprising. However, before 2008, denominational schools presented a less bothersome alternative for many parents who wanted to opt out of their assigned school without going to the trouble of applying to a different school. Since 2008, however, families do not need 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 if choice implies attending a Christian school.

The data also shows that Muslims tend to live in school districts with lower achievement levels (not reported). If Muslim families exert school choice, the difference in the transfer rates between the assigned and chosen schools is not as large as it is for non-Muslim families. The average transfer rate at the attended school is about 26 percent for Muslim students and about 36 percent for non-Muslim students. Thus, academic achievement appears to be a weaker motive for school choice in Muslim families, or else academic achievement is assessed differently in Muslim families than in non-Muslim families. Table 2 also shows that Muslims live in school districts with a substantially higher percentage of Turkish people, which is expected. This difference is even more distinct when looking at the city blocks, i.e. the neighborhood where the students live. Finally, Muslim children live closer to their assigned schools, and also to alternative schools with less students of non-German descent and a higher transfer rate. 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 disadvantaged families (cf. Figure 1).

-- about here Table 2

#### 4. Determinants of choice

##### *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 the 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 their own ethnic background. Second, we study the effect of free school choice on segregation in Wuppertal. In general, we expect segregation to be higher after the abolition of school districts 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 than not, 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 visit his/her assigned primary school depends on the costs and benefits of opting out. It is a function of student level variables,  $\mathbf{X}_{is}$ , such as family preferences regarding education, distance between the students' home and the assigned public school, and characteristics of the students' neighborhood. Besides individual characteristics, choice is also a function of the characteristics of the school district and school characteristics,  $X_s$ , such as the ethnic composition and academic achievement of the school. The school district variables reflect the socioeconomic composition of assigned schools in the absence of choice. If the assigned school is located in a school district 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 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, because 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 district are highly correlated, and it is not possible to identify 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 assigned school.

Moreover, choice also depends on the availability of better alternatives,  $\mathbf{A}_{is}$ . The availability of better alternatives can be measured by the distance to the next school with a more favorable composition and/or a higher transfer rate to the academic track, for instance. It is expected that the availability of alternatives increases the probability to opt out.

Since school districts 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. And finally, we control for differences in school choice behavior between the two sub-groups, the Muslim (Turkish) and the non-Muslim (non-Turkish) populations, by introducing a dummy variable,  $M$ , which is 1 if the student is Muslim (has a Turkish background) and 0 otherwise. Hence we derive the latent dependent variable model

$$y_{is}^* = a + \beta_1 \mathbf{X}_{is} + \beta_2 \mathbf{X}_s + \beta_3 \mathbf{A}_{is} + \gamma T + \delta M + e_{is}, \quad (1)$$

where  $e_{is}$  is the error term. The student only chooses a school, i.e.  $Y_{is} = 1$ , if  $y_{is}^* > 0$ .  $\beta_i$  and  $\gamma$  can be estimated using a logit regression. Our data contains information on the school district level as well as individual student/neighborhood data. While the sample of the school districts can be treated as a random sample, the students in each school district clearly do not constitute not a random sample of the students in Wuppertal. Due to residential segregation, students in different school districts will differ with respect to socioeconomic and ethnic background. Thus, clustering of errors occurs at the school district level. Errors will be correlated within clusters, but not across clusters. While the point estimates of the regressions are not biased, the variance-covariance matrix of the logit model is incorrect and might entail a substantial downward bias. Therefore, we estimate an Eicker-Huber-White type cluster-

robust variance (Wooldridge, 2002; Cameron & Trivedi, 2009). The cluster-robust standard errors converge to the true standard error as the number of clusters gets larger.

