The Effect of School Neighborhoods on Teacher Career Decisions

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INTRODUCTION

A substantial body of research demonstrates that schools with large populations of poor, non-white and low-achieving students, on average have more difficulty attracting and retaining teachers (Boyd et. al., 2005; Boyd et al, 2009; Hanushek et. al., 2004; Ingersoll, 2001; Scafidi et. al., 2007). However, little work assesses the extent to which differences in the neighborhoods in which schools are located either affect teacher recruitment and retention or explain the observed relationship between school characteristics and teachers' career choices. This paper uses newly compiled data on the neighborhoods of all schools in New York City, linked to a unique dataset on teachers' applications to transfer, in order to assess the effects of neighborhoods on teachers' career decisions. The analyses show that while school characteristics are more salient than neighborhood characteristics, neighborhoods do affect teachers' choices. In particular, the income of neighborhood residents and the amenities available near the school both affect teachers' decisions of where to teach, particularly in urban areas with high population-density.

BACKGROUND

Public schools are the most extensive public intervention in the lives of children and youth; and teachers and peers are the most immediate factors influencing school experiences for students. Thus, understanding differences in teacher quality across schools can give insight into the equity and effectiveness of public interventions. Teachers affect students' educational achievement and differences in effectiveness across teachers can be substantial (Rockoff, 2004; Rivkin, Hanushek and Kain, 2005). There is also clear evidence that the characteristics of teachers vary across schools, with poor students, black students, and low-achieving students consistently in classrooms with teachers who are less experienced and less academically able, as measured by their own test performance (Lankford, Loeb and Wyckoff, 2002; Clotfelter, Ladd and Vigdor, 2005). However, qualifications and quality are not the same. There is far less evidence on the distribution of teacher quality across schools, largely because it is difficult to compare teacher quality across different contexts. Even so, researchers can observe the career choices of teachers and use this information to better understand the distribution of quality teachers across schools. The extent to which teachers' career choices of whether to teach in a particular school signal differences in the supply of teachers, they also reflect the potential for schools to select and retain effective teachers and provide high-quality educational opportunities for students.

Teacher attrition is not substantially greater than attrition in other occupations (Harris and Adams, 2007); however, some schools have substantially more difficulty retaining teachers than do other schools. As an example, 27 percent of first-year teachers in New York City's lower-performing schools do not return the following year, compared to 15 percent in the quartile of schools having the relatively highest student achievement (Boyd et. al., 2005). Nearly 44 percent of elementary teachers and 55 percent of middle school teachers in the lowest-performing schools in the city left within two years (Boyd et. al., 2009).

Teacher attrition is not always bad. Recent research shows that more effective teachers, on average, stay in teaching and remain in their school more than do less effective teachers (Boyd et. al, 2008; Boyd et. al. 2009; Goldhaber, Gross and Player, 2007; Hanushek, Kain, O'Brien and Rivkin, 2005). However, the differential attrition of more and less effective teachers appears to be similar across school types, and average attrition differences across schools are largely the result of differences in the appeal of teaching in those schools (Boyd et. al, 2009). Teachers are more likely to leave schools with high proportions of low-income, black and low achieving students, as well as schools with less supportive leadership and lower salaries (Ingersoll and Smith, 2003; Hanushek, 2004; Boyd et. al, 2009b). This greater attrition disadvantages schools because of the cost of recruitment and hiring, the greater instability of instructional programs, and the greater probability of hiring first year teachers who have been shown to be less effective, on average (e.g. Rockoff, 2004). In addition, it likely signals a less desirable pool of teachers interested in filling vacancies.

While it is clear that school characteristics affect teachers' career choices, no research that we know of has identified the effects of neighborhood characteristics on teachers' decisions. There is, however, substantial research on the relationship between neighborhood characteristics and student outcomes. The evidence is mixed. Sanbonmatsu, Kling, Juncan and Brooks-Gunn (2006) analyze a sample of more than 5000 students from the Moving to Opportunity (MTO) program in Boston, Baltimore, Chicago, Los Angeles and New York whose families were randomly assigned to vouchers for housing in higher income communities. They find no effect of voucher receipt on student test scores four to seven years after random assignment, even though the characteristics of neighborhoods were strongly affected by the treatment. The findings of this aggregate study is in keeping with some earlier work, which also found little effect of neighborhood change on student later achievement (Leventhal and Brooks-Gunn, 2004; Jacob, 2004); and it is in keeping with some careful correlational studies of neighborhood effects (such as Solon, Page and Duncan (2000)). However, other smaller experimental studies such as Chicago's Gautreaux program (Rosenbaum,

1995) and the initial analyses of the Baltimore MTO program (Ludwig, Ladd, and Duncan, 2001) do show positive effects of neighborhood transitions. Substantial research also demonstrates correlations between neighborhood characteristics and child and youth outcomes (e.g Chase-Lansdale and Gordon, 1996); however, it is difficult to separate potentially-omitted family characteristics that lead families to locate in a given neighborhood from the effect of the neighborhood itself.

Omitted variables bias is a concern in correlational studies of the effects of neighborhoods on student outcomes, and it is a concern in assessing the effects of neighborhoods on teachers as well. In particular, if we see higher attrition of teachers in one neighborhood than in another, this difference could be driven by neighborhood characteristics but it could also be driven by differences in school characteristics across neighborhoods or by differences in teacher characteristics across neighborhoods that we are not measuring. In the analyses below we adjust for school and teacher characteristics that could differ across neighborhoods using an unusually rich dataset on New York City schools; however, there is still some concern that neighborhood characteristics could be reflecting unobserved characteristics of schools and teachers.

In addition to the potential bias caused by omitted variables, estimates of the effects of neighborhood characteristics are complicated by the potential variation in effects across contexts. A neighborhood characteristic, such as ample public transportation may have a different effect in an area where there is easy access by car and easy parking, than it would in an area without this ease of access. In this study we use data from one large urban school district, so there is more uniformity in location than there would be in a state or national study; we do not, for example, need to worry about differential effects in urban and rural areas. Nonetheless, there is variation within NYC in the density of urban life. In some of the outer areas of the city, teachers drive to work and thus amenities such as parking may be salient and the distance to a coffee shop or subway station less salient; while in the most densely populated areas driving to work is not an option and local amenities and public transportation may be particularly important. To address these differences in location in this paper we look separately at the effects of neighborhood characteristics in high and low population-density locations.

The analysis of teacher career decisions also present challenges of their own. Most studies of teachers' choices examine whether teachers are more likely to quit or to transfer to other schools when they work in one type of school relative to when they work in another type of school. Yet, transferring across schools is a two-sided choice; the teacher has to be willing to transfer and the

school has to be willing to accept the teacher. Transfers reflect both teacher and school preferences. In this paper we are able to isolate teacher preferences by using data on applications to transfer, instead of on the actual transfer (Boyd et. al., 2009). We detail this data below.

DATA

Transfer Request System Data: The primary data for this paper come from the New York City Department of Education Transfer Request System. The data include the applications for open positions for the 2006-07 and 2007-08 academic years. Each application identifies the teacher as well as characteristics of the open positions such as the school and the subject area. This data also indicates which applicants were hired for a given position.[1]

These data are relatively newly available and are the results of policy changes in NYC. In 2005, the Department of Education and its teachers union decided to reform prior hiring policies to move away from a system that was based on seniority and gave teachers and principals little input in hiring decisions to a more free-market approach. Previously, teachers applied for and received transfers through the central Human Resources or district offices, "a behind the scenes process that many teachers and schools found inscrutable" (Daly et. al., 2008). Teachers who were displaced from their jobs for any number of reasons, such as school closure or changing enrollment, were assigned to new placements by Human Resources staff, often without teacher or principal input. The new policy requires that all teachers seeking transfer – both voluntary and involuntary - enter an open, applications system where hiring decisions are made mutually by teacher and principal. Senior teachers can no longer claim the positions of novice teachers due to seniority, a practice that that previously tied the hands of principals in the hiring process. To achieve these objectives, the district instituted a more centralized hiring system, including an online infrastructure for searching job postings and applying to them directly. The open market system allows for transfers during a window that begins the last week in April and closes the first week in August. Transfers that occur outside of this period are not subject to the open market process. The data for this study come from the first two years that the new applications system was in place. We use information on which teachers applied to transfer and to which schools they applied.[2]

[1] We know if a teacher was hired, but do not know who else may have received a job offer for the same position. In terms of estimating school preferences for teachers, we would prefer to know all teachers who received job offers in the first place.

[2] Boyd et. al. (2009) provides more detail on the Transfer system data.

Other School and District Data: To this data, we have linked an array of additional data on teachers and schools in the New York City School District. Data on teacher characteristics include demographic information (race, gender, age); information on professional preparation pathway; years of experience, scores on the general knowledge certification exam, and whether teachers attended a competitive undergraduate college. Data on schools include school level (elementary, middle, high school, or other grade combination), student race/ethnicity, student eligibility for free or reduced-price lunch, student English learner status, when the schools was established, the experience of teachers in the school, school enrollment, crime rates, and a host of other variables.[3]

Neighborhood Data: In order to assess the effects of neighborhoods, we use indicators of the 59 community districts in New York City as well as additional information on the characteristics of neighborhoods surrounding each school. The community districts, shown in Figure 1, were established in 1975 in order to help cities agencies administer public services. They review and monitor quality of life issues for New York City neighborhoods. We choose communities districts as categories of neighborhoods because of this administrative role and because the community districts were designed to align with historical neighborhood boundaries. As shown in Figure 2. Each community district is comprised of multiple neighborhoods. For example, Community District 1 in the Bronx includes the neighborhoods of Mott haven, Port Morris and Melrose, while District 2 includes Longwood and Hunts Point.

