DO NEW YORKERS VOTE WITH THEIR WALLETS?

THE IMPACT OF THE RELEASE OF NEW YORK CITY TEACHER QUALITY DATA ON HOUSING PRICES AND ITS EFFECTS ON RESIDENTIAL AND SCHOOL SEGREGATION

by

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ABSTRACT OF THE DISSERTATION

DO NEW YORKERS VOTE WITH THEIR WALLETS?:
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Dissertation Director:
Jason M. Barr

In February 2012, New York City released value added scores for its grade 4 through 8 public school teachers. There was little concern about the potential impact of the release of this public information on the housing values, residential segregation or school segregation for New York City dwellers. Since people "vote with their feet" (Tiebout, 1956), it is logical to believe that public information on teacher quality measures influences housing price, and resident and student mobility.

Hedonic, fixed effects models were used to analyze the teacher quality, school report card, residential housing sales, and American Community Survey data. The housing market responds significantly to the new information provided by the release of the teacher quality information. The results also suggest that the highly debated release of teacher quality information has large implications on housing choices and an impact on school demographics.

The results provide the first evidence of the effects of teacher quality scores on New York City's housing market. An increase in teacher quality increases housing prices and this influences the demographics of neighborhoods and schools. The release of the data had some impact on increasing the average household income and educational

attainment levels in less affluent and less educated neighborhoods. The results also indicate that home buyers who are responding to the data release are predominately White and are displacing Hispanic and Black residents.

There are also changes that occur in the diversity of the school zones where the percentage of White students has increased in schools with high teacher quality and school diversity indices have decreased. Furthermore, the results show that there are teacher quality gaps between Title I and non-Title I schools putting students at Title I schools at a disadvantage. Not only are they being taught by lower quality teachers, the schools and neighborhoods that they are in are negatively impacted as the wealthier, more educated home buyers opt out of living and attending schools in these areas. As more affluent people move into areas with higher teacher quality, many of the low income families are being prices out and new policies need to be considered to make schools more equitable.

DEDICATIONS

This dissertation is dedicated to these amazing people whom I love beyond words:

My mother, Iris Rivera

Being the daughter of an educator has plenty of benefits - like being a few grade levels ahead in mathematics and reading because of the flashcards and workbooks that were a part of my formative years. What it also provided me was an opportunity to see the educational inequities as I progressed through my schooling. And although I do not have the same passion for K-12 teaching as you do, I still have the same need to understand why these inequities occur and the same desire to fix them. Throughout the years when you pushed me to get my graduate degrees, my main focus has been education and these inequities and I hope that through my research I will be able to make half of the impact that you have made through teaching. Thank you for continuing to be my teacher and for pushing me throughout my life.

My father, Pablo Antonio Rivera

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My husband, Rudy Alexzander Rodas

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My “baby” sister, Antoinette Marie Rivera

You are one of my biggest cheerleaders in life and I do not know where I would be without you. You are truly the yin to my yang and your love and support mean the world to me.

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INTRODUCTION

Statement of Problem

The educational achievement gap that separates economically disadvantaged and ethnic minority students from their peers has been the focus of research and urban school reform for several decades. The gap narrowed considerably through the late 1980s between African Americans and Whites, but since then, progress has slowed and reversed. African American and Latino students are much more likely than White students to have lower academic achievement rates and are much less likely to graduate from high school, obtain a college degree or obtain a middle-class job (National Center for Education Statistics, 2009; National Center for Education Statistics, 2011). Between 1990 and 2013, the White-Black educational gap for 25-29 year olds who completed a Bachelor's degree or higher increased from 13 to 30 percentage points, and the White-Latino gap increased from 18 to 25 percentage points (Kena, et al., 2014).

Research has identified various factors that are linked to the achievement gap, such as students' racial and/or economic background, the educational attainment of their parents, their preschool instruction, school funding, and the expectations and quality of their teachers. Addressing these factors has been at the center of the urban school reform movement (Payne, 2011; Darling-Hammond, 2010; Ferguson, 2008; Cookson, Jr., 2011). There has been a lot of disagreement on how to close the achievement gap, but most agree that improving the quality of public education is a critical component. Exposure to high quality teachers can provide major long-term advantages to academic success and future earning potential of students (Chetty, Friedman, & Rockoff, 2011).

Unfortunately, there are obstacles that prevent all children from having a high quality teacher or attending a high quality school. Researchers have found that schools with a high percentage of low-poverty students tend to have teachers with lower qualifications than higher socioeconomic schools and teachers tend to leave schools with low achievement scores and a high proportion of poor and minority students. High poverty students have less access to effective teachers which contributes to sizable achievement gaps for these students (Reardon, 2011; U.S. Department of Education, 2015). In New York City, schools with higher attendance, higher expenditures, and with only elementary school grades attract higher quality teachers, while higher quality teachers tend to avoid schools with a large number of male students or English Language Learners (Barr, 2005).

Lankford, Loeb, and Wyckoff (2002) found stark differences in the qualifications of teachers across schools in New York State. They found that urban schools have lesser-qualified teachers and that low-income, low-achieving and non-White students in urban areas are often in classes with many of the least skilled teachers. Teacher sorting into more affluent areas combined with residential segregation intensifies the disparities in teacher quality across districts and schools. Unequal access to effective teaching is most related to the school assignment of teachers and students rather than the way that teachers were assigned to students within schools (Isenberg, et al., 2013). Jackson (2009) found that as the demographics of schools were shifted to mostly poor and minority schools, the higher quality teachers – as measured by value added to student achievement scores – left those schools. There is also some evidence that disadvantaged students are more likely

to be assigned to less qualified teachers within schools (Kalogrides, Loeb, & Beteille, 2013).

Racial inequalities in educational outcomes are closely linked to the fact that public schools are still segregated 60 years after the *Brown v. Board of Education* decision by the United States Supreme Court. One of the main reasons why public schools are still segregated is because of residential segregation that still occurs in many areas. In addition to teacher sorting, residents also choose where they want to live based on the quality of the public goods – like public schools – in the neighborhoods that their homes are located (Tiebout, 1956). Nationally, 52 percent of Black students and 58 percent of Latino students attend schools where minority students make up 75 percent or more of the entire student body (National Center for Education Statistics, 2011). In New York City, 85 percent of all Black students and 75 percent of all Latino students in 2010 attended schools whose student population was at least 90 percent minority (New York City Department of Education, 2012). Despite years of federal desegregation efforts, minority children are still heavily concentrated in largely minority schools in which most of the students come from disadvantaged backgrounds, and significant racial and ethnic disparities in dropout rates and educational achievement continue to exist (Yinger, 1995). Residential segregation is a key cause of extensive segregation in elementary and secondary schools.

Homes located in neighborhoods with high-performing schools cost, on average, about 2.4 times as much as those located in neighborhoods with low-performing schools (Figlio & Lucas, 2004). Minority students are more likely to live in low-income neighborhoods than their White counterparts and as a result, minority students have less

access to high-performing schools (Rothwell, 2012). School segregation also differs by the type of community, with the highest levels of segregation occurring in large central cities. Many families select the location of their homes partially based on their perception of school quality (Yinger, 1995).

Residential segregation does not always explain school segregation. There are many instances in which public school demographics do not reflect the demographics of the school zone. Segregated public schools can exist even when a school zone is not segregated if White residents decide to send their children to private schools (Clotfelter C. T., 2004). In the 2009-2010 academic year, 49 percent of White children, compared to 93 percent of Latino children and 89 percent of Black children, attended public schools in New York City[1] (New York City Department of Education, 2012; National Center for Education Statistics, 2012). While private schools play a small role for Black and Latino children in New York City, they do play a much larger role for White children.

Public information on teacher quality scores influences housing prices and resident and student mobility since people "vote with their feet" (Tiebout, 1956). Tiebout theory, which is a major contribution to spatial general equilibrium theory, suggests that given enough communities, individuals would reveal their preference for public goods like education by the choice of community in which they live in (Atkinson & Stiglitz, 1980). Other research has also found that the publication of school accountability data impacts housing choices (Kane, Staiger, & Samms, 2003; Black, 1999; Figlio & Lucas, 2004).

[1]This data does not include schools that only serve grades nine through twelve.

This study shows that a ten percentage point increase in the weighted career teacher quality average[2] increases housing prices by 7.8% in elementary school zones and 5.0% in middle school zones. The people who are responding to this data release and moving into the school zones with the higher teacher quality are predominately White, middle-class and educated. They are moving into areas that had housing values and household incomes below the city average and had more Black and Hispanic residents. The change in neighborhood demographics also changed the demographics in schools.

New York City's Department of Education is one of the most segregated school districts in the country. Racial segregation in New York City's Department of Education has historically been a problem. In the two decades after the *Brown v. Board of Education* decision, there had been several suggested integration plans that were rejected over the years. On top of that, there was never a city-wide integration plan put into effect and instead, voluntary initiatives like magnet schools, dual language schools, and school and district-wide voluntary integration plans were used to try to retain White middle class families within the district and to achieve racial and economic diversity within the schools (Back, 2003).

Although New York City's Department of Education is the largest public school district in the United States with racial and economic enrollment varying across schools and school boundary areas, this diversity across the district has not addressed the student racial isolation within schools. In order to achieve integration among Blacks and Whites in New York City public schools, approximately 80 percent of students would have to move (National Center for Education Statistics, 2011).

[2] The weighted average of teacher quality was calculated using the average teacher quality in the school multiplied by the percentage of teachers who were rated from the total teacher population.