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 fully interacted model and test the coefficients on the interaction terms and the time dummy using a Wald test<sup>7</sup>. By doing this, we obtain

$$y_{is}^* = a + \beta_1 \mathbf{X}_{is} + \beta_2 \mathbf{X}_s + \beta_3 \mathbf{A}_{is} + \gamma_0 T + \gamma_1 T \mathbf{X}_{is} + \gamma_2 T \mathbf{X}_s + \gamma_3 T \mathbf{A}_{is} + e_{is} \quad (2)$$

If  $H_0: \boldsymbol{\gamma} = \mathbf{0}$  is rejected, there is statistical evidence that school choice behavior changed after the abolition of school districts.

Similarly, in order to allow for different choice behavior for each of the two ethnic groups, a second fully interacted model is specified, and the coefficients of the interaction terms are tested for joint significance.

$$y_{is}^* = a + \beta_1 \mathbf{X}_{is} + \beta_2 \mathbf{X}_s + \beta_3 \mathbf{A}_{is} + \gamma T + \delta_0 M + \delta_1 M \mathbf{X}_{is} + \delta_2 M \mathbf{X}_s + \delta_3 M \mathbf{A}_{is} + e_{is} \quad (2')$$

If  $H_0: \boldsymbol{\delta} = \mathbf{0}$  is rejected, it follows that school choice behavior differs between the two ethnic groups. Provided that  $H_0$  is rejected, separate models for Muslim (Turkish) students and non-Muslim (non-Turkish) students will be estimated.

In the second step 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 & 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 district  $i$  and  $A$  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 increased choice. More choice might help advantaged groups, but not

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<sup>7</sup> Since the data is clustered on the school district level, the likelihood ratio test is not appropriate.

disadvantaged groups, to find the best suited school. Politically speaking, this is a highly relevant issue. However, since, as described above, limited school choice also existed before 2008, the old situation might already have been 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 for equivalence of segregation over time, we compute a Wald test, as suggested by Allen, Burgess, & Windmeijer (2009). Since  $D$  is potentially large in small samples even in the absence of systematic segregation, we apply a bootstrap bias adjustment to the dissimilarity index. The Wald statistic uses the double bootstrap variance estimates for the bias corrected estimator of  $D$ .

## *The Results*

### *Determinants of choice*

Tables 3 and 4 summarize the results of the regression analyses. Using data from the official statistics and the school statistics allows us to work with data that is not contaminated by a selectivity bias. Moreover, the data allows us to control for changes over time, and our approach should be easily reproducible for other municipalities with similar data.

Table 3 summarizes the regression results from estimating equation (1). Note that the coefficients provided in this paper are correlations; they cannot be interpreted as causal effects. In the tables we report the odds ratios, *OR*. For instance, the reported odds ratio in column (1) for being a Muslim and exercising school choice is

$$OR = \exp(\delta) = \frac{P(Y_{is} = 1 | M = 1; \mathbf{X}_{is}, \mathbf{X}_s, \mathbf{A}_{is}, T)}{P(Y_{is} = 0 | M = 1; \mathbf{X}_{is}, \mathbf{X}_s, \mathbf{A}_{is}, T)} \bigg/ \frac{P(Y_{is} = 1 | M = 0; \mathbf{X}_{is}, \mathbf{X}_s, \mathbf{A}_{is}, T)}{P(Y_{is} = 0 | M = 0; \mathbf{X}_{is}, \mathbf{X}_s, \mathbf{A}_{is}, T)} = 0.535 .$$

Hence, the odds of choosing a school are 46.5 percent lower for Muslims than for non-Muslims.