We also collected data on the characteristics of the neighborhood surrounding each school. Because schools can be located on the boundaries of community districts and historic neighborhoods, we choose to use measures of characteristics based on geographic distance. We start with administrative data on the latitude and longitude of each school in New York City. We then link the schools to all Census tracts within one mile of the school, as measured by distance to the tract centroid, until the square area of the aggregated tracts is 0.64 square miles. We use this area, which is equivalent to 0.8 by 0.8 miles, because it is a reasonable walking distance for teachers in New York City. We then aggregated the values of each neighborhood characteristics across all such nearby tracts and computed relevant variables from these aggregated tracts.

The Census data includes multiple measures of the local community, but it does not have information on the retail amenities surrounding schools. In order to get this information, we use the Walk Score website (www.walkscore.com). For each address, the website provides data on up to eight grocery stores, restaurants, coffee shops, bars, movie theaters, other schools, parks, libraries,

[3] Boyd et. al. (2005a) provides more detail on the sources of this data.

bookstores, fitness, drug stores, hardware stores, clothing and music stores within any given distance of the school. We use half a mile to designate distance; and, because of the high correlation across amenities, we created an aggregate measure of local amenities using factor analysis. We also collect information on the distance to the closest amenity in each group and use this measure for robustness checks.

Descriptive Statistics: Table 1a provides the descriptive statistics for the teachers in the sample. We see that there are just over 75,000 teachers. Nineteen percent of the teachers are black; 13 percent, Hispanic; and 62 percent white. Most teachers (76 percent) are female and they average 41 years of age. Less than half the teachers entered NYC schools through the traditional college-recommended route (43 percent); while another 14 percent came through the two most common early entry or alternative routes, the New York City Teaching Fellows and Teach for America. Although 22 percent of teachers initially entered teaching with a temporary license, as of 2003 they all must have completed a recognized teacher preparation pathway, and so now have a valid certification. About 33 percent of active teachers graduated from colleges rated in the top two out of four tiers of competitiveness according to Barron's ratings. As part of their NYC certification requirements, the teachers had to take the Liberal Arts and Sciences Test (LAST) intended to measure "knowledge and skills in the liberal arts and sciences, in teaching theory and practice, and in the content area of the certificate title" (NYSED, 2008). The exam includes a multiple-choice section covering scientific, mathematical, and technological processes; historical and social scientific awareness; artistic expression and humanities; communication and research skills; and written analysis and expression. There is also a written component requiring teachers to prepare a written response to an assigned topic. Teachers had an average score on the LAST exam of 248 (s.d. = 30) where 220 is required to pass the exam for teacher certification. Active teachers had an average of about seven and a half years of teaching experience. Over a third of teachers (36 percent) of teachers had three or fewer years of experience; under a third (32 percent) had more than ten years of experience.

Table 1a also includes similar descriptives for areas of the city with high and low population density as this distinction will prove important in the analyses. We define high-density areas as those with greater than 50,000 people per square mile; and low-density areas as those with less than 50,000 people per square mile. This categorization splits the sample of teachers approximately in half. On average, teachers in high population-density areas of the city are more likely to be Hispanic and to

have entered teaching through alternative pathways. They are also slightly less experienced, on average and were more likely to attend a competitive college.

Table 1b provides similar descriptive statistics for the schools in New York City. Just over half of all schools are elementary, with another 20 percent middle schools and 26 percent high schools. The average enrollment in these schools is 746 students with approximately 70 percent of students qualifying for a free or reduced price lunch. The attendance rate averages 90 percent and the racial distribution of students is 40 percent Hispanic, 36 percent black, 13 percent white, and 11 percent Asian. On average, there is a somewhat greater representation of elementary schools in the low population-density areas. In addition, the enrollments are slightly higher; the percent of students eligible for subsidized lunch, lower; the percent of Hispanic students, lower; and the percent of low achieving students somewhat lower.

Table 1c provides information on neighborhoods. The median family income of neighborhoods averages $42,500, and is somewhat higher in low population-density areas than high population-density areas. Eighteen percent of households are married couples with children; this is lower in high density areas. Almost six percent of housing units are vacant and 61 percent of the population is living in the same house that they lived in five years before. On averages there are almost 50 amenities within half a mile of a school, but schools in low density areas have substantially fewer local amenities.

While we measure multiple neighborhood characteristics, if these characteristics are highly correlated then we might not be able to distinguish among them in the multivariate analyses. Table 2a gives the pairwise pearson correlation coefficients for the neighborhood variables. The strongest correlation in the table is between median family income and the percent of the adult population with greater than a bachelor's degree (0.89). It will be difficult to separate the effects of these two neighborhood characteristics. Median family income also varies strongly with the percent of white residents (0.68). The other strong correlation is between the amenities factor and population density (0.66). Because of the relatively high correlations among measures, we use the neighborhood variables both together as a group and individually in the multivariate analyses. When entered individually, a given variable likely measures an aggregate characteristic of the neighborhood and not the specific characteristic included in the model.

Table 2b provides the correlations between school and neighborhood characteristics. Independent variation at each level is necessary in order to distinguish the effects of neighborhoods from the effects of schools. The table shows relatively high correlations between school and

neighborhood race – 0.61 between the percent of black students and the percent of non-white residents – and between student poverty and neighborhood median family income – 0.61 between the percent of students eligible for a lunch subsidy and neighborhood median family income. However, even in these areas there is meaningful independent variation and all other correlations are low.

METHODS

We assess the effects of neighborhoods on teacher choices using three approaches. First we model the number of applicants a school receives for each position using ordinary least squares regression. We use these models to estimate the importance of neighborhoods using the community district indicator variables. Second, we use logit models to estimate the relationship between neighborhood characteristics and a teachers' decision of whether or not to apply for transfer to another school. Finally, we use conditional logit models to estimate where a teacher applies given that he or she applies to schools within the transfer system. In this way we can examine the kinds of neighborhoods to which teachers are trying to transfer. This section describes each of these approaches.

Applications per vacancy: Equation 1 describes the first set of analyses in which the log of applications per vacancy is modeled as a function of school and neighborhood characteristics as well as community district indicator variables. We use the log transformation of the applications measure because of the skewed distribution (see Appendix Figure 1)

$$LnA_{sy} = \beta_0 + S_{sy}\beta_1 + N_{sy}\beta_2 + C_s + \tau_y + \varepsilon_{sy} \qquad (1)$$

The log of applications, A, for school s in year y, is a function of that school's characteristics, S, the neighborhood characteristics specific to the school, N, as well as indicator variables for the community district, C, and the year. We compare results from the full model to results of specifications that do not include the neighborhood measures in order to assess the importance of including neighborhood measures.

Whether a teacher applies to transfer: While the first set of analyses benefit from simplicity, they are not able to adjust for the characteristics of teachers, which may differ across neighborhoods and schools. A more thorough analysis uses teacher level data. In this set of

analyses, we model active teachers' choices of whether to apply.[4] We model the likelihood of applying for transfer as a function of teacher characteristics, school characteristics and neighborhood characteristics as given by Equation 2:

$$P_{tsy}(teacher\ t\ applying) = \frac{e^f}{1+e^f}$$

$$\text{where, } f=\alpha_0 + T_{tsy}\alpha_1 + S_{sy}\alpha_2 + N_{sy}\alpha_3 + \sigma_y + \omega_{sy} \quad (2)$$

The probability that teacher t in school s in year y applies to transfer is a function of that teacher's characteristics, T, the characteristics of the school from which he/she is applying, S, the neighborhood characteristics of the school from which he/she is applying, N, an indicator variable for the year, σ, and a random error, ω.

Where a teacher applies to transfer: Finally, in order to model preferences of where to apply, we use a logit model for applying to a given school. We limit the sample to elementary schools so that we do not need to distinguish teaching fields. In this model, each teacher has a separate observation for each school to which he or she could apply. The standard errors are then clustered by school in order to adjust for the multiple teachers with the option to apply to each school. Equation 3 summarizes this approach.:

$$P_{tly}(teacher\ applying\ to\ school\ l) = \frac{e^g}{1+e^g}$$

$$\text{where,} \quad g=\gamma_0 + T_{ty}\gamma_1 + S_{ly}\gamma_2 + N_{ly}\gamma_3 + \rho_y + \varphi_{tly} \quad (3)$$

In Equation 3, the probability that teacher *t* applies to school l in year y is a function of the teacher's characteristics, T, the characteristics of the school to which he/she might apply, S, the characteristics of the neighborhood of the school to which he or she might apply, N, an indicator variable for the year ρ, and a random error term, φ.

[4] By "active" teacher we mean teachers that are in the human resources data-base as paid regular teachers at the beginning of the school year who are working at 70 percent of full-time or more. Teachers who had taken leave, quit, or were of unknown status were dropped from our sample. This reduced our sample down to more than 70,000 teachers each academic year. While teachers who quit or were on leave, for instance, make up some of the teachers who entered the Transfer Request System, there were relatively few. It did not make sense to include these teachers because we were interested in accounting for the effects of teachers' current school workplace on their applying and transferring behaviors. Given these teachers were not currently in schools, such models could not apply.

Additional models: As discussed above, because of the potential differential role of neighborhood characteristics in areas with different population densities, we run the analyses that estimate the effects of neighborhood characteristics (Equations 2 and 3) separately for teachers in high and low population density schools. In addition, we assess the differential effects of neighborhoods on teachers with different characteristics using both interaction and separate equations.

RESULTS

Applications per Vacancy: Table 3 gives the results of the first set of analyses modeling the log of applications per transfer. Because of space, Table 3 includes only the estimates for the school characteristics. Models 1 through 4 include all schools. The first column gives the coefficients and standard errors for when only the school characteristics are included in the model. The second column adds in 58 indicator variables for the 59 community school districts. The third column does not include these indicator variables but does include the neighborhood characteristics. The final column has both the indicators and the characteristics. The second set of four models includes a measure of the percent of students in the school scoring at the lowest level on the math exam. Because these exams are only given in grades three through eight, high schools are not included in these analyses. Prior studies have shown a strong relationship between student achievement and teacher retention, and thus we present these results on the reduced sample.