New York City's Department of Education has thirty-two separate Community School Districts across all five boroughs, and all but three of them are subdivided into attendance zones for individual elementary schools. In these twenty-nine Community School Districts, students have a choice of attending their zones school or attending school elsewhere. Schools with mostly zoned students have student demographics that reflect that of the neighborhood. Students from more affluent families are often the ones to attend the less disadvantaged schools which increases segregation within New York City public schools (New York Appleseed, 2014).

Even as residential segregation has declined, Black isolation in schools has persisted. School segregation is greater than that found in neighborhoods. For instance, residential segregation has been lower for Latinos than for Blacks but the school segregation statistics show that more Latinos are in Latino isolated public schools (Orfield & Yun, Resegregation in American Schools, 1999). School boundary areas consist of neighborhoods, so as the demographics of these neighborhoods change then schools should as well. Therefore, it should follow if homes are being purchased by different demographic groups, then not only do the neighborhood demographics change, but so do the demographics of the schools in the neighborhood. In fact, school racial profiles change faster than that of the neighborhood because those who more recently moved are often younger adults with children, while those residents who are least likely to move are those who are older and who have finished raising their children (Orfield & Lee, 2006).

If home buyers are influenced by school or teacher quality measures when they decide on the neighborhoods and school zones that they move into, then it is logical to

believe that this movement of people into new homes is changing the demographic profile of the zoned public schools in that area. However, as neighborhoods integrate, attendance at private schools may increase and may lead to more segregation in public school than neighborhoods (Reardon & Yun, 2002). Goeyette, Farrie and Freely's (2012) found that as predominantly White schools experienced increases in their Black student body, that White residents are more likely to perceive that the quality of the schools has declined regardless of any changes in school poverty and standardized test scores.

As Latinos and Blacks move into neighborhoods with high quality schools and/or teachers, some White families may put their children in private schools, which would not allow the changes in school demographics to reflect the changes in neighborhood demographics. The movement of certain families and students out of public schools may negatively impact the school quality of those same schools that some middle class non-White families were once attracted to and may have influenced their purchase of their new homes. The withdrawal of White students from public school leads to the concentration of minority students which negatively impacts academic achievement (Bankston III & Caldas, 2000).

Schools with a disproportionately large number of low-performing students have a harder time retaining quality teachers (Clotfelter, Ladd, Vigdor, & Aliaga Diaz, 2004). Teachers with the least experience and the fewest qualifications teach in schools with high proportions of low socioeconomic status children and minority children (Mayer, Mullens, Moore, & Ralph, 2000). There are also big differences in the distribution of

teachers who are "highly qualified" in their subject areas[3]. Funding is one of the reasons why teacher quality disparities exist between poor or high-minority schools and predominately middle-class White schools.

Title I of the No Child Left Behind Act (NCLB) is intended to prevent local school districts from spending less on students in the poorest schools. Each school district that receives Title I funding must use its state and local funds to provide "comparable services" to its Title I and non-Title I schools before federal funds are received. Title I money is intended to provide additional money for additional services in Title I schools (Luebchow, 2009).

One of the areas that must be comparable is teacher salary, which is important in ensuring that teacher quality is the same across the district. Unfortunately, this is not the case for Title I schools since high-poverty schools are more likely to have under-qualified teachers that are paid less than more experienced and fully qualified teachers who are concentrated in more affluent schools. As a result, some school districts spend less money in Title I schools than non-Title I schools (Roza & Hill, 2004). Although teacher income is not a good proxy for teacher quality, since teacher salary is based on a set salary schedule in New York City, teachers with less experience teaching have lower salaries. The teacher quality of teachers with less than three years of data is not included in the teacher value added data and schools with a lot of new teachers have lower weighted averages for teacher quality. So while Title I schools are supposed to have similar quality teachers as those in non-Title I schools, this is not the case and low-income students are not receiving the same quality education as their more affluent peers.

[3] According to NCLB, highly qualified teachers must have 1) a bachelor's degree, 2) full state certification or licensure, and 3) demonstrate competency in each subject they teach.

Purpose

Although there have been a few studies that have looked at effects of school quality data, there is limited research that explores the effects of publicly providing teacher quality value added information. This study explores whether the degree to which these teacher quality value added measures are capitalized into housing prices in New York City, especially when teacher quality ratings depict a different view of the school's quality than the schools report cards did. It also explores whether this movement into new school zones has had a significant impact on public school segregation and the disparities in teacher quality between Title I and non-Title I schools.

According to Tiebout, people who are financially able to move out of poor areas with low quality public goods like schools will relocate to areas with better public goods. It is important to note that this ability to "vote with your feet" is dependent upon having enough wealth to be upwardly mobile and as a result, residents with less wealth will not have the same access to the same quality of public goods. Given these circumstances, residential stratification on the basis of race and/or income is to be expected since household preferences for school quality will vary with these same characteristics (Tiebout, 1956). In the Tiebout model, local jurisdictions use benefit taxes that effectively communicate to households the cost of consuming different levels of local public goods like education. This results in an efficient pattern of consumption of these goods for households only (Oates, 1999). The mobility assumption of the Tiebout model plays a more limited role than in classical federalism models, where the costs of mobility are higher and therefore mobility is limited.

As households sort across school zones according to their willingness to pay for school quality through housing prices, then schools become stratified on the basis of income, and since race is correlated with income, this division of classes leads to increased residential segregation by race (Bayer, McMillan, & Ruebe, 2001). When looked at in this way, the release of the New York City teacher quality data and its impact on residential mobility can also be said to impact segregation between public schools in New York City since not all residents are able to respond to the newly released teacher quality data.

The movement of people from bad school zones into better ones (household sorting) has been studied by using average standardized test scores, but has only been done once using the newly reported value added models of teacher effectiveness. Imberman and Lovenheim (2013) look at the impact of several value added releases in Los Angeles. Using a difference-in-difference model, they found that teacher value added scores were not capitalized into housing prices. This study explores whether the degree to which these teacher quality value added measures are capitalized into housing prices in New York City, especially when teacher quality ratings depict a different view of the school's quality than the schools report cards did. In addition, unlike the Imberman and Lovenheim paper, this study explores regional issues and is not presented with property tax differences since New York City property tax rates are homogeneous across school zones by tax class each year. Another important difference is that this study looks at one release of teacher value added data while the Imberman and Lovenheim paper looks at several releases over time from different sources.

In addition, while the movement from one district to another has been explored, the movement within districts has not been examined. Since value added models are very controversial in the ways that they are implemented and the types of models used, it is interesting to see how they have impacted housing prices and neighborhood demographics in areas that identify the schools with quality teachers within one large school district where property taxes are the same across school zones.

The capitalization of teacher quality value added measures into housing prices in New York City also impacts the demographics of the schools as well. As the demographics of the neighborhood change, the demographics of the neighborhood zoned public schools also change. As mentioned before, school demographics change more rapidly than neighborhood demographics because those who more recently moved are often younger adults with children, while those residents who are least likely to move are those who are older and who have finished raising their children (Orfield & Lee, 2006). Unfortunately, there is a lack of research on the impact of school accountability measures on school segregation or student mobility so this study will provide some insight in the gap in the literature. This study measures the impact of teacher value added rankings on residential demographics (racial and economic), school demographics (racial and economic), student mobility, residential segregation, and school segregation.

In addition, this study investigates the inequity in teacher quality between schools with a high proportion of low income students versus more affluent schools. In particular, it will examine the distribution of teachers with high value added rankings in Title I schools and compare it to the distribution of teachers with high value added ranking in non-Title I schools. Title I schools are supposed to have equally qualified

teachers as non-Title I schools within the same district; however, the research has shown that this is not always the case (Luebchow, 2009). This study will attempt to shed some light on the disparities by exploring the differences between the schools (i.e.: school location, school funding, student demographics and neighborhood characteristics) to understand why Title I schools are not meeting the teacher quality requirements within New York City.

Research Questions

This dissertation explores three distinct studies related to the release of the New York City teacher value added rankings. The first study examines the relationship between teacher value add in New York City elementary and middle schools and housing price values. The study focuses on K-8 school zones for two main reasons: 1) teacher quality data is based on test score growth and this information is only available for teachers who teach grades four through eight and 2) New York City no longer has zoned public high schools and instead employs a choice method for all traditional high schools so residential movements would not impact high school choices. Put differently, this study seeks to determine whether houses in the school zones of two schools with highly comparable attributes and whose market values previously reflected these attributes even with publicly used School Report Card data are valued systematically differently if their related schools have different average teacher quality measures.

The second study explores the impact of this movement into new school zones on the demographics of K-8 schools. While the third study examines the disparities in

teacher quality in Title I and non-Title I schools. Specifically, the following research questions are addressed:

1. Did the release of value-added teacher data affect housing prices in New York City?
    a. Did the K-8 school zones in New York City with high value added teachers experience a greater increase in housing values in comparison to K-8 school zones in New York City with low value added teachers?
    b. Are comparable houses within the K-8 school zones valued differently if their neighborhood schools have different teacher quality ratings?
2. Did the release of value-added teacher data increase racial/ethnic segregation across New York City school zones?
    a. Did the K-8 school zones in New York City with high value added teachers experience a greater increase in population in comparison to K-8 school zones in New York City with low value added teachers?
    b. Did the K-8 school zones with high value added teachers experience a change in demographics relative to K-8 school zones with low value added teachers?
    c. Did the K-8 school zones with high value added teachers experience a change in residential segregation relative to K-8 school zones with low value added teachers?
3. Is there a disparity in teacher quality between Title I and non-Title I schools?
    a. What contributes to these disparities in teacher quality?

b. Does the value added data reveal teacher quality disparities? If so, are they consistent with pay gaps?

c. Did the release of the teacher value added models have an impact on teacher quality disparities?