In models (1) to (4) we estimate the pooled model, including a time dummy for 2008 and using different strategies to differentiate between ethnic groups. The decision to choose a non-assigned school positively correlates with the distance to the assigned school. In model (1) the odds ratio is 1.139. Thus, if the distance to the assigned school increases by 100 m, the odds of choosing another school are 1.139 times as high. The longer the distance to the assigned school, the more likely it is that parents opt out. The higher the percentage of the Turkish population in the school district, the more likely it is that the assigned school is not chosen. Thus parents opt out of the assigned public school if the composition of the school district is

perceived to be unfavorable. Being Muslim reduces the odds ratio to 0.54, and the coefficient is highly significant. Therefore, the chance to choose a school is about twice as high if the student is not a Muslim. The academic track variable has the expected positive effect on choice, i.e., if parents choose, the chosen school is a school with a higher level of academic achievement. Looking at the availability of alternatives, it turns out that the nearer better alternatives are located, the more likely it is that the students will choose another school. Last but not least, the time dummy has a positive and significant effect; hence, significantly more families exercise school choice under the new policy. So far, the results confirm our conjectures: Choice does, in fact, depend on the proximity to the school, the academic achievement level and ethnic composition of the school, and the student's family background. Finally, choice has increased after the school districts were abolished.

-- About here Table 3 --

In model (2), we use the percentage of Turkish people per city block as an alternative to measure ethnicity. The variable is defined in terms of deviations from the school district averages, and describes the ethnic composition of the students' neighborhood relative to the composition of the school district. As expected, the percentage of Turkish people in the direct neighborhood has a negative effect, because it serves as a proxy variable for family socioeconomic background. The other coefficients remain fairly unchanged. Also note that, compared to (1), the number of observations is higher. This is due to the fact that not all schools reported their students' denomination. Models (3) and (4) deal with public schools only, as they are predominantly affected by the new school law. The results are qualitatively the same as in models (1) and (2). However, proximity to the assigned school is now less important, and the time dummy gains in size and significance.

To test for structural change between the years before and after 2008, we estimated the fully interacted model as specified in equation (2) and tested the joint significance of the time dummy and the interaction effects using a Wald test. The test is not significant for model (1) ( $\chi^2(7) = 8.27$ ). Thus, estimating equation (1) with a time dummy is sufficient; no separate regressions for the two points in time are required. However, testing model (3), using the sample of public schools only, yields a significant result ( $\chi^2(7) = 31.85$ ). Testing model (2), with all schools included, and model (4), with public schools only, shows that the interaction

effects are jointly significant ( $\chi^2(7) = 46.23$  and  $\chi^2(7) = 59.21$ ) in both specifications; hence choice when school districts existed differs from choice after school districts were abolished.

In models (5) and (6), we report the regressions for 2007 and 2008. The most surprising result is that while the percentage of Turkish inhabitants per city block is significant before 2008, it is no longer significant in 2008. Hence, the ethnic composition of the students' neighborhood becomes less important in explaining school choice. Moreover, the decision to choose in 2008 is not as dependent on the availability of alternatives. The distance to a school with a higher academic track transfer rate and the distance to a school with less students of non-German descent is significant for explaining choice in 2007, but not in 2008. The percentage of Turkish inhabitants per school district, on the other hand, becomes more significant. When comparing the percent of correctly predicted outcomes and the pseudo R-squared, it turns out that the model fit is better in 2007 than in 2008.

Hence, there is evidence that the new enrollment policy has changed parental school choice. Next we will test whether choice differs between ethnic groups by estimating the fully interacted model in equation (2') and testing for the joint significance of the interaction effects. The results are reported in Table 4.

The Wald test for differences between Muslims and non-Muslims is significant ( $\chi^2(7) = 37.4$ ). Hence, separate models are estimated. The results for non-Muslims in column (1) and Muslims in column (2) are, in fact, different. Non-Muslims tend to opt out of school districts with a high percentage of Turkish inhabitants. Muslim families do not react significantly to the ethnic composition of the school district, but the odds ratio is, at 1.112, surprisingly high. Distance to the assigned school is more important for Muslim students and their decision to choose, but the academic transfer rate does not appear to matter for Muslim families. The year dummy is significant for non-Muslims, but is only marginally significant for Muslims.