First looking at the R-square we see that neighborhood measures explain a substantial proportion of the variation in applications. In the models that include the full sample, the school characteristics alone account for 18.7 percent of the variation. The addition of the neighborhood characteristics in Model 3 increases this explained variation to 21.5 percent. The community district indicators further increase this explained variation to 29.3 percent. In the models that include student test performance, the similar figures are 23.1 percent, 25.2 percent and 36.0 percent.

Now consider the coefficients on the school characteristic variables. Middle schools, in particular, receive fewer applications per position. They are relatively evenly spread across neighborhoods and thus neighborhood characteristics do not explain the relationship between middle schools and applications. Thus, the inclusion of neighborhood characteristics does little to change the estimates on the school level measures. Similarly, the relationship between school size and applications per position are not meaningfully affected by neighborhood controls. On average, larger schools receive fewer applications per position than do smaller schools.

Neighbor characteristics that are included in these models explain only a small amount of the relationship between student characteristics and teachers choices. The characteristics of schools most clearly tied to teacher retention in other analyses using administrative data on schools are the percent of students eligible for subsidized lunch (a measure of poverty), the percent of black students, and student test scores. Table 3 shows that once neighborhood characteristics are included in the model, the percent of poor students is no longer negatively associated with applications per transfer. This student measure has also tended to be the weakest of these measures for predicting of teachers' career trajectories in earlier analyses. The inclusion of neighborhood characteristics does less to reduce the negative relationship between the percent of black students and the percent of low performing students and the number of applications per position. The coefficients lose significance in some models but the point estimates are only partially reduced. For example, the coefficient on percent of black students fall from -.0061 to -.0043 in the full model. The coefficient size on low performing students actually increases very slightly from -.0084 to -.0089 across the four models.

Overall, we find evidence that neighborhoods affect teachers' decisions but that they do not explain the relationships between school characteristics and teacher application decision. We now move on to model the relationship between neighborhood characteristics and teachers' choices more carefully.

Whether a Teacher Applies for Transfer: Table 4 presents the results of the model predicting whether a teacher applies to transfer as a function of neighborhood characteristics surrounding their current schools. Table 4a gives results for the full sample, while Tables 4b and 4c give the results for low population density areas and high population density areas, respectively. The first column in each table includes only the neighborhood characteristics. The second column adds in controls for characteristics of the teacher and the third column adds in characteristics of the school as given in Tables 1a and 1b. The final column in each table includes all the controls but the neighborhood characteristics are entered separately so that each coefficient and standard error set represents a separate estimation, with the exception of linear and squared terms for the same measure which are included together.

Table 4a shows across all models that teachers are less likely to seek to transfer if they currently teach in a neighborhood with higher median family income. An increase in family income of $10,000 reduces the odds of applying by just under seven percent. Without teacher controls, teachers in neighborhoods with a higher proportion of non-white residents are more likely to seek

transfer and those in neighborhoods with higher proportion of households with families are less likely to seek transfer. However, these relationships do not hold up to the inclusion of any of the controls.

As discussed above, neighborhood characteristics could have different effects in different types of neighborhoods. Because of this we rerun the models in Table 4a for low and high population density areas separately. Table 4b shows that in low population density areas, teachers working in neighborhoods with higher median family income are less likely to seek transfer (only significant in the Model 4), in keeping with the results for the full sample. In addition, they are less likely to seek transfer if there is a higher proportion of married-couple-with-children households. In contrast, in high-density areas teachers' application behavior is more highly associated with the income of the area, as teachers are less likely to request transfer from higher income areas across model specifications. They are also less likely to apply to transfer if the amenities in the area are greater. Later, we explore whether certain kinds of amenities are more highly associated with transfer requests.

Where a Teacher Applies for Transfer: Factors affecting whether a teacher applies to transfer may differ from factors that affect where they apply to transfer to. Table 5 gives the results predicting school choice. Models reflect the same approach taken for the estimates presented in Table 4. Table 5a, for the full sample, shows results consistent with Table 4a. Teachers are more likely to apply to transfer to schools in neighborhoods with higher median family income. An increase in median income of $10,000 increases the odds of applying to a given school by approximately eight percent. Teachers are also more likely to apply to schools in neighborhoods with a higher proportion of white residents. An increase in white residents of 10 percent increases the probability of applying by approximately six percent. While the local violent crime rate did not affect a teacher's propensity to apply for transfer, it is related to where a teacher applies.[5] Teachers are substantially less likely to apply to schools in neighborhoods with high violent crime. In addition, they are more likely to apply to schools in neighborhoods with a lot of amenities; however, this relationship does not hold up to the inclusion of other neighborhood characteristics.

Tables 5b and 5c give the results for low and high population density schools respectively. We see that median family income appears more salient for schools in low density neighborhoods,

[5] We tried examining whether teachers' choices about whether and where to apply for transfer were associated differentially with different neighborhood crime measures, such as property crime, rape, murder, and assault. However, the propensities of the different forms of crime were so highly correlated that we could not distinguish their separate effects.

while amenities are far more important in high density areas. In fact, the relationship between amenities and applications is negative for low density areas, perhaps indicating other disadvantages such as greater difficulty parking in close proximity to retail amenities. Violent crime is also more predictive of applications in low density areas than in high density areas.

Differential Relationships for Different Teachers: The results above show the average relationship for all teachers, but there is likely variation across teachers in their preferences for neighborhood characteristics. Surprisingly, we find only small differences in the relationship between neighborhood characteristics and application behavior by teacher race/ethnicity, gender, and age (Appendix Tables 2 and 3 give these results).

For the teachers in schools in low-density areas, we found slight evidence that they were less likely to apply from schools in higher median income neighborhoods (coefficients of .94-.97). In separate estimates by teacher characteristics, we find a stronger relationship for white teachers (.91) than for black or Hispanic teachers (1.05 and .95 respectively) and a stronger relationship for female teachers (0.92) than for male teachers (1.01), but the estimates are not statistically different from zero. For teachers in schools in high population density areas, we find that on average teachers are less likely to apply to transfer if they currently work in neighborhoods with higher median income or stronger amenities. When we estimate the models separately by teacher characteristics, we find that across the board teachers are less likely to apply to transfer from schools in higher median income neighborhoods. Amenities also predict fewer applications away, though the effect appears stronger for women than for men.

The models of applications to schools in low density areas show that teachers are more likely to apply to schools in neighborhoods with higher medium income and less violent crime, while in high density areas they are more likely to apply to neighborhoods with more amenities. For schools in low-density neighborhoods, the positive relationship with median family income is relatively consistent across teacher groups. The relationship between violent crime and applying is negative for most teacher groups, but less strong for black teachers and for older teachers. For schools in high density areas, the non-linear relationship with population density holds up across teacher types, while the relationship with amenities is stronger for white teachers and for female teachers.

Effects of Different Kinds of Amenities: As described above, in high density areas teachers are less likely to request transfers from and are more likely to request transfers to neighborhoods with greater amenities. We wondered, however, whether some kinds of amenities are more highly associated with transferring than others kinds. By rotating the general amenity factor

loadings, we create four orthogonal measures of amenities: leisure, practical, residential, and community. The "leisure" factor signals areas with nearby bars, fitness centers, movie theaters, and coffee shops. Neighborhoods characterized as having "practical" amenities have a higher concentration of grocery, hardware, clothing, and drug stores nearby. The "residential" factor signals areas with few amenities of any kind. Finally, the "community" factor represents neighborhoods with many parks, schools, and libraries.

Table 6 reports estimates for whether (on left) and where (on right) teachers apply for transfer as a function of the different amenity factors. In the overall sample, including both high and low population density areas, teachers are less likely to apply for transfer from and more likely to apply for transfer to "community" neighborhoods - those with many parks, schools, and libraries. Consistent with prior analyses, the relationships between amenities and requests for transfer are stronger in higher population density areas. More specifically, teachers in high-density neighborhoods are significantly less likely to request transfer from neighborhoods that have many practical amenities and are significantly more likely to apply for transfer to schools that have more amenities for leisure nearby.

DISCUSSION

To our knowledge, this is the first study to estimate the effects of neighborhood characteristics on teachers' career decisions. We find that neighborhoods do play a role in teachers' choices. First, neighborhoods add substantial predictive power to models that include relatively rich measures of school characteristics. Second, neighborhood characteristics predict teachers' choices.

The effects of neighborhoods characteristics differ between urban areas with relatively low and high population density. Not surprisingly, neighborhood characteristics are more important to teachers in high density areas. In lower density areas it is likely easier for teachers to travel and, thus, the immediate surroundings of the school are less important. In applying to schools, teachers tend to favor neighborhoods with higher median family income and less violent crime. In higher-density areas, teachers also favor neighborhoods with greater local amenities, particularly amenities for practical (grocery, hardware, drug stores) and leisure (bars, fitness centers, coffee shops, movie theaters) purposes.

There are two important caveats to these findings. First, it may be that our estimates of the importance of neighborhood characteristics are biased by important omitted variables. If a school characteristic that we do not include in the model is correlated with neighborhood characteristics in

the model then these neighborhood characteristics may simply proxy for school characteristics. The potential omitted variables bias seems more concerning in regards to neighborhood median family income than amenities since the correlation between median income and measured school characteristics is much stronger than is the correlation between amenities and these school characteristics. Nonetheless, bias remains a concern in this study's analyses, which are all correlational.

A second caveat is that though neighborhood characteristics are potentially salient, they explain little of the relationship between the student characteristics of schools and teachers' career choices. Teachers demonstrate preferences for schools with lower proportions of black students and low achieving students. Including neighborhood indicator variables and neighborhood characteristics in the models does little to change these relationships.