CHAPTER 2

CONCEPTUAL FRAMEWORK, LITERATURE REVIEW AND HYPOTHESES

Theoretical Perspectives

This study uses four theories to better understand the extent to which the release of teacher value added rankings impact both housing prices and residential and school demographics.

Ecological Model and Suburbanization

In the early 1900s, cities were the center of economic activity and the majority of people lived within them. However, ecological models show that they were having a negative effect on its residents and therefore gave city dwellers reasons to move out of city centers. Simmel (1903) analyzed the effects of the big city on the mind of the individual and found that it had caused an irreversible transformation of the mind. The big city had an overall negative effect on the mind and the city dweller's well-being. Simmel influenced the thinking of Park, Wirth and other American sociologists at the University of Chicago who collectively became known as the "Chicago School".

Park and Burgess (1925) predicted that once cities were fully grown, they would take the form of five concentric rings with areas of social and physical deterioration concentrated near the city center and more prosperous areas located near the city's edge. They used this theory to explain social problems like unemployment and crime in Chicago districts. Park and Burgess believed that spatial competition created by the struggle for survival produced a land use pattern of concentric rings.

Park also proposed that cities are environments like those found in nature, governed by many of the same forces of Darwinian evolution like competition. People

and their activities concentrate in a particular area as cities form and grow. Central areas of cities become highly populated, so people scatter away from the central city to establish suburbs and disperse. Competition for land and other urban resources leads to the division of urban space into zones in which people share similar social characteristics. When a zone becomes more desirable, property values increase and people and businesses migrate into that zone and away from the city center. This then led to his social disorganization theory which directly linked high crime rates to neighborhood ecological characteristics.

Wirth expanded on Park's theories and stated that large cities produced a host of changes that are economically productive, but they are also destructive of family life and close social interaction because of crime and family break-up. The city broke down traditional primary relations and therefore contributed to various negative aspects of city living (Wirth 1938). This again led to the dispersion of people to the edges of cities.

Ecological theory is a sociological theory that tries to explain the distribution of people throughout different neighborhoods in cities. According to ecological theory, residential mobility is the intermediate step to structural assimilation, which occurs when a group has equal access to institutions – such as education. However, there are barriers to residential mobility that inhibit structural assimilation such as residential segregation.

Spatial General Equilibrium Theory

Spatial equilibrium theory examines the achievement of stable market and residential patterns, under the assumptions that agents and firms are distributed in space, and that spatial movement involves real costs. The spatial equilibrium model has three core conditions – workers must be indifferent between locations, firms must be

indifferent about hiring more workers, and builders must be indifferent about supplying more housing. These three conditions provide the labor supply curve, housing supply curve, and labor demand curve that collectively determine area population, wages, and prices. Exogenous differences across space in productivity, amenities, and the construction sector drive differences in density, incomes, and home prices. The main assumption of spatial equilibrium models is that free migration across space and flexible housing prices ensure that welfare levels are more or less equal in different areas. That is, the South Bronx may be poor, but it has low housing prices that offset that poverty. If welfare levels are more or less equal across space, then there is no good equity rationale. The spatial equilibrium model makes sense of housing prices within cities and the distribution of prices and wages across cities (Alonso, 1964; Rosen, 1979; Roback, 1982).

Spatial equilibrium theory suggests that policies that aid poor areas are not necessarily redistributive and will have indirect consequences, for example pushing up housing costs and inducing poor people to move to poor areas. Housing supply elasticity determines whether urban success shows up in more people or higher incomes. Glaeser et al. (1993) use a spatial equilibrium model where migration responds slowly to local shocks but the spatial equilibrium is always maintained because of housing price flexibility. Since housing prices can change quickly, the price adjustment is sufficient to maintain the spatial equilibrium. Research has looked at the connection between housing costs and local amenities, such as good schools (Black, 1999).

Tiebout Theory

Charles Tiebout framed his sorting model as a contribution to spatial general equilibrium theory. Tiebout theory states that people will choose to live in areas where the mix of public goods and taxes are at their preferred level. Local governments choose this mix of taxes and public goods to attract certain types of residents. In order for Tiebout theory to work, there needs to be a large number of neighborhoods offering different and fixed levels of local public goods, such as public education (Tiebout, 1956). This is the case in New York City, where there are several school zones throughout the city that are ranked differently and have varying per pupil spending.

When people "vote with their feet" to choose their most preferred community, they are revealing their preferences for the public goods. There are seven assumptions that must be maintained for Tiebout's model to work: 1) consumers are perfectly mobile; 2) consumers have full information; 3) there are a large number of communities; 4) commuting is not an issue; 5) public goods do not spillover among communities; 6) there are economies of scale; and 7) communities are trying to achieve an optimal size (Tiebout, 1956). However, there are issues with some of these assumptions. Not all consumers are free to choose where they live because of costs and discrimination. In addition, not all consumers have access to complete information. Not all prospective residents have all the information about the schools in which they choose to live in. For instance, the release of the teacher quality rankings were not available on the New York City Department of Education website and only informed home buyers would have researched the findings that were available on other websites like School Book on the New York Times. On top of that, there may be a divide in who is using the data based on

access to a computer and internet and there may be a language divide for many of the residents in New York City who do not read English fluently.

There have been a few studies that have examined the impact between local government fragmentation and residential segregation. For instance, Dawkins (2005) examines the link between residential segregation and Tiebout-induced sorting. Dawkins found that Tiebout-induced sorting may increase racial inequalities in the consumption of local public services. There is a larger effect of Tiebout choice on residential segregation and Tiebout choice not only contributes to residential segregation but these locations may offer different local public service bundles – such as the quality of schools.

There are differences in the consumption of school quality that are associated with parental education and race, as Bayer, et al. (2005) found. The differences in the consumptions associated with race are explained by the demand for housing – differences in housing preferences and/or discrimination in the housing market and the preferences for the race of one's neighbors. This creates a lack of availability of communities that combine high quality schooling with poor quality housing and implies a potentially serious imperfection in local education markets.

Cutler and Glaeser (1997) state that residential segregation by race increases social costs. Centralization and segregation produce harmful effects for African-Americans and Latinos because it makes African-American and Latino young adults less likely to complete high school, more likely to be unemployed and single parents.

Social Capital

Greater social capital should positively affect children's educational attainment. However, research has shown that social capital could negatively affect educational

achievement. While having ethnic peers can be beneficial because of the close social ties of family members with other community members, the negative effect occurs when the community lacks opportunities and knowledge that would be beneficial to the children in the community (Putnam, 2000).

Studies have also recognized the significance of family and the role of social capital in children's adaptation to school. For example, Coleman (1990) found that close communities make the role of parenting stronger because adults reinforce each other's control on their children.

Environmental factors outside of school influence students' decisions to remain in school (Nora 2003). Students with parents with lower socioeconomic status normally have family responsibilities and jobs that effect whether or not a student continues with his/her education (Nora 2003). The social capital of parents, measured by socioeconomic status via level of education attained by parents, is related to the level of education that a student will achieve (Warburton, Burgarin, and Nuñez 2001).

In addition to social capital, academic resources that students develop during their high school experiences also affect their level of educational attainment. Research also shows that there are a disproportionate number of failing schools, across all grade levels, which are predominantly comprised of poor, racial, and ethnic minority students. These segregated schools tend to have fewer resources – financial, material, and human – than schools in more affluent areas. Students who attend these schools receive a substandard education. The quality and rigor of a student's high school curriculum has emerged as one of the strongest predictors of Bachelor degree attainment (Warbuton, Burgarin, and Nuñez 2001).

Even though the urban school reform movement aimed at closing the achievement gap has been in effect for over two decades and has gone through various policy implementation phases, there has been little overall significant improvement in closing the achievement gap. Low levels of social capital can undermine many types of urban school reforms. This has caused policy makers and practitioners to implement policies and research their effects on policies and reforms that have limited value in improving urban schools or decreasing the achievement gap. In order to successfully close the achievement gap, improvement efforts must involve both structural and cultural features of schools (Payne, 2011).

The fact that lower tier schools have a lack of social capital in comparison to top performing schools has limited the effectiveness of some of the policies and programs that have tried to close the achievement gap in urban school systems. Policies like increasing teacher quality, improving school leadership and decreasing class sizes are not always successful in closing the achievement gap because of the social dimensions that these policies overlook when they are implemented. These policies do not get at the root cause of the achievement gap which starts in the homes and the communities where the students live, which is impacted by residential sorting (Darling-Hammond, 2010).

Reforms such as high-stakes standardized testing have been detrimental to closing the achievement gap because it has led to teachers teaching to the test instead of focusing on quality teaching. Accountability reforms have also led to policies that punish low-performing schools instead of providing them with the supports that they need. The social capital divide causes an achievement gap in schools.

Empirical Studies on Academic Achievement

While standardized tests may be a reliable measure of student achievement, there are some challenges in measuring teacher quality through test scores. For instance, tests are not complete measures of all the goals in a school system. Currently, most school districts, like the New York City Department of Education, focus their annual state standardized testing on Mathematics and English Language Arts (ELA), and these are not the only skills that are taught to students in schools. There are several untested subjects, like Science, Arts and Social Studies. Furthermore, there are several grades that are untested as well, so it is impossible to measure student achievement via test scores for those grades and subjects (Goe, Bell, & Little, 2008).

Another challenge with using student test scores to measure teacher quality is that it is difficult to correctly determine what portion of the student's scores are attributed to the teacher. Growth measures like value added scores attempt to more fully explain the portion of teacher quality that impacts student's scores separate from the outside sources that may also impact student scores like previous test scores and family environment (McCaffrey D. F., Lockwood, Koretz, Louis, & Hamilton, 2004). Value added measures a teacher's contribution to student learning, accounting for the student's previous achievement level and background characteristics.