As noted earlier, using the students' denomination entails a loss of data. Hence, the alternative variable representing students from Turkish neighborhoods is used. A new indicator variable for neighborhoods with a high percentage of Turkish people is defined. The indicator variable is 1 if the student lives in a neighborhood with a percentage of Turkish inhabitants that is in the highest quartile of the distribution of Turkish people in Wuppertal. Since the Wald test is significant ( $\chi^2(7) = 34.47$ ), we report separate regressions for students with low and high percentages of Turkish people in the neighborhood (columns [3] and [4]). As before, the distance variable is more important for students from neighborhoods with a

higher percentage of Turkish inhabitants. The ethnic composition of the school district is now significant, indicating that Turkish as well as German parents avoid schools with a higher percentage of students from less favorable backgrounds. Distance to the nearest school with a higher transfer rate is only relevant for those families who live in a neighborhood with a low percentage of Turkish people, and the year dummy is positive and significant. The effect is even stronger for less advantaged families, and the odds of choosing a school are twice as high for this group in 2008 than in 2007. Thus, free school choice has also benefited more disadvantaged families and made it easier for them to make educational choices.

— About here Table 4 —

So far, the analysis has shown that choice has changed after the new school choice policy was implemented. The option to freely choose a public school other than the one assigned (as allowed by school capacity) is used by parents. The percentage of children who do not attend their assigned school increases significantly between 2007 and 2008. While non-Muslim parents use the new opportunity to avoid school environments with a high percentage of disadvantaged children, Muslim parents also use school choice as an option. The motives underlying the school choice of Muslim parents, however, are less clear cut than those of non-Muslim parents.

### *Choice and Segregation*

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

The dissimilarity index is calculated using data from the school statistics for primary schools, which yields information about the composition of the schools at the school level. In particular, we use data from the school statistics 2007/08 (grade 4) and 2008/09 (grades 1 to 4). Thus we have data for the enrolment in 5 years. Children who entered school in 2004 are fifth-graders in 2008 (grade 4 in the school statistics 2007), children who entered in 2005 are in fourth grade and so forth. Note that children in grade 2 and above are not affected by the new legislation concerning school districts. Only first graders in 2008/09 are no longer

restricted in their choice by the existing school districts. In order to assess the effect of the abolition of the school districts, we use the allocation of the students in grades 2-5 as a benchmark against which we compare segregation in grade 1. An increase in segregation from grade 1 in the school year 2008/09, combined with no increase in 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. Clearly, since segregation might follow a time trend that is unrelated to the existence of school districts, it does not suffice to only compare, for instance,  $D_1$  and  $D_2$ . The time path of segregation also has to be accounted for.

Moreover, during the time period from 2004 to 2008, abolishing the school districts has not been the only policy that potentially affects segregation. First, the number of Turkish students reported in the official statistics is decreasing, because the majority of children of non-German ethnicity who have been born in Germany after January 1<sup>st</sup>, 2000, have the German citizenship.<sup>8</sup> Hence there is an expected drop in the number of Turkish children in the school years 2006 and 2007, i.e. students in grades 2 and 3. Moreover - and this is a general problem with data derived from school statistics - the information about a child's first citizenship is reported by his or her parents. This information is neither verified by the school, nor is it compared to the official statistics. Hence, the data on citizenship might be an increasingly less reliable indicator of objective citizenship but increasingly an indicator of a subjective citizenship and hence a better indicator of ethnicity. This data problem has been acknowledged by educational authorities, and in the future, more care will be given to collect data on minority students. Our second indicator of ethnicity – being Muslim or not – is more reliable, when the families ethnic origin is of interest. However, as noted earlier, Muslims in Germany are quite heterogeneous, when looking at issues of integration and preferences for education. But unlike the citizenship, the religious denomination is a stable characteristic of minority families. While the number of Turkish students decreases, the number of Muslim students remains fairly stable throughout the sample. The proportion of Muslim students is growing because the number of non-Muslim students is decreasing.