TABLES

TABLE 1a: Descriptive statistics on active teachers

	Full Sample		By Population Density	
	Obs	Overall	Low - 49.7%	High - 50.3%
Black	75364	0.19	0.18	0.20
Hispanic	75364	0.13	0.09	0.16
"Other, Non-White"	75364	0.06	0.05	0.07
White	75364	0.62	0.68	0.57
Female	77751	0.76	0.76	0.75
Age	77755	41.27	41.79	40.76
College-Recommending	71748	0.43	0.48	0.39
Teaching Fellows	71748	0.12	0.09	0.14
TFA	71748	0.02	0.01	0.03
Temporary License	71748	0.22	0.20	0.23
"Other" Path	71748	0.21	0.21	0.22
LAST Score	53023	248.00 (30.01)	246.77 (28.91)	249.12 (30.93)
Years of Experience	77755	7.51 (6.85)	7.97 (6.92)	7.06 (6.76)
Value-Added to Math	12847	-0.35 (0.24)	-0.35 (0.23)	-0.35 (0.26)
Competit. Undergrad College	58991	0.33	0.31	0.36

TABLE 1b: Descriptive statistics on schools

	Full Sample		By Population Density	
	Obs		Low Pop Den	High Pop Den
Proportion Elementary Schools	1363	0.54	0.61	0.48
Proportion Middle Schools	1363	0.20	0.17	0.22
Proportion High Schools	1363	0.26	0.22	0.29
Enrollment (per 100 students)	1357	7.46	8.28	6.74
		(6.17)	(6.75)	(5.51)
% Qualify Free/Reduced Lunch	1301	69.58	63.16	75.46
		(22.83)	(24.06)	(19.92)
Attendance Rate	1301	90.38	90.87	89.93
		(5.69)	(5.15)	(6.12)
% Black	1357	36.25	36.98	35.62
		(28.80)	(30.36)	(27.38)
% Hispanic	1357	40.11	31.36	47.75
		(25.61)	(21.69)	(26.32)
% Asian	1357	10.89	13.65	8.48
		(15.58)	(16.67)	(14.14)
% ELL	1295	13.24	9.98	16.24
		(13.72)	(10.30)	(15.67)
% Female	1357	49.82	49.42	50.18
		(7.44)	(6.37)	(8.25)
% Faculty 5+ Yrs Experience	1347	47.44	51.56	43.82
		(18.74)	(16.98)	(19.46)
Suspension/Enrollment	1347	0.05	0.04	0.06
		(0.09)	(0.06)	(0.11)
% Level 1 (lowest) Math Achievement	901	14.51	12.78	16.38
		(12.79)	(11.31)	(13.98)

TABLE 1c: Descriptive statistics on neighborhoods

School Neighborhood Features	Full Sample		By Population Density	
	Obs	Overall	Low Pop Den	High Pop Den
Median Family Income ($10,000)	1320	4.35 (2.56)	4.64	4.07
Population Density (10,000)	1320	5.41 (3.00)	3.10	7.75
% of Pop Who Are Non-White	1320	61.18 (27.58)	57.28	65.13
% of Households Married-Couple-w-Kids<18	1320	17.83 (7.08)	20.38	15.23
% of Housing Units that are Vacant	1320	5.88 (2.93)	5.58	6.18
% of Pop Living in Same House 5 Yrs Ago	1320	61.40 (6.24)	62.97	59.80
% of Pop Age 25+ w/ Ed>Bachelors	1320	9.38 (8.89)	8.73	10.04
Distance from School to Nearest Subway	1320	0.56 (0.89)	0.86	0.26
High Violent Crime Rate (top quartile)	1424	0.24	0.18	0.30
General Amenities Factor – Centered	1346	0.00 (1.00)	-0.56	0.52
Sum of Amenities within 0.5 Miles	1347	49.16 (25.34)	35.00	62.49

TABLE 2a: School-Level Correlations Among Neighborhood Characteristics

	Income	Density	Nonwhite	% > BA	Married	Vacant	Same House	Subway	Crime
Pop Density	-0.0043								
% Non-White	-0.6797	0.1086							
% > BA	0.8872	0.2184	-0.6332						
% HH Married	-0.013	-0.4351	-0.2401	-0.2411					
% Vacant	-0.0491	0.0385	0.3237	-0.0335	-0.4265				
% Same House	-0.3002	-0.2993	0.2039	-0.4538	0.2465	-0.157			
Subway Dist	0.195	-0.4117	-0.101	0.0363	0.3149	-0.2085	0.2626		
Violent Crime	-0.4204	0.0422	0.4607	-0.3541	-0.3106	0.5005	0.0436	-0.1842	
Amenities	0.1325	0.6579	-0.0938	0.4018	-0.4899	0.1154	-0.4693	-0.4307	0.0187

TABLE 2b: School-Level Correlations Between School and Neighborhood Characteristics

	Income	**Density**	**Non-White**	**> BA**	**Married HH**
Enrollment	0.0728	-0.1261	-0.1105	-0.0088	0.2673
Lunch	-0.6059	0.2697	0.5582	-0.4719	-0.2211
Attendance	0.1029	-0.0435	-0.1921	0.0552	0.2255
%Black	-0.1727	-0.0843	0.6139	-0.174	-0.3541
%Hispanic	-0.3344	0.3847	0.0986	-0.1897	-0.1047
%Asian	0.2059	-0.1382	-0.3069	0.158	0.4098
%ELL	-0.2265	0.2814	0.0273	-0.14	0.1201
%Tchrs > 5yrs exp	0.1326	-0.2274	-0.2038	0.0562	0.2693
Suspensions	-0.0526	0.1015	0.0895	0.0047	-0.1393
Violent Crime	-0.0288	0.1064	0.1414	0.0139	-0.1986
Low Performance	-0.3021	0.1135	0.3249	-0.2378	-0.1507
	Vacant	**Same HH**	**Subway**	**Violence**	**Amenities**
Enrollment	-0.1677	-0.0209	0.0502	-0.1433	-0.106
Lunch	0.1914	-0.0087	-0.3937	0.3402	0.1498
Attendance	-0.1991	0.0802	0.1567	-0.1721	-0.0893
Black	0.3769	0.1775	0.0352	0.2857	-0.1372
Hispanic	-0.0345	-0.2197	-0.3191	0.1261	0.2934
Asian	-0.3289	-0.0174	0.2324	-0.3133	-0.0165
ELL	-0.1826	-0.1486	-0.1862	-0.0466	0.1866
Tchrs > 5yrs	-0.1392	0.096	0.1845	-0.1831	-0.1653
Suspensions	0.0513	-0.0346	-0.0613	0.0377	0.0861
Violent Crime	0.1533	-0.068	-0.1017	0.1089	0.126
Low Perfomance	0.1436	0.0186	-0.1289	0.2665	0.0303

Table 3: Modeling Log Applications Per Vacancy at the School Level (1: no controls, 2: district indicators, 3: measures, 4: both)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Middle School	-0.4970***	-0.4724***	-0.4933***	-0.4955***	-0.3464**	-0.1827	-0.3443**	-0.2181~
	(0.0753)	(0.0751)	(0.0761)	(0.0767)	(0.1187)	(0.1193)	(0.1205)	(0.1217)
High School	-0.0509	0.0554	0.0314	0.0353	-0.0747	-0.1005	-0.1146	-0.2397
	(0.0934)	(0.0981)	(0.1008)	(0.1035)	(0.2116)	(0.2241)	(0.2213)	(0.2334)
Enrollment	-0.0117**	-0.0147**	-0.0148**	-0.0165***	0.0023	-0.0159	-0.0041	-0.0166
	(0.0045)	(0.0047)	(0.0048)	(0.0049)	(0.0098)	(0.0110)	(0.0105)	(0.0114)
Lunch Subsidy	-0.0042*	0.0010	0.0007	0.0018	-0.0059*	0.0026	0.0003	0.0029
	(0.0019)	(0.0024)	(0.0022)	(0.0024)	(0.0025)	(0.0033)	(0.0031)	(0.0034)
Attendance	0.0118~	0.0125~	0.0114	0.0110	-0.0206	-0.0454*	-0.0277	-0.0449~
	(0.0070)	(0.0073)	(0.0074)	(0.0076)	(0.0220)	(0.0231)	(0.0232)	(0.0241)
% Black	-0.0061**	-0.0062*	-0.0080**	-0.0043	-0.0049*	-0.0052	-0.0104**	-0.0057
	(0.0019)	(0.0027)	(0.0029)	(0.0035)	(0.0022)	(0.0033)	(0.0036)	(0.0043)
% Hispanic	-0.0039~	-0.0026	-0.0065*	-0.0022	-0.0040	-0.0035	-0.0084*	-0.0033
	(0.0022)	(0.0032)	(0.0027)	(0.0035)	(0.0026)	(0.0039)	(0.0033)	(0.0042)
% Asian	0.0045~	-0.0004	0.0004	0.0006	0.0041	-0.0004	-0.0005	-0.0003
	(0.0025)	(0.0035)	(0.0030)	(0.0040)	(0.0029)	(0.0041)	(0.0036)	(0.0048)
% ELL	-0.0011	-0.0028	-0.0016	-0.0031	0.0027	-0.0020	-0.0007	-0.0046
	(0.0026)	(0.0028)	(0.0028)	(0.0030)	(0.0047)	(0.0055)	(0.0050)	(0.0057)
Teacher >5 Yrs	0.0005	0.0002	0.0017	0.0011	0.0056*	0.0054~	0.0066*	0.0064*
	(0.0017)	(0.0018)	(0.0018)	(0.0019)	(0.0026)	(0.0027)	(0.0027)	(0.0028)
Suspension Rate	0.2548	0.0445	0.0971	-0.0267	0.0139	-2.0263*	-0.5435	-2.1781*
	(0.3095)	(0.3074)	(0.3107)	(0.3099)	(0.8859)	(0.9553)	(0.9084)	(0.9710)
High Schl Violence	-0.0103	-0.0337	0.0025	-0.0132	-0.0183	-0.0324	-0.0070	-0.0302
	(0.0557)	(0.0569)	(0.0562)	(0.0578)	(0.0632)	(0.0658)	(0.0641)	(0.0669)
Low Math Scores					-0.0084*	-0.0107*	-0.0066	-0.0089*
					(0.0042)	(0.0043)	(0.0043)	(0.0044)
Observations	1015	1013	980	980	732	732	722	722
R-squared	0.1867	0.2825	0.2154	0.2929	0.2308	0.3548	0.2521	0.3599