The New York City teacher quality data not only provided potential and current New York City residents with new data on the quality of their teachers and therefore schools, it also provided them with a different level of data that was not previously available through school report card data. As this newly released and different level of data was made public, the neighboring areas have changed in reaction to moving out of

school zones with ineffective teachers and the moving into school zones with effective teachers.

Teacher Quality

The importance of quality schooling is reflected in test scores such as the SATs. The relationship between students and teachers is very important to the quality of a child's education. The relationship that students have with their teachers is linked to student engagement and academic performance (Suarez-Orozco, Pimental, & Martin, 2009).

Throughout the years, effective teaching has been defined in different ways (Mujis, 2006; Cheng & Tsui, 1999). As the definition of effective teaching has evolved, so have the methods for measuring teachers. While there is a general agreement that good teaching matters and may be the most important school-based factor in improving student achievement (Darling-Hammond, 2000), there has not been a consensus on measuring teacher effectiveness. In part, this has occurred due to the disagreement surrounding what an effective teacher is and does (Cruickshank & Haefele, 1990). Therefore, there is no one teacher evaluation method that is generally agreed upon.

Recently, there has been a move toward quantifiable measures since qualitative evaluation systems are subjective and can be inconsistent due to bias that may occur during observation-based evaluations. Not only that, but many districts have begun supplementing traditional teacher evaluations with value-added measures of teacher quality because of the No Child Left Behind (NCLB) Act of 2001 and the Race to the Top (RTTT) funding that have focused more attention on the use of student achievement

as a component of teacher quality and observation based evaluations do not necessarily indicate how much students learn as a result of their teacher.

The move toward a more quantitative approach has occurred in a number of ways. The two most widely used are absolute standardized test scores and value-added modeling. The practical difference between a growth model and a value added model is that the value added models control for outside influences (i.e.: student demographics, prior performance) on student achievement (O'Malley, McClarty, Magda, & Burling, 2011). When using absolute standardized test scores, the assumption is that teachers and schools are effective if their students score well on standardized tests and ineffective if they do not. Since underrepresented minorities and low income students score lower on standardized tests on average than their White and more affluent counterparts, the findings when using absolute standardized test scores normally show that teachers of affluent, White and Asian students are high-performing and teachers of urban, minority students are low-performing (Goe, Bell, & Little, 2008). Due to this finding, value-added models are favored over absolute standardized test scores.

Value-added modeling seeks to disentangle socioeconomic status from school contributions to student learning. Value-added models take into account where students started at the beginning of each year (using their standardized test scores from the year before) and theoretically isolate the schools' or teachers' impact on student achievement and improvement regardless of race and socioeconomic status.[1] Unfortunately, typical

[1] While there is a movement toward value-added measures, there are some issues with it that may impact its validity. For instance, non-random assignment of students to teachers and schools makes it difficult to isolate the impact of schools from outside sources. Statistical validity is crucial to value-added models since the value-added measures that are included on school report cards inform the general population of which schools are deemed better than others. If the models are not valid, they may incorrectly inform parents about the quality of schools.

school report cards, student report cards, teacher evaluation policies and NCLB reports do not account for where students start. As a result, schools and teachers who have higher performing incoming students who most likely score higher on standardized tests at the end of the year will positively bias overall school and teacher grades.

Although some states (i.e.: Pennsylvania, Ohio, and North Carolina) do use value added models to measure teacher and school impact on student achievement, this information is not readily available to the public on the school report cards. There are a few states and school districts that include student growth models in their report cards. Kentucky, Tennessee and Florida are among some of the states that do include student growth on their school report cards; but in most cases, this information is included as a proportion of the final letters grade. In compliance with their applications to RTTT, the nineteen states and their districts who have won RTTT funds are designing and implementing new teacher evaluation systems that evaluate teachers based on how much their students learn based on their test scores.

New York is one of the states that has received RTTT funds and must create a new teacher evaluation system and has passed a law requiring school districts to institute new teacher evaluation systems to replace the previous model. The new evaluation system, which was agreed upon in mid-February 2012, includes a mixture of standardized tests scores (40%) and classroom observations (60%)[2]. Previously, teachers were graded either satisfactory or unsatisfactory, now teachers will be rated on a four-tier system of ineffective (scores of 0-64), developing (65-74), effective (75-90) and highly effective

[2] Twenty to twenty-five percent of the evaluation will consist of state assessments and other comparable measures. Another twenty to twenty-five percent of the evaluation will consist of locally selected measures of student achievement. And the remaining sixty percent will consist of classroom observations. (New York State, 2012)

(91-100). Furthermore, teachers who are rated ineffective based on standardized test scores cannot receive a developing score overall (Cuomo, 2012).

The use of value added models in the New York City Department of Education is not new. In fact, the New York City Department of Education used to create teacher rating reports that were used internally as a tool to decide tenure. At the end of February 2012, the data from the 2007-2008, 2008-2009 and 2009-2010 academic years were released to several media sources who requested the information through the Freedom of Information Law[3]. The Department of Education stopped creating these reports after the 2009-2010 academic year because New York State has created new reports using a different formula for the new teacher evaluation system for the entire state. These scores were published in raw form through various news outlets and the New York Times provided both career and 2010 value added scores for teachers on its School Book website. In addition, the School Book website published the percentage of teachers who were considered to be above average or high in each school (Appendix A provides snapshots of the School Book website).

Validity has been the primary concern over the public release of the New York City value added teacher quality data. Other concerns include how the model compares to other districts which also use value added modeling, and the way public release of such data will increase existing incentives to teach to the test. However, there has been little concern about the potential impact of the release of this public information on the mobility of New York City residents and its impact on housing values and rent prices in New York City.

[3] This data also has value added teacher quality scores for the 2005-2006 and 2006-2007 academic years as well.

Value-added models

Value-added models have been used in a variety of different analyses to assess the differences in teacher effectiveness within schools. Analyses have shown large and consistent differences among teachers in the learning pace of their students (Hanuskek & Rivkin, 2010). The value-added model estimates the contribution of schools, classrooms or teachers to student achievement, controlling for non-school factors. It is used to estimate the unique contributions of the school or teacher on students' achievement over time rather than the cumulative efforts of education or student background factors (Goe, Bell, & Little, 2008).

The first step in the value-added model is calculating an estimate of what is expected for each child. There is a set average expectation based on what is known about the child and classroom at the beginning of the year. This estimate might include how well the child has done on prior tests. The value-added of teachers can be estimated in a number of ways, but normally it subtracts the achievement test score of a teacher's students at the beginning of the year from the score at the end of the year, and makes statistical adjustments to account for differences in student learning that might result from student background or school-wide factors that the teacher cannot control (Hanuskek & Rivkin, 2010).

Some value added models make adjustments for demographics and some may look at overall classroom environment (lowering the baseline when a group of low-performing are clustered together). Value-added methods use these components and compare them to the average academic performance of other students who had the same characteristics, and produce an "expected" performance as the average for one year for

kids in that particular classroom. When looking at teacher or school effects, the value-added method measures whether students in that classroom did better or worse than expected. Therefore, value-added evaluation isolates the contribution that each teacher or school makes in a given year, which can be compared to the performance of other teachers and schools in the same evaluation (McCaffrey D. F., Lockwood, Koretz, & Hamilton, 2003). This is another reason to focus on primary grades because there is tighter teacher to student coupling than secondary schools where kids rotate.

Adjusted gains are then compared across teachers and schools and can be expressed in a number of ways. One way is a percentile score that specifies where a given teacher stands relative to other teachers. Therefore, a teacher who scored at the 75^{th} percentile on value-added for achievement in Math would have produced greater gains for his/her students than the gains produced by 75 percent of the other teachers included in the evaluation. The same is true for schools; a school that scored at the 75^{th} percentile on value-added for achievement in Math would have produced greater gains for its students than the gains produced by 75 percent of the other schools included in the evaluation.

In summary, value added measures are used to determine a summary score of the contribution of factors toward student achievement growth (Goldhaber & Anthony, 2003). Value added models use multiple years of students' test scores to estimate the effects of teachers or schools through complex statistical techniques (McCaffrey D. F., Lockwood, Koretz, & Hamilton, 2003). Value added models quantify the added value that teachers or schools contribute to student achievement. Ideally, value-added models are supposed to measure the effects of teachers or schools on student achievement while

controlling for other factors such as students' demographic and socioeconomic characteristics. Teacher fixed effects have shown that there is a link between differences among teachers and reading and math test scores (Rockoff, 2004).

Value added models quantify the impact of teacher or school effectiveness on student achievement by separating teacher or school effects from other uncontrolled factors such as students' demographic and socioeconomic characteristics and neighborhood environment. However, there are some factors that are difficult to control for when using value added models such as separating school and teacher effects, non-random student assignments to schools and teachers, multiple classes, multiple teachers, student mobility, differing school resources across schools, peer effects and changes in the home environment. These issues must be addressed when value added models are used to evaluate teacher quality.

Challenges and Solutions of Value Added Models

Separate Teacher and School Effects

Isolating teacher effects can be difficult because value-added models are not able to sort out teacher effects from classroom effects. When differences between schools are not controlled, influences on student learning by factors other than teachers, such as other characteristics of the school in which the teacher works, may not be properly accounted for. For instance, if students attending different schools differ in ways that are likely to affect both achievement and growth in achievement and if the composition of the school's students (e.g., the proportion of students eligible for free and reduced-price lunches) affects these outcomes, bias in estimates of teacher effects can occur. The demographics of the student body have a great impact on estimates of teachers'

effectiveness. However, since teacher or school effects might be correlated with the characteristics of the students that they teach, current models are not able to separate effects caused by the composition of the school from teacher or school effects (McCaffrey et al., 2004).