Second, in 2007 the cut-off date for entering school was changed from June 30<sup>th</sup> to July 31. Thus in 2007, the children born in July were enrolled in school in addition to the regular cohort of 12 months. This amounts to a sizable increase in the number of students in grade 2

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<sup>8</sup>This confirms a general trend in NRW. The percentage of Muslim students rose from 13 percent in 2005 to 14 percent in 2008, whereas the percentage of Turkish (non-German) students fell from 8 (15) percent in 2005 to 6 (13) percent in 2008.

of our sample and might also affect segregation in either direction. Compared to the first grade, there are about 10 percent more children in grade 2.

Table 5 summarizes the results. As before, we focus on two minorities in Germany: Turkish students and Muslim students. First look at the sample of all schools, public and denominational. The number of schools has been reduced from 61 to 59 and finally to 57 for the first graders in 2008, because one school did not have enough applications to form a first grade in 2008, and the other three school are closed or are about to be closed. Column (1) in Table 5 shows the dissimilarity index of Muslim versus non-Muslim students. The dissimilarity index is stable at high values of about 0.43. Hence an equal distribution of Muslim and non-Muslims students requires removing 43 percent of the sample. Only in second grade the index drops to 0.39 and increases again to 0.43 in 2008. As first sight this is surprising and cannot be explained by changes due to the abolition of the school districts one year later. The explanation for this result is that due to the new cut-off-date, the number of students is larger in second than in first grade. And while the number of Muslim students (the minority) increases by 12 percent, the number of non-Muslim students increases by only 2 percent. Hence it is not surprising that the segregation index changes. The direction of change, however, is interesting, as the allocation of Muslim students across schools has become more and not less equal. In first grade, the index is back at 0.43, and the small differences between the dissimilarity indices are not significant. Hence so far there is no clear evidence that segregation is higher in Wuppertal after school districts have been abolished.

The situation is different if we study segregation between the Turkish and non-Turkish student populations.  $D_3$  (0.40) is significantly lower than  $D_1$  (0.48). However, the increase between  $D_2$  and  $D_1$  is again moderate and insignificant. Recall though that in 2<sup>nd</sup> grade there more students due to the change cut-off date. Unlike the dissimilarity index between Muslims and non-Muslims, the dissimilarity index for the Turkish students increases when in 2007 a cohort of 13 months enters school. Hence the Turkish children, or children of parents who report having the Turkish citizenship, are allocated less equally across the schools. This finding confirms our earlier interpretation of the regression results. We presume that the group of Muslim families is heterogeneous and some Muslim families use the new school law as an opportunity to choose a school that fits their preferences for education best. The group of Turkish students, however, are either first-generation immigrants or have parents who – due to a lack of information – misreport their citizenship because they do not feel like natives. 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. But in any case, the evidence obtained so far on segregation tendencies after the abolition of school districts is rather inconclusive and only partly supports the hypothesis that free school choice increases segregation.

As shown in the lower part of Table 5, the results are similar when restricting the sample to public schools only. The number of schools drops to 46 in first grade and the dissimilarity index for Muslims and non-Muslims is again fairly constant and at a similar level as for 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 first grade than in grade 3, 4 or 5, and the increase is with 5 percentage points sizable, though not significant. Hence, the existence of denominational schools cannot explain the high levels of segregation in Wuppertal and 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 districts. The 2008/2009 school year was the first in which every community had to enforce the new legislation. In this paper, we addressed the differences in school choice behavior before and after the abolition of school districts, using data from Wuppertal, a major city in NRW. More specifically, we focused on two questions: First, we were interested in the changes in school choice behavior of Muslim (Turkish) and non-Muslim (non-Turkish) parents over time. Second, we looked at school choice and its effect on 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 benefited from increased choice as well. School choice gives both groups a chance to find the school that best suits their educational preferences. However, non-Muslim (non-Turkish) parents exercise school choice more often than Muslim (Turkish) 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.