TABLE 4a: Modeling Whether A teacher Applies to Transfer – Full Sample (odds ratios)

	Model 1	Model 2	Model 3	Model 4
Median Family Inc / 10,000	0.9336*	0.9306*	0.9169**	0.9627**
	(0.0299)	(0.0268)	(0.0285)	(0.0137)
Pop Density / 10000	1.0707	1.0376	1.0496	1.0511
	(0.0472)	(0.0413)	(0.0441)	(0.0381)
Pop Density Squared	0.9968	0.9987	0.9978	0.9966
	(0.0030)	(0.0027)	(0.0028)	(0.0027)
% Non-White	1.0058***	0.9963	0.9986	1.0026
	(0.0017)	(0.0025)	(0.0026)	(0.0017)
% HH Married With Kids	0.9863*	0.9954	0.9937	0.9954
	(0.0059)	(0.0058)	(0.0060)	(0.0042)
% Lots Vacant	1.0200~	1.0109	1.0097	1.0030
	(0.0117)	(0.0109)	(0.0112)	(0.0092)
% Same House 5 years	1.0023	1.0011	1.0036	1.0060
	(0.0057)	(0.0052)	(0.0054)	(0.0044)
% Education BA or >	1.0152	1.0102	1.0160~	0.9941
	(0.0098)	(0.0089)	(0.0095)	(0.0037)
Subway Distance	1.0585	1.1031	1.1431	1.0650
	(0.1435)	(0.1385)	(0.1470)	(0.1251)
Subway Distance Squared	0.9755	0.9737	0.9716	0.9761
	(0.0341)	(0.0310)	(0.0307)	(0.0302)
High Violent Crime	1.0627	0.9695	0.9751	1.0548
	(0.0807)	(0.0686)	(0.0713)	(0.0650)
Amenity Factor	0.9335	0.9237	0.9181	0.9754
	(0.0493)	(0.0475)	(0.0481)	(0.0303)
Amenity Factor Squared	0.9706~	0.9948	0.9847	0.9820
	(0.0150)	(0.0149)	(0.0161)	(0.0184)
Observations	128045	118659	76300	
chi^2	187.8954	618.0945	1117.6845	
univariate				X
teacher controls		X	X	X
school controls			X	X

TABLE 4b: Modeling Whether A teacher Applies to Transfer – Low Density Sample

	Model 1	Model 2	Model 3	Model 4
Median Family Inc / 10,000	0.9419	0.9689	0.9475	0.9451*
	(0.0446)	(0.0418)	(0.0437)	(0.0231)
Pop Density / 10000	1.4030*	1.0618	1.0928	1.0760
	(0.2396)	(0.1843)	(0.1983)	(0.1815)
Pop Density Squared	0.9607	1.0028	0.9962	0.9985
	(0.0268)	(0.0292)	(0.0297)	(0.0271)
% Non-White	1.0048*	0.9948	0.9970	1.0008
	(0.0021)	(0.0033)	(0.0035)	(0.0026)
% HH Married With Kids	0.9840*	0.9929	0.9894	0.9873~
	(0.0074)	(0.0081)	(0.0081)	(0.0065)
% Lots Vacant	1.0244	1.0070	1.0108	1.0053
	(0.0183)	(0.0162)	(0.0167)	(0.0136)
% Same House 5 years	1.0006	0.9968	1.0009	1.0042
	(0.0078)	(0.0066)	(0.0070)	(0.0059)
% Education BA or >	0.9936	0.9937	0.9979	0.9932
	(0.0123)	(0.0122)	(0.0129)	(0.0058)
Subway Distance	1.1273	1.1864	1.2703	1.1139
	(0.1788)	(0.1801)	(0.2036)	(0.1693)
Subway Distance Squared	0.9759	0.9627	0.9529	0.9677
	(0.0380)	(0.0354)	(0.0363)	(0.0363)
High Violent Crime	0.9750	0.9681	0.9920	1.0651
	(0.1166)	(0.1068)	(0.1169)	(0.1088)
Amenity Factor	1.0034	0.9639	0.9948	1.0185
	(0.0665)	(0.0602)	(0.0655)	(0.0500)
Amenity Factor Squared	0.9918	0.9998	0.9992	0.9942
	(0.0170)	(0.0168)	(0.0183)	(0.0203)
Observations	69411	64171	39535	
chi^2	129.7075	384.0339	641.2161	
univariate				X
teacher controls		X	X	X
school controls			X	X

TABLE 4c: Modeling Whether A teacher Applies to Transfer – High Density Sample

	Model 1	Model 2	Model 3	Model 4
Median Family Inc / 10,000	0.8960*	0.8994*	0.8910*	0.9767
	(0.0484)	(0.0425)	(0.0442)	(0.0175)
Pop Density / 10000	1.0810	1.2008	1.2324~	1.1220
	(0.1340)	(0.1451)	(0.1461)	(0.1228)
Pop Density Squared	0.9968	0.9912	0.9892	0.9937
	(0.0068)	(0.0067)	(0.0066)	(0.0062)
% Non-White	1.0059	0.9962	0.9989	1.0023
	(0.0036)	(0.0043)	(0.0047)	(0.0024)
% HH Married With Kids	0.9936	0.9981	0.9981	0.9985
	(0.0106)	(0.0104)	(0.0108)	(0.0065)
% Lots Vacant	1.0207	1.0182	1.0139	0.9997
	(0.0168)	(0.0171)	(0.0170)	(0.0129)
% Same House 5 years	1.0018	1.0067	1.0092	1.0106
	(0.0097)	(0.0094)	(0.0098)	(0.0068)
% Education BA or >	1.0364*	1.0272~	1.0344*	0.9966
	(0.0178)	(0.0159)	(0.0171)	(0.0048)
Subway Distance	3.2373	1.2484	0.9417	1.0541
	(2.5464)	(0.8092)	(0.6723)	(0.7846)
Subway Distance Squared	0.1534~	0.5851	0.8776	0.7794
	(0.1644)	(0.4905)	(0.8250)	(0.7917)
High Violent Crime	1.1738	1.0178	1.0035	1.0102
	(0.1254)	(0.1009)	(0.0982)	(0.0778)
Amenity Factor	0.8603	0.7877*	0.7525**	0.8583~
	(0.1114)	(0.0883)	(0.0788)	(0.0689)
Amenity Factor Squared	0.9866	1.0779	1.0813	1.0726
	(0.0712)	(0.0758)	(0.0744)	(0.0588)
Observations	58634	54488	36765	
chi^2	66.1902	305.3255	615.4564	
univariate				X
teacher controls		X	X	X
school controls			X	X

TABLE 5a: Modeling Where A Teacher Applies to Transfer To – Full Sample

VARIABLES	Model 1	Model 2	Model 3	Model 4
Median Family Inc / 10,000	1.0530~	1.0643*	1.0686*	1.0809***
	(0.0295)	(0.0290)	(0.0304)	(0.0155)
Pop Density / 10000	0.9749	0.9817	0.9843	0.9425
	(0.0455)	(0.0479)	(0.0512)	(0.0383)
Pop Density Squared	1.0022	1.0022	1.0020	1.0054*
	(0.0028)	(0.0030)	(0.0031)	(0.0026)
% Non-White	0.9949**	0.9990	0.9981	0.9933**
	(0.0018)	(0.0029)	(0.0032)	(0.0023)
% HH Married With Kids	1.0126*	1.0028	0.9996	0.9972
	(0.0061)	(0.0066)	(0.0072)	(0.0051)
% Lots Vacant	0.9896	0.9958	1.0003	1.0065
	(0.0134)	(0.0144)	(0.0153)	(0.0118)
% Same House 5 years	0.9875*	0.9877*	0.9881~	0.9830***
	(0.0055)	(0.0062)	(0.0067)	(0.0050)
% Education BA or >	1.0032	0.9951	0.9950	1.0152***
	(0.0097)	(0.0096)	(0.0101)	(0.0035)
Subway Distance	1.3591*	1.1850	1.2339	1.0424
	(0.1909)	(0.1675)	(0.1846)	(0.1507)
Subway Distance Squared	0.9652	0.9880	0.9811	1.0104
	(0.0357)	(0.0358)	(0.0373)	(0.0402)
High Violent Crime	0.9934	0.9682	0.9711	0.8212*
	(0.0921)	(0.0889)	(0.0937)	(0.0663)
Amenity Factor	1.0560	0.9867	1.0290	1.0664*
	(0.0698)	(0.0582)	(0.0630)	(0.0331)
Amenity Factor Squared	1.0222	1.0112	1.0214	1.0465*
	(0.0232)	(0.0214)	(0.0228)	(0.0235)
Observations	2435595	2390167	1540257	
chi^2	456.3906	679.5239	22307.0505	
Univariate				X
current school controls		X	X	X
teacher controls			X	X