Some scholars argue that this bias can be reduced by including separate predictor variables for each school in the value-added regression models (McCaffrey et al., 2004). However, additional empirical research is needed to determine the extent of which inclusion of school fixed effects changes interpretations about teacher impact on student achievement. Adjusting for school fixed effects should control for unmeasured characteristics across different schools (i.e.: class sizes, curriculum, etc.). Nevertheless, adjusting for school fixed effects would also adjust away any school-level differences in average teacher quality. Therefore, when school fixed effects are included in the model, there is an assumption that on average all schools hire equally capable teachers (McCaffrey et al., 2004).

Teacher and School Effects are Constant

Another potential problem with using value added models to determine teacher or school effects on student achievement is the issue of changing teacher or schools effects over time (Brophy, 1973; Rosenshine, 1970). Researchers have found a moderate correlation between value-added teacher rankings in different years (McCaffrey et al., 2004) using elementary and middle school Math teachers in several school districts in Florida. On the other hand, another study found that value-added model teacher rankings were variable in an analysis of five urban districts in the United States (Sass, 2008).

Students are Randomly Sorted

A key assumption of value-added models is that students are randomly sorted into schools and classrooms. This assumption is never observed since school sorting is based on where students live and many schools track their students by academic performance (Koedel & Betts, 2014; Sass et al., 2012). Plus, at the elementary level, more involved parents are more proactive in finding out who the quality teachers are and getting their children placed in those classes. This is particularly relevant at the middle school level, where teachers typically offer different courses to different groups of students during any given year, and course assignment policies may dictate that a teacher typically teaches high-level courses to high-achieving students or less challenging courses to low-achieving students. Therefore, the assumption that students are randomly sorted into schools and classrooms is violated and teacher and school effectiveness in these different classrooms may not be equal. There is not a lot of research in this area because most studies do not have access to the data that will allow that sort of comparison. However, a few studies use student and/or school fixed effects because of issues of bias from non-random student sorting (McCaffrey et al., 2004; Paufler & Amrein-Beardsley, 2014).

Student Background

Value added models that do not include student-level variables produce results that are biased against schools and teachers that disproportionately serve low-performing students. But there is also an issue of whether or not student background variables should be included in the models. The Tennessee Value Added Assessment System (TVAAS) does not control for student characteristics and it is one of the most prominent examples of value-added modeling (Sanders & Horn, 1998). The developers of TVAAS argue that

their model implicitly controls for students background characteristics since they are related to initial levels of student achievement (Ballou, Sanders, & Wright, 2004). However, New York City's model does include student-level demographics. Variables include race, gender, socioeconomic status, and even whole-class characteristics like the size of the class and how many students are new to the city are included in the value added model calculations.

Multiple Teachers

In middle and high school, it is common to have more than one teacher teach core courses. In many schools, students take one Math course in the Fall semester and another course with a different teacher in the Spring semester. If more than one teacher taught a student, it is generally not possible to separate the effects of each teacher on these students related test score growth through statistical methods. However, McCaffrey et al. (2004) describe some possible theoretical approaches for modeling student sharing. Teachers who have shared students within a core subject will still be included in the analysis using dosage values. This analysis is further elaborated on in Isenberg and Hock's (2010) evaluation of the DC Public schools. In order to account for multiple teachers, dosage effects should have been included in the New York City value added models.

Housing Prices

School-Level Average Achievement and Housing Prices

A number of papers have examined the relationship between school quality information and housing prices and many of these studies estimate a willingness to pay

for schools that have higher -average test scores. These studies have found that housing prices are influenced by neighborhood school quality. This research would imply that high value added teachers would also impact housing prices.

However, there is some research that has found no evidence that indicated that housing prices respond to school rankings. Using data from the housing market in Mecklenburg County, North Carolina between 1997 and 2001, Kane, Staiger, and Samms (2003) propose that either school quality was known to buyers for some time even without the information provided by school report card or that home buyers were uninterested in differences in school quality measures. The authors evaluated the housing market's response to the categorical rating of school performance created by school accountability systems not using value added results. Using report card ratings that NCLB has mandated, they have found a correlation between the school test scores in Charlotte with differences in measured housing characteristics. The authors cite an older study done by Figlio and Lucas in Florida that suggested a large housing price change after the announcement of the Florida school ratings in 1999.

Figlio and Lucas (2004) examined whether the housing market responds to information provided by the state report card data in Florida. The paper looked at the Florida housing market and they found that information provided in the report cards did have an impact on housing prices. They use repeat sales data and found that the housing market initially exhibited a strong response to the assignment of school letter grades. However, as the school grades fluctuated over time, they found that these effects are almost negligible after three years.

On the other hand, Bayer, Ferreira and McMillian (2005) findings show that changes in school quality set in motion a process of re-sorting on the basis of neighborhood characteristics that reinforces itself which leads to substantially larger stratification effects. Expanding on this research, Bayer, Ferreira, and McMillan (2007) show that school quality increases housing prices. The authors provide a framework for estimating household preferences over a broad range of housing and neighborhood characteristics, some of which are determined by the way that households sort in the housing market. Their framework links the traditional discrete choice literature with a clear strategy for dealing with the correlation of unobserved neighborhood quality with both school quality and neighborhood demographics. The model is estimated by using data on a large metropolitan area, drawn from a restricted version of the Census. The paper indicates that, on average, households are willing to pay an additional one percent in housing prices when the average performance of the local school is increased by 5 percent. The paper also shows that the full capitalization of school quality into housing prices is typically 70-75 percent higher than the direct effect as a result of a social multiplier, where increases in school quality also raises prices by attracting households with more education and income to the corresponding neighborhood.

Kane, Riegg, and Staiger (2006) examine the relationship between school characteristics and housing prices in Mecklenburg County, North Carolina between 1994 and 2001. During this time, the school district was operating under a court-imposed desegregation order and redid a number of school boundaries. The paper uses two different sources of variation to disentangle the effect of schools and other neighborhood characteristics such as differences in housing prices along assignment zone boundaries

and changes in housing prices following the change in school assignments. The findings show systematic differences in housing prices along school boundaries and that housing prices seem to react to changes in school assignments. Part of the impact of school assignments is mediated by subsequent changes in the characteristics of the population living in the school zone.

School-Level Value Added and Housing Prices

In addition to the research that has focused on the impact of average standardized test scores and housing prices, there are a few studies that have explored the link between housing prices and school level value added measures. Hayes and Taylor (1996) use data from Dallas to test three different models. One model was based on per pupil expenditures, another on average achievement in the sixth grade and the last on the value added on achievement. Using a sample of only 188 houses, they test each of their models and found that there is no impact of per pupil expenditures on housing values, but they found a statistically significant impact of average school achievement on house values. When Hayes and Taylor tested their last model, they found that only value added is important and they state that home buyers are only willing to pay for school-specific attributes and not the parent and student characteristics of the school.

On the other hand, Downes and Zabel (2002) test alternative models of the impact of school quality on housing prices using 1,173 house price observations in the Chicago metropolitan area. They found that a one percent increase in mean reading test scores in the neighborhood school will lead to a 1.6 percent increase in housing values. Both of these articles have been criticized for the samples – Hayes and Taylor (1996) had a small sample size and Downes and Zabel (2002) used the American Housing Survey so

matching houses was not precise to the census tracts. Furthermore, unlike average student achievement, these value added measures are not readily available to home buyers in the current research. There is no clear way to identify whether home buyers were aware for the value added that a school had on its students relative to what was already described on school report cards. This research will look at the value added measures that are readily available to home buyers.

Measuring Impact on Housing Prices

Reliable methods are necessary to take into account potential omitted variables and endogenity issues in order to effectively measure the impact of reported value added measures on housing prices. The boundary fixed-effect approach has been used in several studies that have analyzed the impact of school quality on housing prices (Gill, 1983; Cushing, 1984). The boundary fixed-effect approach compares the relation between housing prices and school quality on two sides of a single school district's catchment zones. Black (1999) assumes that the neighborhood characteristics do not change across the border and houses near both sides of a border are assigned the same value for a dummy variable that indicates a boundary between school zones. Black states that this dummy variable captures both the unobserved and observed neighborhood characteristics shared by houses on either side of the border and therefore, the remaining difference in housing prices is due to school quality differences between the zones. Black's approach suggest that models that do not control for omitted neighborhood characteristics overestimate the relationship between housing prices and school quality.

Black (1999) does not account for changes in neighborhood characteristics across school borders, but many researchers have used her model in part and added on to it in

order to control for differences in housing values at school boundaries in terms of income levels, building quality, square footage, and other house characteristics (Kane, Riegg, & Staiger, 2006). However, due to the limit of repeat sales data or information on boundary redistricting to provide the exogenous variation required, the boundary discontinuity approach is considered to be the best model.

Due to criticisms on the boundary discontinuity approach, many researchers have augmented the model by including demographic information at the Census block level (Chiodo, Hernandez-Murillo, & Owyang, 2010). In addition, nonlinear hedonic models have also been used to estimate the impact of school quality on housing prices. Chiodo, Hernandez-Murillo and Owyang found that the relationship between quality of public schools and housing prices is nonlinear because potential home buyers are heterogeneous in regards to their preferences for school quality and neighborhood characteristics and home buyers with a stronger preference for education quality may focus their search for a house in the highest-quality school zones. In contrast to previous studies that use the boundary discontinuity approach, they found that the price premium from school quality remains substantially large, particularly for neighborhoods associated with high-quality schools. They found that the price premium parents must pay to buy a house in an area associated with a better school increases as school quality increases. This is true even after controlling for neighborhood characteristics, such as the racial composition of neighborhoods.