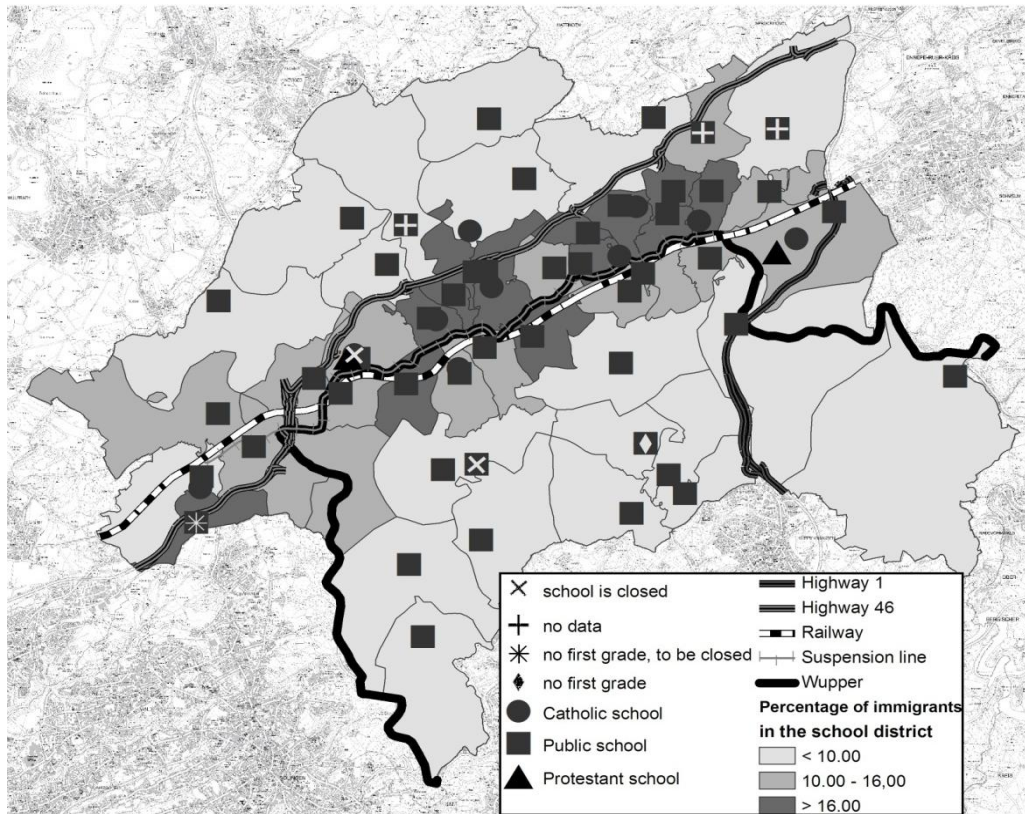
The dissimilarity index, our measure of segregation, increases over time, when looking at the allocation of Turkish versus non-Turkish students. However, we find no differences in segregation before and after abolishing school districts when comparing Muslim and non-Muslim students.

The debate on segregation and free school choice will continue to be on our research agenda. Moreover, the role of schools in the admission process has not yet been addressed. Do schools engage more often in cream-skimming strategies than before? The rich data and the quasi-experimental setting we have utilized here allow for more research and promise interesting answers.