TABLE 5b: Modeling Where A Teacher Applies to Transfer To – Low Density Sample

VARIABLES	Model 1	Model 2	Model 3	Model 4
Median Family Inc / 10,000	1.0199	1.1020~	1.1155*	1.1105***
	(0.0476)	(0.0575)	(0.0611)	(0.0284)
Pop Density / 10000	0.9321	0.9253	0.9778	0.9685
	(0.1815)	(0.1826)	(0.2071)	(0.1663)
Pop Density Squared	0.9922	1.0030	0.9934	0.9798
	(0.0310)	(0.0315)	(0.0334)	(0.0286)
% Non-White	0.9973	1.0026	1.0021	0.9950
	(0.0020)	(0.0039)	(0.0041)	(0.0032)
% HH Married With Kids	1.0219**	1.0027	1.0006	1.0148*
	(0.0076)	(0.0096)	(0.0102)	(0.0075)
% Lots Vacant	1.0092	1.0145	1.0195	1.0103
	(0.0215)	(0.0217)	(0.0230)	(0.0191)
% Same House 5 years	0.9883~	0.9899	0.9889	0.9883~
	(0.0069)	(0.0082)	(0.0088)	(0.0070)
% Education BA or >	1.0242*	1.0016	1.0005	1.0089
	(0.0123)	(0.0148)	(0.0156)	(0.0057)
Subway Distance	1.0302	1.0062	0.9951	1.1230
	(0.1605)	(0.1615)	(0.1684)	(0.1910)
Subway Distance Squared	1.0126	1.0198	1.0231	1.0028
	(0.0404)	(0.0417)	(0.0440)	(0.0429)
High Violent Crime	0.7332*	0.7149*	0.6911*	0.6138***
	(0.1107)	(0.1011)	(0.1049)	(0.0720)
Amenity Factor	0.8423	0.8028*	0.8157~	0.8864
	(0.0915)	(0.0819)	(0.0867)	(0.0686)
Amenity Factor Squared	0.9084*	0.9150*	0.9155*	0.9755
	(0.0422)	(0.0374)	(0.0408)	(0.0334)
Observations	1273456	1266513	852171	
chi^2	266.2695	393.0693	889.3649	
Univariate				X
current school controls		X	X	X
teacher controls			X	X

TABLE 5c: Modeling Where A Teacher Applies to Transfer To – High Density Sample

VARIABLES	Model 1	Model 2	Model 3	Model 4
Median Family Inc / 10,000	1.0308	0.9804	0.9779	1.0589*
	(0.0308)	(0.0347)	(0.0361)	(0.0240)
Pop Density / 10000	1.3532***	1.3205***	1.3434***	1.3536***
	(0.1073)	(0.1078)	(0.1104)	(0.1123)
Pop Density Squared	0.9850***	0.9864**	0.9855***	0.9857***
	(0.0041)	(0.0041)	(0.0041)	(0.0042)
% Non-White	0.9915**	0.9947	0.9931	0.9907**
	(0.0028)	(0.0042)	(0.0044)	(0.0033)
% HH Married With Kids	1.0070	1.0026	0.9997	0.9775**
	(0.0084)	(0.0110)	(0.0113)	(0.0082)
% Lots Vacant	0.9754	0.9873	0.9947	0.9997
	(0.0161)	(0.0179)	(0.0188)	(0.0151)
% Same House 5 years	0.9866	0.9912	0.9932	0.9754**
	(0.0084)	(0.0080)	(0.0084)	(0.0083)
% Education BA or >	0.9952	1.0093	1.0099	1.0240***
	(0.0092)	(0.0118)	(0.0125)	(0.0061)
Subway Distance	5.6793*	4.7040*	5.7789*	3.1031
	(4.5912)	(3.5578)	(4.4808)	(2.5370)
Subway Distance Squared	0.2575	0.3467	0.3124	0.4793
	(0.2851)	(0.3593)	(0.3293)	(0.5043)
High Violent Crime	1.2038~	1.1948~	1.1923	0.9685
	(0.1207)	(0.1283)	(0.1317)	(0.0968)
Amenity Factor	0.9570	0.9561	0.9960	1.1677*
	(0.0904)	(0.0958)	(0.1040)	(0.0849)
Amenity Factor Squared	1.2608***	1.1838*	1.1884*	1.1421*
	(0.0884)	(0.0777)	(0.0823)	(0.0664)
Observations	1162139	1123654	756066	
chi^2	485.6503	3334.7207	1984.5860	
Univariate				x
current school controls		x	x	x
teacher controls			x	x

Table 6: Modeling Whether and Where a Teacher Applies to Transfer as a Function of Different Kinds of Amenities

	Whether Teacher Applies for Transfer			Where Teacher Applies for Transfer		
Kinds of Amenities:	Overall	Low Density	High Density	Overall	Low Density	High Density
Leisure	0.9402 (0.0397)	0.9541 (0.0496)	0.8893~ (0.0628)	1.0457 (0.0496)	0.9212 (0.0684)	1.1536* (0.0720)
Practical	0.9473 (0.0381)	1.0226 (0.0454)	0.7844** (0.0684)	0.9617 (0.0463)	0.9915 (0.0573)	0.8860~ (0.0594)
Residential	1.0078 (0.0276)	0.9973 (0.0263)	1.0716 (0.0888)	1.0134 (0.0391)	1.0009 (0.0455)	0.9650 (0.0897)
Community	0.9303* (0.0293)	0.9472 (0.0402)	0.9109~ (0.0447)	1.0900* (0.0406)	0.9882 (0.0624)	1.0764 (0.0529)
Neighborhood Controls	x	x	x	x	x	x
School Controls	x	x	x	x	x	x
Teacher Controls	x	x	x	x	x	x

Figures

Figure 1: New York City Community Districts (NYC Department of City Planning)

Figure 2: Neighborhoods within Community Districts

APPENDICES

APPENDIX TABLES

APPENDIX TABLE 1a: Constant Sample Sizes for Table 4a

Median Family Inc / 10,000	0.9116**	0.9132**	0.9168**	0.9626**
	(0.0313)	(0.0280)	(0.0285)	(0.0138)
Pop Density / 10000	1.0498	1.0380	1.0499	1.0515
	(0.0475)	(0.0427)	(0.0441)	(0.0382)
Pop Density Squared	0.9975	0.9986	0.9978	0.9966
	(0.0030)	(0.0027)	(0.0028)	(0.0027)
% Non-White	1.0056**	0.9969	0.9986	1.0026
	(0.0019)	(0.0026)	(0.0026)	(0.0018)
% HH Married With Kids	0.9872*	0.9941	0.9937	0.9953
	(0.0060)	(0.0059)	(0.0060)	(0.0042)
% Lots Vacant	1.0232~	1.0112	1.0097	1.0031
	(0.0120)	(0.0112)	(0.0111)	(0.0092)
% Same House 5 years	1.0031	1.0029	1.0036	1.0059
	(0.0058)	(0.0053)	(0.0054)	(0.0044)
% Education BA or >	1.0211*	1.0162~	1.0161~	0.9942
	(0.0106)	(0.0094)	(0.0095)	(0.0037)
Subway Distance	1.2370	1.1733	1.1428	1.0645
	(0.1737)	(0.1503)	(0.1469)	(0.1252)
Subway Distance Squared	0.9394~	0.9627	0.9717	0.9762
	(0.0347)	(0.0304)	(0.0307)	(0.0302)
High Violent Crime	1.0295	0.9401	0.9748	1.0524
	(0.0790)	(0.0677)	(0.0713)	(0.0663)
Amenity Factor	0.9244	0.9172~	0.9163~	0.9709
	(0.0495)	(0.0479)	(0.0481)	(0.0305)
Amenity Factor Squared	0.9767	0.9880	0.9841	0.9804
	(0.0163)	(0.0156)	(0.0162)	(0.0187)
Observations	76300	76300	76300	76300
chi^2	149.8213	486.8594	1117.4746	
univariate				X
teacher controls		X	X	X
school controls			X	X

APPENDIX TABLE 1b: Constant Sample Sizes for Table 4b

Median Family Inc / 10,000	0.9055*	0.9488	0.9475	0.9452*
	(0.0445)	(0.0427)	(0.0437)	(0.0250)
Pop Density / 10000	1.3930~	1.1045	1.0928	1.0808
	(0.2470)	(0.1978)	(0.1983)	(0.1828)
Pop Density Squared	0.9543	0.9931	0.9962	0.9978
	(0.0276)	(0.0293)	(0.0297)	(0.0272)
% Non-White	1.0047*	0.9955	0.9970	1.0006
	(0.0022)	(0.0035)	(0.0035)	(0.0026)
% HH Married With Kids	0.9858~	0.9894	0.9894	0.9869*
	(0.0073)	(0.0081)	(0.0081)	(0.0066)
% Lots Vacant	1.0346~	1.0106	1.0108	1.0056
	(0.0185)	(0.0169)	(0.0167)	(0.0136)
% Same House 5 years	1.0046	1.0009	1.0009	1.0038
	(0.0080)	(0.0069)	(0.0070)	(0.0059)
% Education BA or >	1.0035	0.9975	0.9979	0.9937
	(0.0131)	(0.0128)	(0.0129)	(0.0060)
Subway Distance	1.3166~	1.2673	1.2703	1.1149
	(0.2181)	(0.2014)	(0.2036)	(0.1694)
Subway Distance Squared	0.9376	0.9508	0.9529	0.9677
	(0.0390)	(0.0360)	(0.0363)	(0.0363)
High Violent Crime	0.9507	0.9522	0.9920	1.0687
	(0.1126)	(0.1096)	(0.1169)	(0.1094)
Amenity Factor	1.0218	0.9927	0.9948	1.0185
	(0.0687)	(0.0641)	(0.0655)	(0.0500)
Amenity Factor Squared	1.0012	1.0015	0.9992	0.9942
	(0.0190)	(0.0178)	(0.0183)	(0.0203)
Observations	39535	39535	39535	39535
chi^2	111.8258	274.9313	641.2161	
univariate				X
teacher controls		X	X	X
school controls			X	X