School Segregation

The demographics of public schools in the United States have changed dramatically in recent years. From 1990 to 2010, the percentage of public school students who were White decreased by 13 percentage points (from 67 to 54 percent), and the percentage of those who were Hispanic increased by 11 percentage points (from 12 to 23 percent) and the percentage of those who were Black decreased by 2 percentage points (National Center for Education Statistics, 2011). Because of the shift in demographics, White students attend schools with increasing numbers of minority students, but remain relatively isolated from other racial and ethnic groups. The average White student attends a school where 78 percent of the students are also White. In comparison the average Black students attends a school where 30 percent of the students are White (Orfield & Lee, 2006).

Black and Hispanic students are more likely to attend low-income schools than White students. In 2003, 51 percent of Latino students, 47 percent of Black students, and five percent of White students attended schools where 75 percent or more of the students were eligible for free or reduced-lunch. In addition, these low-income schools do not provide the same educational opportunities as more affluent schools (i.e.: fewer resources, lower levels of student achievement, and less qualified teachers) (Orfield & Lee, 2006).

Research has stated that neighborhood segregation, in addition to school segregation, may have an impact on students' levels of academic achievement. This may occur because families choosing to live in different neighborhoods may differ on other characteristics that influence their children's academic performance. Card and Rothstein

(2006) found that school segregation affects Black students' achievement but that neighborhood characteristics may be a more important determinant of the Black-White test score gap than school characteristics.

In addition, the quality of teachers is not as high in predominantly minority schools as it is in majority White schools. School districts serving large concentrations of minority students received $908 less revenue per student from state and local funds than school districts servicing low concentrations of minority students (Wiener & Pristoop, 2006). Another study by Clotfelter, Ladd and Vigdor (2004) found that new teachers were overrepresented in North Carolina school districts with higher proportions of minority students. A study in New York found that 17 percent of minority students had teachers who were not certified to teach in any of their current teaching assignments, compared to four percent of White students (Lankford, Loeb, & Wyckoff, 2002).

Studies have shown that predominately minority schools often have fewer certified teachers and teachers with less experience. And since minority students are often in low-income schools, these students are also faced with low resources that impact their educational achievement. The school students attend is only one of the many factors that influence their academic achievement, which also include family, neighborhood, and housing conditions. However, these factors are often related to the school characteristics as well.

Title I and Teacher Quality

Title I was first enacted as part of the Elementary and Secondary Education Act of 1965 (ESEA) and Congress has reauthorized ESEA several times since then, with the

most recent reauthorization occurring in 2002 as the No Child Left Behind Act (NCLB). Title I provides funding and guidelines for providing an education to "educationally disadvantaged" children. Title I focuses on providing funding to school districts with high concentrations of students who are typically from poor families (McLaughlin, 1974).

The comparability provision of Title I requires that school districts must equalize educational services that are local and state sources fund before Title I funds can be issued by the federal government. This ensures that high needs schools receive more funds than other schools through Title I funds. However, there is evidence that Title I's comparability provision is not ensuring that students in Title I schools are receiving equal resources. Loopholes with respect to spending on teacher salaries allow for two schools in the same district to be considered comparable even if the teachers in one school are more experienced than those in another school (Luebchow, 2009). While there are several loopholes for comparability in Title I, these loopholes occur mainly because districts with staff salary differentials based on years of employment are exempt and the New York City Department of Education is one of those districts. This loophole allows for disparities in teacher quality in Title I and non-Title I schools.

If a school district decides to compare per-pupil teacher salary expenditures, it does not have to take into consideration the difference in spending on the salary of an experienced teacher. Because teacher salary schedules are based on years of teaching experience and education credentials, the difference in salaries between an inexperienced and experienced teacher within the same district is usually large. For example, in 2010 in the New York City Department of Education, a first-year teacher with a master's degree

is paid $51,425, while a veteran teacher with 10 years of experience and the same credentials is paid $72,990, a difference of $21,565 (New York City Department of Education, 2008).

To make matters more difficult, when schools report their teacher budgets, they use average salary costs and schools with the same number of teachers will report the same amount of money spent in terms of teachers' salaries. As a result, more affluent schools have a financial advantage that is linked to the qualifications and experience of their teachers because they do not report their salary gaps (Roza, Miller, & Hill, 2005).

Hypotheses of the Study

The release of value-added teacher data should impact housing prices in New York City in a positive way. In fact, elementary and middle school zones in New York City with high value added teachers should experience a greater increase in housing values in comparison to elementary and middle school zones in New York City with low value added teachers. It should hold that comparable houses within the elementary and middle school zones are valued differently if their neighborhood school have significantly different weighted average teacher quality ratings.

Furthermore, the release of value-added teacher data should effect the racial segregation across New York City school zones. Elementary and middle school zones in New York City with high value added teachers should have experienced an increase in population and a change in school and residential segregation with more affluent people moving into these school zones. The changes will also be reflected in the disparity in teacher quality between Title I and non-Title I schools.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

Data

As mentioned previously, school report cards have been a part of the school accountability process since the 1980s. New York City's School Progress Reports have served as their school report cards and have provided information about the quality of schools to residents and prospective residents of New York City since the 2006-2007 academic year. The School Progress Reports for elementary and middle schools are based mostly (60%) on improvement on the standardized exams, which gives poorly performing schools an advantage since they have more room to grow. School Progress Reports are based on the same standardized test scores as the teacher data reports.

Teacher quality value added scores are calculated using student growth on standardized test scores, and many teachers are not given a value added score. For instance, teachers who teach untested grades (i.e.: Pre-Kindergarten-Second grade), teachers who teach students who do not have prior test scores to measure growth (i.e.: Third grade), and teachers who do not teach Math or ELA (i.e.: Science, Gym, Art teachers). As a result, many elementary and middle schools do not have teacher quality scores for all of their teachers. In addition, some of the teachers who do teach these testable grades and subjects may not have teacher quality value added scores because they either did not teach the minimum number of students to be included in the model or they did not teach the same subject and grade for a minimum of three years as the New York City model requires. Therefore, estimating school quality using these teacher value added scores is a difficult task.

To date there has been limited literature that has estimated school quality based on teacher value added scores. Taking a simple average of the teacher quality value added scores for each school could lead to biased results for schools with a lot of teacher turnover because they will only have a small percentage of their teachers represented. Instead, the weighted average of teacher quality value added scores is used by assigning a weight to each average score by the percentage of teachers represented in the value added score. In addition to taking the weighted average of teacher quality, a robustness check is conducted using the top quartile of schools with a vast amount of teachers represented in the average teacher quality measures in comparison to the lowest quartile.

Housing Data

In order to examine the degree to which the teacher value added measures are capitalized into housing prices, a house price data set from New York City's Department of Finance's Rolling Sales File is used which provides property transaction data. It shows the value of real estate sold in New York City by address since 2003. The data is provided for all five boroughs and includes information such as neighborhood, building type, square footage and sales price.

This study uses the data from three of the five boroughs in New York City – the Bronx, Brooklyn, and Queens[4] – from June 2009 through October 2013. Only residential sales that were classified as tax class 1 and 2 at the time of the sale were kept for analyses.[5][6] Homes that were considered a transfer of ownership without a cash

[4] Manhattan and Staten Island are not included because there is not always a direct link between housing prices and school zones in these boroughs. Manhattan has inflated housing costs due to the number of elite private schools in the Upper East Side and the Upper West Side (Satow, 2015).

[5] Tax Class 1 includes most residential property, vacant land that is zoned for residential use and most condominiums that are not more than three stories. Tax Class 2 includes all other property that is primarily residential, such as cooperatives and condominiums. The two tax classes that were excluded (tax classes 3

consideration (i.e.: ownership from parents to children) had a sales price of $0 and were excluded from the analysis. In addition, sales prices that were more than one standard deviation away from the predicted value of the home based on the data within the Rolling Sales File were eliminated.

The data from March 2012 through October 2013 reflects home buyers in the data who had access to the February 2012 released value added teacher quality data. The data from June 2009 through February 2012 provide a baseline. The use of time series data on every residential real estate transaction controls for unobserved, time-invariant property-specific fixed effects. Moreover, neighborhood-year interactions are controlled for since the precise subdivision of each residential property sale can be identified. Therefore anything common to all properties in the same neighborhood at the same time is excluded from the analysis.

As seen in Table 1, there were 35,931 residential properties sold in the three boroughs in forty-two different neighborhoods (as defined by the Census) between June 2009 and February 2012. There were an additional 21,439 residential properties sold between March 2012 and October 2013 from forty-two different neighborhoods (Figure 1). The percent of sales in each season is relatively equal before and after the release and the distribution between the type of home and the borough remains the same (Table 2).

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and 4) include properties with equipment owned by a utility company or are offices, factories, warehouses, etc. Only 0.09% of all sales were in tax class 2.

[6] In addition to these sales being in either tax class 1 or 2 at the time of sale, they are currently in tax class 1 or 2 and therefore are still residential housing units.