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Figure 1



**Table 1. Sample description**

	All		Public Schools		All	
	2007	2008	2007	2008	2007	2008
Non-assigned school	0.325 (0.468)	0.370** (0.483)	0.149 (0.356)	0.208** (0.406)	0.324 (0.468)	0.363** (0.481)
Distance to assigned to assigned school (in m)	622.4 (471.0)	616.9 (483.3)	591.4 (468.0)	583.6 (468.2)	624.2 (473.3)	619.7 (486.7)
Student is Muslim					0.197 (0.398)	0.213+ (0.410)
% Turkish inhabitants in city block	4.541 (6.290)	4.801+ (6.537)	4.448 (6.483)	4.486 (6.583)	4.435 (6.246)	4.834** (6.595)
% Turkish inhabitants in school district	3.806 (2.997)	3.815 (2.964)	3.572 (3.008)	3.582 (2.983)	3.614 (2.797)	3.825** (2.988)
% Transfer rate academic track chosen school	33.88 (13.40)	33.21* (12.95)	33.66 (14.19)	33.27 (13.57)	34.11 (13.55)	33.16** (12.97)
Distance to school with 5 PPT higher transfer rate (in m)	1362.7 (1257.4)	1318.6+ (1216.8)	1514.8 (1335.5)	1467.3 (1293.2)	1365.3 (1331.2)	1331.6 (1228.9)
Distance to school with 5 PPT less immigrants (in m)	2059.2 (2493.3)	2044.0 (2438.3)	2310.6 (2668.3)	2325.7 (2638.4)	2218.7 (2706.0)	2068.1* (2465.7)
Number of schools	57	54	45	43	53 <sup>1</sup>	53
Number of students	11976	2695	9494	2146	9611	2619

Note: + p < 0.10, \* p < 0.05, \*\* p < 0.01. 53 schools supplied the information about the students' denomination. For 11 of the 53 schools the data for 2007 is only available for grades 1 and 2.

**Table 2. Sample description by denomination**

	Non-Muslims All		Muslims All	
	2007	2008	2007	2008
Non-assigned school	0.341 (0.474)	0.380 (0.485)	0.254 (0.435)	0.303 (0.460)
Distance to assigned school (in m)	648.9 (488.2)	647.3 (503.4)	523.7 (391.7)	517.6 (403.8)
% Turkish inhabitants in city block	3.151 (4.648)	3.546 (5.227)	9.656 (8.707)	9.592 (8.636)
% Turkish inhabitants in school district	3.161 (2.586)	3.345 (2.705)	5.452 (2.869)	5.595 (3.305)
% Transfer rate academic track chosen school	36.15 (13.42)	35.12 (12.85)	25.80 (10.55)	25.89 (10.62)
Distance to school with 5 PPT higher transfer rate (in m)	1487.8 (1420.3)	1449.0 (1318.7)	867.8 (683.9)	897.9 (653.1)
Distance to school with 5 PPT less immigrants (in m)	2486.3 (2917.9)	2328.3 (2690.0)	1131.4 (1003.4 )	1106.8 (798.1)
Number of students	7713	2061	1898	558

**Table 3. Decision to not attend assigned public school**

	(1)	(2)	(3)	(4)	(5)	(6)
	All schools	All schools	Public schools	Public schools	Public schools 2007	Public school 2008
Distance to assigned school (in 100 m)	1.139** (7.36)	1.139** (6.71)	1.107** (7.49)	1.109** (6.61)	1.113** (6.46)	1.097** (5.53)
% Turkish inhabitants in city block (a)		0.976** (-2.60)		0.964** (-2.90)	0.954** (-3.77)	0.992 (-0.53)
% Turkish inhabitants in school district	1.166** (3.75)	1.141** (2.97)	1.206** (5.20)	1.150** (4.29)	1.142** (3.85)	1.173** (4.41)
Student is Muslim	0.535** (-4.12)		0.523** (-3.97)			
% Transfer rate academic track chosen school	1.042* (2.45)	1.049** (2.82)	1.046** (3.36)	1.044** (3.25)	1.044** (3.21)	1.041** (2.95)
Distance to school with 5 PPT higher transfer rate (in 100m)	0.964* (-2.19)	0.945** (-3.19)	0.988 (-1.14)	0.977* (-2.25)	0.976* (-2.43)	0.980 (-1.61)
Distance to school with 5 PPT less immigrants (in 100m)	0.975+ (-1.88)	0.977 (-1.57)	0.985* (-2.02)	0.986+ (-1.77)	0.985* (-1.99)	0.990 (-1.00)
Year=2008	1.232* (2.13)	1.313** (3.85)	1.591** (4.59)	1.602** (5.37)		
Observations	12233	14671	9726	11640	9494	2146
Pseudo R <sup>2</sup>	0.149	0.158	0.108	0.098	0.100	0.078
Percent correctly predicted	75.85	77.00	85.56	85.07	86.13	80.89