APPENDIX TABLE 1c: Constant Sample Sizes for Table 4c

Median Family Inc / 10,000	0.8762*	0.8826*	0.8908*	0.9767
	(0.0492)	(0.0429)	(0.0442)	(0.0175)
Pop Density / 10000	1.1562	1.2312~	1.2334~	1.1227
	(0.1451)	(0.1430)	(0.1458)	(0.1230)
Pop Density Squared	0.9925	0.9895	0.9892	0.9936
	(0.0069)	(0.0064)	(0.0066)	(0.0062)
% Non-White	1.0064	0.9965	0.9988	1.0023
	(0.0039)	(0.0046)	(0.0047)	(0.0024)
% HH Married With Kids	0.9972	0.9991	0.9978	0.9985
	(0.0115)	(0.0108)	(0.0109)	(0.0065)
% Lots Vacant	1.0192	1.0178	1.0139	0.9997
	(0.0171)	(0.0169)	(0.0169)	(0.0129)
% Same House 5 years	1.0021	1.0079	1.0091	1.0106
	(0.0098)	-0.0094	(0.0098)	(0.0068)
% Education BA or >	1.0443*	1.0354*	1.0347*	0.9966
	(0.0198)	(0.0169)	(0.0171)	(0.0048)
Subway Distance	2.0129	0.8185	0.9373	1.0522
	(1.6880)	(0.5772)	(0.6683)	(0.7834)
Subway Distance Squared	0.3704	1.1359	0.8798	0.7810
	(0.4320)	(1.0555)	(0.8257)	(0.7934)
High Violent Crime	1.1443	0.9707	1.0023	1.0063
	(0.1236)	(0.0947)	(0.0982)	(0.0798)
Amenity Factor	0.7886~	0.7594**	0.7499**	0.8329*
	(0.0973)	(0.0805)	(0.0787)	(0.0753)
Amenity Factor Squared	1.0521	1.0710	1.0769	1.0823
	(0.0760)	(0.0741)	(0.0741)	(0.0626)
Observations	36765	36765	36765	
chi^2	59.2069	252.0574	614.7283	
univariate				X
teacher controls		X	X	X
school controls			X	X

APPENDIX TABLE 2a: Modeling Whether A Teacher Applies to Transfer By Background – Low Density Sample

	White	Black	Hispanic	Female	Male	31 or >	<31
Median Fam Inc / 10,000	0.9166~	1.0462	0.9531	0.9284	1.0050	0.9603	0.9211
	(0.0472)	(0.1001)	(0.0946)	(0.0463)	(0.0670)	(0.0473)	(0.0558)
Pop Density / 10000	1.3003	0.6951	0.8790	1.1653	0.8846	1.0776	1.1301
	(0.2553)	(0.2603)	(0.3731)	(0.2264)	(0.2291)	(0.2264)	(0.2454)
Pop Density Squared	0.9659	1.0902	1.0156	0.9830	1.0364	0.9958	0.9942
	(0.0311)	(0.0618)	(0.0661)	(0.0310)	(0.0441)	(0.0344)	(0.0353)
% Non-White	0.9977	0.9951	0.9944	0.9983	0.9924*	0.9990	0.9937~
	(0.0036)	(0.0062)	(0.0070)	(0.0040)	(0.0038)	(0.0040)	(0.0037)
% HH Married With Kids	0.9946	0.9618*	0.9812	0.9949	0.9736*	0.9872	0.9930
	(0.0084)	(0.0162)	(0.0169)	(0.0086)	(0.0115)	(0.0097)	(0.0090)
% Lots Vacant	1.0161	0.9788	1.0583~	1.0089	1.0198	1.0001	1.0247
	(0.0198)	(0.0222)	(0.0346)	(0.0186)	(0.0191)	(0.0184)	(0.0195)
% Same House 5 years	1.0047	0.9636**	1.0309*	0.9997	0.9998	0.9998	1.0021
	(0.0075)	(0.0138)	(0.0160)	(0.0073)	(0.0099)	(0.0080)	(0.0085)
% Education BA or >	1.0084	0.9533	1.0019	1.0056	0.9696	0.9995	0.9959
	(0.0138)	(0.0285)	(0.0269)	(0.0142)	(0.0196)	(0.0153)	(0.0153)
Subway Distance	1.1379	1.9823*	1.7298~	1.1880	1.5432~	1.3760~	1.1263
	(0.1759)	(0.6649)	(0.5702)	(0.1951)	(0.3448)	(0.2624)	(0.2131)
Subway Dist Squared	0.9829	0.8727~	0.8770	0.9705	0.9000~	0.9308	0.9892
	(0.0378)	(0.0717)	(0.0718)	(0.0375)	(0.0515)	(0.0446)	(0.0453)
High Violent Crime	1.0305	0.9406	1.0847	1.0465	0.8871	0.9628	1.0401
	(0.1345)	(0.1632)	(0.2097)	(0.1252)	(0.1406)	(0.1283)	(0.1433)
Amenity Factor	0.9932	0.9319	1.1762	1.0200	0.9604	1.0213	0.9660
	(0.0644)	(0.1156)	(0.1484)	(0.0738)	(0.0865)	(0.0799)	(0.0735)
Amenity Factor Squared	0.9999	0.9841	1.0478	0.9989	1.0089	0.9972	1.0021
	(0.0172)	(0.0476)	(0.0472)	(0.0200)	(0.0281)	(0.0237)	(0.0198)
Observations	25118	7730	4144	30130	9405	25174	14343
chi^2	482.3451	279.9801	138.0363	565.8564	239.7787	557.3397	463.8060

APPENDIX TABLE 2b: Modeling Whether A teacher Applies to Transfer by Background – High Density Sample

	white	black	hispanic	female	male	31 or >	<31
Median Fam Inc/10,000	0.9025*	0.8844	0.9822	0.8978*	0.8758*	0.8729*	0.9192
	(0.0460)	(0.0886)	(0.0862)	(0.0465)	(0.0576)	(0.0507)	(0.0544)
Pop Density / 10000	1.3390*	1.1285	1.0524	1.3215*	1.0625	1.2854~	1.1740
	(0.1680)	(0.2362)	(0.2142)	(0.1577)	(0.1965)	(0.1752)	(0.1921)
Pop Density Squared	0.9853*	0.9909	0.9981	0.9853*	0.9974	0.9879	0.9907
	(0.0069)	(0.0121)	(0.0113)	(0.0066)	(0.0103)	(0.0074)	(0.0095)
% Non-White	0.9991	1.0177~	0.9969	0.9977	1.0023	0.9985	0.9997
	(0.0049)	(0.0099)	(0.0095)	(0.0049)	(0.0064)	(0.0046)	(0.0066)
% HH Married W/Kids	0.9967	0.9932	0.9909	1.0017	0.9875	1.0019	0.9923
	(0.0112)	(0.0209)	(0.0186)	(0.0110)	(0.0153)	(0.0112)	(0.0138)
% Lots Vacant	1.0196	0.9942	1.0193	1.0183	1.0010	1.0038	1.0291
	(0.0188)	(0.0244)	(0.0359)	(0.0175)	(0.0246)	(0.0209)	(0.0211)
% Same House 5 years	1.0118	0.9973	1.0289~	1.0199*	0.9839	1.0092	1.0114
	(0.0103)	(0.0186)	(0.0175)	(0.0100)	(0.0140)	(0.0108)	(0.0128)
% Education BA or >	1.0257	1.0811*	1.0207	1.0365*	1.0310	1.0430*	1.0216
	(0.0182)	(0.0364)	(0.0324)	(0.0182)	(0.0222)	(0.0184)	(0.0226)
Subway Distance	0.4951	2.2625	5.3499	1.4781	0.2842	0.4464	4.2485
	(0.4560)	(2.9184)	(6.8882)	(1.1709)	(0.2935)	(0.3668)	(4.4779)
Subway Dist Squared	1.3743	0.4403	0.1540	0.4097	6.5763	2.1663	0.1272
	(1.7300)	(0.8079)	(0.2606)	(0.4373)	(8.6352)	(2.4122)	(0.1799)
High Violent Crime	1.0517	0.9004	1.0407	1.0168	0.9345	1.1418	0.8042~
	(0.1239)	(0.1216)	(0.1523)	(0.0991)	(0.1288)	(0.1314)	(0.0962)
Amenity Factor	0.7446*	0.7244*	0.7719	0.7273**	0.8412	0.7831~	0.7140**
	(0.0903)	(0.1094)	(0.1320)	(0.0731)	(0.1397)	(0.1004)	(0.0828)
Amenity Factor Squared	1.1124	0.9813	1.0568	1.0949	1.0164	1.0139	1.1855~
	(0.0959)	(0.1043)	(0.1343)	(0.0834)	(0.0974)	(0.0800)	(0.1108)
Observations	19497	7559	6979	28149	8616	23133	13632
chi^2	402.2507	213.8291	209.7827	529.3538	299.5989	566.1374	261.4353