Figure 1. Map of Neighborhoods and Borough Sections

Table 1. Descriptive Statistics of Residential Sales (*Sale Price is in $100,000)

	June 2009 - Feb 2012 (N=35,931)			Mar 2012 - Sept 2013 (N=21,439)			June 2009 - Oct 2013 (N=57,370)		
	Median	Mean	Std Dev	Median	Mean	Std Dev	Median	Mean	Std Dev
Sale Price*	4.43	4.56	2.21	4.46	4.65	2.20	4.43	4.60	2.21
Age	80.00	73.26	26.20	83.00	77.24	24.83	81.00	74.75	25.77
Units	1.00	1.50	0.50	1.00	1.49	0.50	1.00	1.49	0.49
Land Sq Ft	2500.00	2816.44	1306.93	2500.00	2839.66	1483.52	2500.00	2825.12	1390.49
Gross Sq Ft	1760.00	1878.38	1760.00	1885.18	712.02	777.19	1760.00	1880.92	701.82
Bronx	(N=3930)			(N=2306)			(N=6236)		
Sale Price*	3.83	3.68	1.61	3.55	3.41	1.46	3.71	3.58	1.56
Age	74.50	68.95	29.42	78.00	73.79	27.12	76.00	70.74	28.68
Units	2.00	1.59	0.49	2.00	1.59	0.49	2.00	1.59	0.49
Land Sq Ft	2500.00	2740.76	1537.02	2500.00	2869.02	2158.88	2500.00	2788.18	1793.20
Gross Sq Ft	1952.00	2083.64	743.68	1938.00	2069.48	797.76	1944.00	2078.41	764.09
Brooklyn	(N=10302)			(N=6921)			(N=17223)		
Sale Price*	5.07	5.21	2.32	5.07	5.27	2.34	5.07	5.23	2.33
Age	86.00	81.49	26.79	88.00	85.83	25.34	88.00	83.23	26.30
Units	2.00	1.65	0.48	2.00	1.65	0.48	2.00	1.65	0.48
Land Sq Ft	2000.00	2283.49	860.45	2000.00	2265.97	823.22	2000.00	2276.45	845.70
Gross Sq Ft	2000.00	2094.50	745.73	2000.00	2097.39	754.34	2000.00	2095.66	749.18
Queens	(N=21699)			(N=12212)			(N=33911)		
Sale Price*	4.32	4.41	2.18	4.42	4.54	2.12	4.35	4.46	2.16
Age	76.00	70.14	24.38	78.00	73.03	22.76	77.00	71.18	23.85
Units	1.00	1.41	0.49	1.00	1.38	0.48	1.00	1.40	0.49
Land Sq Ft	2700.00	3083.17	1357.25	2800.00	3159.26	1582.57	2700.00	3110.57	1442.89
Gross Sq Ft	1620.00	1738.59	622.77	1615.00	1730.11	625.68	1617.00	1735.54	623.82

Table 2. Distribution of Residential Sales

	June '09 – Feb '12 (N=35,931)	Mar '12 – Sept '13 (N=21,439)	June '09 - Oct '13 (N=57,370)
Fall	27.54%	20.85%	25.05%
Spring	17.63%	30.42%	22.41%
Summer	29.47%	33.70%	31.05%
Winter	25.35%	15.02%	21.49%
One Family Homes	50.24%	51.19%	50.59%
Two Family Homes	49.59%	48.40%	49.14%
Condos / Co-ops	0.01%	0.26%	0.10%
Bronx	10.94%	10.76%	10.87%
Queens	28.67%	32.28%	30.02%
Brooklyn	60.39%	56.96%	59.11%
Bronx	(N=3930)	(N=2306)	(N=6236)
Fall	26.72%	21.99%	24.97%
Spring	17.48%	30.62%	22.34%
Summer	29.39%	32.35%	30.48%
Winter	26.41%	15.05%	22.21%
One Family Homes	41.02%	41.24%	41.10%
Two Family Homes	58.79%	58.59%	58.71%
Condos / Co-ops	0%	0%	0%
Brooklyn	(N=10302)	(N=6921)	(N=17223)
Fall	26.75%	19.92%	24.01%
Spring	17.68%	30.21%	22.71%
Summer	29.10%	34.71%	31.35%
Winter	26.47%	15.16%	21.92%
One Family Homes	35.15%	35.15%	35.15%
Two Family Homes	64.73%	64.70%	64.72%
Condos / Co-ops	0%	0%	0%
Queens	(N=21699)	(N=12212)	(N=33911)
Fall	28.08%	21.17%	25.59%
Spring	17.64%	30.49%	22.27%
Summer	29.66%	33.39%	31.00%
Winter	24.62%	14.94%	21.13%
One Family Homes	59.07%	62.15%	60.18%
Two Family Homes	40.73%	37.24%	39.48%
Condos / Co-ops	0.02%	0.45%	0.17%

New York City Value Added Model Data

Elementary and middle school zoning areas have been mapped to the housing price panel using ArcGIS. Therefore, every property sold has elementary and middle school report card grades and school demographics, and properties sold from February 2012 on have an average teacher quality measure attached to it for the elementary and middle school. Overall, there were value added scores for 6,851 fourth through eighth grade ELA teachers and 7,565 fourth through eighth grade Math teachers from 811 public schools where residential property sales occurred between June 2009 and October 2013 in one of the three boroughs.[7] Over 50% of the teachers who received value added scores in these three boroughs taught either fourth or fifth grade (Table 3). This data will be used as an independent variable in order to estimate the impact that this information has had on housing prices in school zones.

Table 3. Teacher Value Added Descriptive Statistics

	Mean	Std. Dev.	Min	Max
% ELA Teachers	0.48	0.50	0	1
% Math Teachers	0.52	0.50	0	1
% 4th Grade Teachers	0.30	0.46	0	1
% 5th Grade Teachers	0.28	0.45	0	1
% 6th Grade Teachers	0.15	0.36	0	1
% 7th Grade Teachers	0.14	0.34	0	1
% 8th Grade Teachers	0.13	0.34	0	1
2009-2010 Value Added Score	49.23	28.66	0	99
Career Value Added Score	50.94	28.73	0	99
% in the Bronx	0.28	0.45	0	1
% in Brooklyn	0.39	0.49	0	1
% in Queens	0.33	0.47	0	1

[7] Some of these teachers are counted twice because in some grades, teachers are in self-contained classrooms and are responsible for teaching both Math and ELA.

The value added model in New York City uses a set of student and classroom variables to estimate the impact that teachers have on student achievement outcomes in their classrooms. Value added in New York City is measured in Math and ELA in grades four through eight at the teacher level. Teachers receive single-year value added measures that reflect student growth in 2007-2008, 2008-2009, 2009-2010 as well as multiple-year value added measures that reflect student growth over as many as four years. In addition, value added results were also computed for student subgroups within a teacher's classroom, such as English language learners and students with disabilities. The value-added model in New York City measures average achievement about teachers' students, controlling for prior achievement in both math and ELA and a large number of student and classroom characteristics (Value-Added Research Center, 2010). The New York Times published this data on its School Book website at the end of February 2012, and a snapshot of the data provided on the website is provided in Appendix A.

In short, the New York City Department of Education compared how well teachers' students did on tests with projected progress based on attendance rates, ethnicity, previous test scores, poverty level and other classroom and student level criteria. Teachers whose classes performed better than expected received higher ratings than those whose classes performed worse than expected. The expected score for each student is based on the average score that was observed among students with similar characteristics at the beginning of the year (i.e.: students with similar pretest scores and who were similar in terms of demographics and program participation) and who were in classrooms and schools with similar student characteristics.

It is important to note that not all outside factors were controlled for when looking at student characteristics. For instance, the educational achievement of parents was not included and neither was other demographic information about the parents like age or occupation. Studies have emphasized the significance of family and community networks and the role of social capital in children's adjustment to school (Coleman 1990). Not controlling for this could bias the teacher quality measures because children with parents with higher social capital would be expected to have higher growth rates than parents that do not. However, the model does control for poverty level which could be used as a proxy for parental socioeconomic status.

Another issue with the New York City value added is that it does not control for multiple teachers. It is common for students in middle schools to have more than one teacher teach core courses throughout the academic year. If more than one teacher taught a student, it is generally not possible to separate the effects of each teacher on these students related test score growth through statistical methods. The New York City value added model does not take multiple teachers into consideration and therefore, the model could be overestimating teacher effects based on the impact that another teacher actually had on that student during that year. Furthermore, the New York City value added model also does not adjust for school fixed effects which would control for unmeasured characteristics across different schools like curriculum.

Each teacher's value added estimate is the average difference between the actual test score and the expected score across all of the students assigned to that teacher. This is done using only the most recent year of data and using multiple years, and is done separately by subject and by grade. Value added at the teacher level is compared to two

groups of teachers: all teachers in the same grade, and teachers in the same grade with similar experience and students with similar characteristics. Teachers received a score between 0 and 99 that is meant to indicate where they stood compared to other teachers in the same grade and teachers in the same grade with similar experience. Based on these scores, teachers were given a rating: teachers with scores from 0-4 were rated Low; teachers with scores from 5-24 were rated Below Average; teachers with scores from 25-74 were rated Average; teachers with scores from 75-94 were rated Above Average; and teachers with scores from 95-99 were rated High. In order to avoid some error in the value added estimates, the value added model uses shrinkage techniques so that the value added estimates do not overstate or understate the effectiveness of some teachers because of chance events. Shrinkage techniques reduce the effects in sampling variation which is a problem with the way that New York City calculates its teacher quality value added measures because not all teachers are included in the overall sample – only teachers that teach for at least three years and who teach ELA or Math to grades four through eight. Shrinkage techniques should improve the value added estimates so that it is closer to the real value by reducing the mean square error of the predicted values (Value-Added Research Center, 2010).