Note: Logit model. The dependent variable is the binary indicator for whether the student attends the assigned public school. In parentheses we report the t-values that are based on robust standard errors adjusted for clustering within school districts. The reported coefficients are odds ratios. +  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ ; (a) In deviations from school district level.

**Table 4.** Decision to not attend the assigned public school by denomination

	Non- Muslims	Muslims	Low % Turkish population	High % Turkish population
Distance to assigned school (in 100 m)	1.104** (7.60)	1.134** (3.41)	1.103** (6.02)	1.145** (3.35)
% Turkish inhabitants in school district	1.247** (6.31)	1.112 (1.58)	1.228** (5.76)	1.166** (4.05)
% Transfer rate academic track chosen school	1.051** (3.59)	1.005 (0.15)	1.042** (3.09)	1.061* (2.27)
Distance to school with 5 PPT higher transfer rate (in 100m)	0.986 (-1.29)	1.015 (0.53)	0.978* (-2.14)	0.976 (-1.07)
Distance to school with 5 PPT less immigrants (in 100m)	0.985+ (-1.92)	1.013 (0.96)	0.988 (-1.60)	0.997 (-0.21)
Year=2008	1.628** (4.08)	1.483+ (1.80)	1.490** (4.03)	2.026** (4.53)
Observations	7696	2030	8838	2805
Pseudo R <sup>2</sup>	0.120	0.057	0.100	0.098
Percent correctly predicted	84.99	88.47	84.87	86.02

Note: Only public schools are included. See Table 3.

**Table 5. Dissimilarity Index  $D$** 

	D Muslim students	N Muslim students	N non-Muslim students	D Turkish students	N Turkish students	N non-Turkish students	Number of schools
All schools							
Grade 5	0.422	577	2642	0.400	336	2883	61
$H_0: D_5=D_4$	0.019 (0.889)			0.111 (0.739)			
Grade 4	0.427	603	2575	0.389	307	2871	59
$H_0: D_4=D_3$	0.002 (0.868)			0.058 (0.810)			
Grade 3	0.425	608	2538	0.398	271	2875	59
$H_0: D_3=D_2$	1.553 (0.213)			3.04 (0.081)			
$H_0: D_3=D_1$	0.016 (0.898)			3.979 (0.046)			
Grade 2	0.391	679	2596	0.468	220	3055	59
$H_0: D_2=D_1$	1.835 (0.176)			0.131 (0.717)			
Grade 1	0.429	604	2391	0.484	164	2831	57
Public schools only							
Grade 5	0.439	492	2130	0.400	290	2332	48
$H_0: D_5=D_4$	0.006 (0.936)			0.029 (0.866)			
Grade 4	0.436	499	2088	0.393	259	2328	47
$H_0: D_4=D_3$	0.003 (0.955)			0.008 (0.931)			
Grade 3	0.435	508	2003	0.396	229	2282	47
$H_0: D_3=D_2$	0.322 (0.570)			2.885 (0.089)			
$H_0: D_3=D_1$	0.086 (0.769)			1.347 (0.246)			
Grade 2	0.417	566	2040	0.471	189	2417	47
$H_0: D_2=D_1$	0.723 (0.394)			0.156 (0.693)			
Grade 1	0.444	490	1901	0.449	146	2245	46

Note: The reported figures are bias corrected dissimilarity indices and test statistics from 500 bootstrap samples and 500 samples for the double bootstrap variance estimate of  $D$ . p-values of the Wald-test on equality of the dissimilarity indices in parentheses.