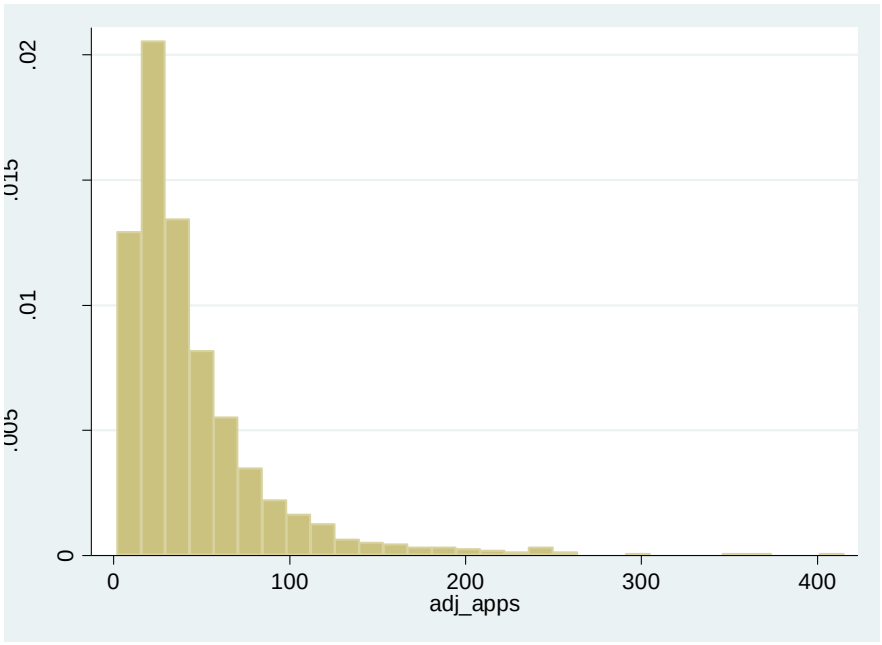
APPENDIX TABLE 3a: Modeling Where A Teacher Applies to Transfer To – Low Density Sample

	white	black	hispanic	female	male	31 or >	<31
Median Fam Inc / 10,000	1.1093~	1.0519	1.1858**	1.1149*	1.1262~	1.1243*	1.1030~
	(0.0640)	(0.0646)	(0.0745)	(0.0610)	(0.0709)	(0.0616)	(0.0635)
Pop Density / 10000	1.0079	1.3432	0.7127	0.9667	1.2423	0.8729	1.0896
	(0.2312)	(0.3043)	(0.1666)	(0.2068)	(0.2907)	(0.1821)	(0.2446)
Pop Density Squared	0.9840	0.9599	1.0484	0.9924	0.9740	1.0096	0.9785
	(0.0363)	(0.0344)	(0.0424)	(0.0339)	(0.0359)	(0.0338)	(0.0346)
% Non-White	1.0004	1.0052	0.9994	1.0013	1.0064	1.0024	1.0016
	(0.0044)	(0.0047)	(0.0043)	(0.0041)	(0.0046)	(0.0041)	(0.0044)
% HH Married With Kids	1.0028	1.0089	0.9811~	1.0029	0.9840	1.0011	1.0000
	(0.0104)	(0.0129)	(0.0103)	(0.0103)	(0.0111)	(0.0101)	(0.0106)
% Lots Vacant	1.0166	1.0335	1.0171	1.0177	1.0312	1.0033	1.0347
	(0.0256)	(0.0234)	(0.0248)	(0.0234)	(0.0239)	(0.0233)	(0.0238)
% Same House 5 years	0.9880	0.9964	0.9795*	0.9873	0.9999	0.9852~	0.9930
	(0.0097)	(0.0091)	(0.0091)	(0.0089)	(0.0093)	(0.0086)	(0.0093)
% Education BA or >	1.0019	1.0102	0.9799	0.9991	1.0079	0.9937	1.0078
	(0.0168)	(0.0176)	(0.0154)	(0.0155)	(0.0194)	(0.0159)	(0.0163)
Subway Distance	1.0200	0.8061	1.1725	0.9735	1.1599	0.9056	1.1012
	(0.1841)	(0.1538)	(0.1829)	(0.1662)	(0.2079)	(0.1478)	(0.2007)
Subway Dist Squared	1.0211	1.0538	0.9704	1.0265	1.0038	1.0432	1.0019
	(0.0460)	(0.0531)	(0.0381)	(0.0443)	(0.0457)	(0.0431)	(0.0463)
High Violent Crime	0.6236**	0.8731	0.5361***	0.6963*	0.6680*	0.7900	0.5821***
	(0.1095)	(0.1510)	(0.0880)	(0.1063)	(0.1315)	(0.1209)	(0.0956)
Amenity Factor	0.8463	0.7107*	0.6739***	0.8079*	0.8690	0.7757*	0.8495
	(0.0935)	(0.0967)	(0.0768)	(0.0873)	(0.0976)	(0.0840)	(0.0916)
Amenity Factor Squared	0.9281~	0.8899*	0.8547**	0.9158*	0.9026~	0.8978*	0.9288~
	(0.0416)	(0.0524)	(0.0460)	(0.0402)	(0.0525)	(0.0420)	(0.0411)
Observations	526924	146546	121126	739037	113134	465019	387152
chi^2	807.6608	461.7738	498.2228	692.9616	683.6534	635.9415	955.9567

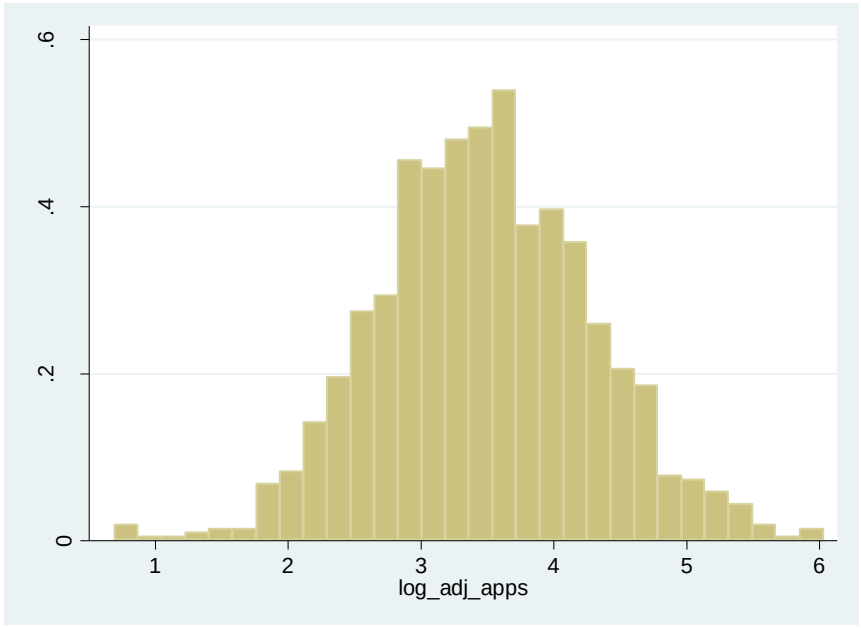
APPENDIX TABLE 3b: Modeling Where A Teacher Applies to Transfer To – High Density Sample

	white	black	hispanic	female	male	31 or >	<31
Median Fam Inc/10,000	0.9849	0.9706	0.8781**	0.9763	0.9858	0.9703	0.9817
	(0.0396)	(0.0505)	(0.0379)	(0.0365)	(0.0415)	(0.0352)	(0.0411)
Pop Density / 10000	1.3073**	1.2808*	1.3284**	1.3565***	1.2798**	1.3699***	1.3081**
	(0.1176)	(0.1279)	(0.1348)	(0.1121)	(0.1222)	(0.1130)	(0.1195)
Pop Density Squared	0.9864**	0.9887*	0.9882*	0.9849***	0.9886*	0.9850***	0.9864**
	(0.0044)	(0.0054)	(0.0052)	(0.0041)	(0.0049)	(0.0041)	(0.0045)
% Non-White	0.9894*	1.0045	0.9967	0.9919~	0.9992	0.9962	0.9905~
	(0.0050)	(0.0065)	(0.0049)	(0.0045)	(0.0049)	(0.0041)	(0.0052)
% HH Married W/Kids	1.0025	0.9941	1.0018	1.0029	0.9850	0.9998	1.0007
	(0.0126)	(0.0138)	(0.0104)	(0.0117)	(0.0111)	(0.0102)	(0.0133)
% Lots Vacant	1.0006	0.9668	1.0153	0.9949	0.9917	0.9868	1.0027
	(0.0217)	(0.0202)	(0.0222)	(0.0190)	(0.0208)	(0.0177)	(0.0219)
% Same House 5 years	0.9971	0.9819~	0.9925	0.9923	0.9958	0.9906	0.9962
	(0.0094)	(0.0101)	(0.0095)	(0.0087)	(0.0090)	(0.0079)	(0.0100)
% Education BA or >	1.0073	1.0257	1.0352*	1.0090	1.0154	1.0157	1.0061
	(0.0132)	(0.0180)	(0.0140)	(0.0126)	(0.0138)	(0.0120)	(0.0141)
Subway Distance	5.2355~	4.8397~	6.1887*	6.8771*	2.7184	5.0699*	6.4502*
	(4.6400)	(4.4433)	(5.3921)	(5.4717)	(2.1598)	(3.7986)	(5.8731)
Subway Dist Squared	0.4226	0.2378	0.1848	0.2640	0.6538	0.3176	0.3189
	(0.5269)	(0.2870)	(0.1989)	(0.2881)	(0.6650)	(0.3241)	(0.3997)
High Violent Crime	1.0898	1.2769~	1.4497**	1.1672	1.2924*	1.2932*	1.0921
	(0.1319)	(0.1832)	(0.1758)	(0.1306)	(0.1551)	(0.1430)	(0.1368)
Amenity Factor	1.0393	0.9187	0.9737	0.9852	1.0397	0.8902	1.1377
	(0.1238)	(0.1150)	(0.1413)	(0.1041)	(0.1185)	(0.0901)	(0.1399)
Amenity Squared	1.2060*	1.0473	1.0505	1.2170**	1.0594	1.1494*	1.2013*
	(0.0917)	(0.0809)	(0.1072)	(0.0841)	(0.0879)	(0.0753)	(0.0988)
Observations	467448	129462	106994	655726	99932	410768	343552
chi^2	2284.5926	276.2299	550.1863	1603.2888	861.6894	1373.0730	1847.7578

Appendix Figure 1a: Applications per Vacancy



Appendix Figure 1b: Log of Applications per Vacancy



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