As previously mentioned, taking a simple average of the teacher quality value added scores for each school could lead to biased results for schools with a lot of teacher turnover because they will only have a small percentage of their teachers represented. Instead, the weighted average of teacher quality value added scores are created by assigning a weight to each average score by the percentage of teachers represented in the value added score. In addition, when the New York Times School Book reported teacher

quality for schools, it not only provided the raw scores for each teacher by name for the 2009-2010 academic year and the teachers' careers, but they also calculated the percentage of teachers who are above average or high. The percentage of teachers who are above average or high within a school will also be used as an independent variable to determine the impact on housing prices to see if the impact on housing prices is statistically different than using the weighted average.

The test scores used in the value added model are scores from the New York State test examinations in Math and ELA. According to the New York City Department of Education website, elementary and middle school students in New York take annual State exams in three core academic subjects in order to assess their mastery of the New York State Learning Standards. ELA and Math State exams are administered in the Spring of each year to grades 3-8 (New York City Department of Education). The number of correct answers that a student gets on a test is converted into the student's scale score which makes it possible to compare performance on the tests across different grades. Scale scores are divided into four performance levels and the students who score at a level 1 or 2 have not met standards and may not be promoted to the next grade level while students who score at level 3 or 4 have met or exceeded State Learning Standards (New York City Department of Education). Scale scores were converted into z-scores, which have a mean of 0 and a standard deviation of 1 across the city. Scale scores in math and ELA are normalized within grade and year into z-scores.

The value added model is defined by four equations – a "best linear predictor" value added model defined in terms of true student post and prior achievement and three measurement error models for observed post and prior achievement:

(1) Student achievement: $y_{1t} = \zeta + \lambda y_{0i} + \lambda^{alt} y_{0i}^{alt} + \beta' X_i + \gamma' Z_i + \alpha' J_i + e_i$

(2) Posttest measurement error: $Y_{1i} = y_{1i} + v_{1i}$

(3) Same-subject pretest measurement error: $Y_{0i} = y_{0i} + v_{0i}$

(4) Other-subject pretest measurement error: $Y_{0i}^{alt} = y_{0i}^{alt} + v_{0i}^{alt}$

where y_{1i} is true post achievement; y_{0i} and y_{0i}^{alt} are true prior achievement in the same subject and in the other subject, with slope parameters λ and λ^{alt}; X_i is a vector of characteristics of student i (includes gender, race, current English language learner status (ELL), former ELL, free- and reduced- price lunch, disability[8], summer school enrollment, lagged absences and suspensions, retained in grade before pretest, change in school between pretest and posttest year, and new to the city in pretest year), with slope parameter vector β'; Z_i is a vector of characteristics of student i's classroom (includes class size, classroom averages in pretests and most of the student-level variable in X, and proportion of students new to city in the posttest year), with slope parameter vector γ'; J_i is a vector of teacher indicators such as years teaching and age; α is a vector of teacher value-added effects; e_i is the error in predicting post achievement given the explanatory variables included in the model; Y_{1i} is measured post achievement; v_{1i} is measurement error in post achievement; Y_{0i} and Y_{0i}^{alt} are measured prior achievement; and v_{0i} and v_{0i}^{alt} are measurement error in prior achievement. By substituting the measurement error equations into the student achievement, yields an equation defined in terms of measured student achievement:

(5) Measured achievement: $Y_{1i} = \zeta + \lambda Y_{0i} + \lambda^{alt} Y_{0i}^{alt} + \beta' X_i + \gamma' Z_i + \alpha' J_i + \varepsilon_i$

[8] The special education variable is defined by special education services recommended.

where the error term ε_i includes both the original error component and the measurement error components ($\varepsilon_i = e_i + v_{1i} - \lambda v_{0i} - \lambda^{alt} v_{0i}^{alt}$) (Value-Added Research Center, 2010).

In short, the New York City Department of Education compared how well teachers' students did on tests with projected progress based on attendance rates, ethnicity, previous test scores, poverty level and other classroom and student level criteria. Teachers whose classes performed better than expected received higher ratings than those whose classes worse than expected. The expected score for each student is based on the average score that was observed among students with similar characteristics at the beginning of the year (i.e.: students with similar pretest scores and who were similar in terms of demographics and program participation) and who were in classrooms and schools with similar student characteristics.

In addition to using teacher value added measures, teaching gap measures have been computed to compare Title I schools to non-Title I schools. Teaching gap measures have been calculated using a similar method found in Isenberg, et al (2013), by using a simple regression: (6) $V_j = \alpha + \delta Title\ I_{jk} + e_{jk}$, where V_j is the value added of teacher j. By regressing V_j on $Title\ I_{jk}$, a binary variable that takes a value of one for a teacher in a Title I school and a zero for a teacher in a non-Title I school. The estimated coefficient δ measures the estimated mean difference in teaching quality between Title I and non-Title I schools, with a positive δ indicating an inequitable gap and a negative δ indicating a compensatory gap.

School Report Card Data

The data on New York City's School Progress Reports is an important factor as well. The School Progress Reports contain data on school demographics and teacher information that could also explain some of the outside variables that impact teacher quality and neighborhood quality. In particular, the number of teachers in each school is needed to calculate the weights for each school to ensure that the value added teacher quality measures are accurately representing the school quality. In addition, information like the percentage of English Language Learners, or special education students could impact school quality as well. It may also impact a parent's decision to move into a particular school zone.

School demographics for each academic year from 2007-2008 to 2011-2012 are included in Table 4. Each school received a report card score that was then converted to a letter grade. Points were earned in the Student Progress, Student Performance, and School Environment categories and added together with any additional credit to get the overall report card score. The overall cut scores were determined based on a set grade distribution for each school type (elementary, middle or K-8: 25% As, 35% Bs, 30% Cs, 7% Ds, and 3% Fs. Because letter grades were determined by distributions, each year a report card score could convert into a different letter grade depending on the range of scores. On top of that, there are two possible ways where a school could have received a grade higher than what the score would have implied – a school with an average math and ELA proficiency in the top 33% citywide could not receive lower than a C, and schools that received an A in the previous year could not receive lower than a D. For

these reasons, the report card scores were not used since they are not clearly aligned to the report card grades.

Table 4. Descriptive Statistics of Schools

	2007-2008 (N=517)		2008-2009 (N=605)		2009-2010 (N=590)		2010-2011 (N=592)		2011-2012 (N=573)	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Report Card Score	57.75	14.54	66.46	13.57	65.52	15.16	46.87	14.62	48.56	13.90
Student Body	719.71	327.87	703.32	334.16	682.61	332.37	688.76	339.59	697.08	346.24
% Special Ed	16.82	5.59	17.03	5.61	17.66	5.70	17.62	5.46	17.51	5.39
% FRPL	73.83	18.16	76.67	17.51	78.57	17.39	74.18	18.83	73.05	19.94
% Black/ Hisp	76.48	28.04	75.11	28.67	75.29	28.76	74.89	28.90	74.20	29.05
% ELL	15.73	11.23	16.20	11.49	16.41	11.68	16.30	11.58	16.02	11.38
% in Bronx	31.14	46.35	30.25	45.97	31.36	46.43	30.91	46.25	30.37	46.02
% in Brooklyn	46.62	49.93	42.48	49.47	42.45	49.40	43.32	49.54	43.28	49.47
% in Queens	22.24	41.63	27.27	44.57	26.20	43.93	25.76	43.70	26.35	43.96
% with Grade A	37.33	48.20	56.54	39.33	57.86	36.49	24.65	37.67	23.15	37.66
% with Grade B	39.95	48.79	28.44	36.87	23.16	32.27	36.86	39.71	37.62	41.30
% with Grade C	16.68	37.07	10.97	25.94	17.36	28.09	32.83	39.86	30.92	39.42
% with Grade D	5.46	22.51	3.35	15.14	1.57	10.34	4.36	16.97	6.21	20.05
% with Grade F	0.58	7.60	0.69	7.40	0.05	1.24	1.30	8.98	2.09	12.18

Population Data

The U.S. Census Bureau conducts a monthly survey called the American Community Survey (ACS) which collects information on income, employment, age, educational attainment and enrollment, and rent prices. The data on income and employment will be linked to the teacher quality data through the Public Use Microdata Areas (PUMAs). PUMAs have very similar boundaries as the New York City Community School Districts and therefore, the link between Community School Districts and income related variables could easily be made. PUMAs are also very similar to community district boundaries in New York City and therefore can be used as a proxy to look at neighborhood characteristics. ACS 1 year estimates at the PUMA level for the 2007, 2008, 2009, 2010, 2011, and 2012 are mapped on to the school-level in order to estimate any differences in teacher quality and housing prices by income level. Using demographic information from the ACS, Diversity Indices were created for each of the neighborhoods using the following equation:

$$(7) Diversity\ Index = 1 - \left[\left(Prob(White)\right)^2 + \left(Prob(Black)\right)^2 + \left(Prob(Native\ American)\right)^2 + \left(Prob(Asian)\right)^2 + \left(Prob(Hispanic)\right)^2\right]$$

The calculation is the probability that any two people in a neighborhood are a different race/ethnicity (White, Black, Native American, Asian or Hispanic. An index of .75 means that there is a 75 percent chance that a random pair of people from the neighborhood is from different races. The diversity indices indicate the level of diversity within a neighborhood ranging from 0 to 0.8 where a neighborhood with a diversity index of 0 experienced no diversity in its population (that is, all residents are of the same

race/ethnicity) and a neighborhood with a diversity index of 0.8 experienced complete diversity.

Model 1 – Teacher Quality and Housing Prices

In order to investigate the impact of the release of value-added teacher data on housing prices, a model that reduces the probability that unobserved factors are impacting the change in housing prices elementary and middle school zones in the three boroughs – Bronx, Brooklyn, and Queens – is used. Using a model similar to that in Figlio and Lucas (2004) would control for a series of fixed effects using a hedonic model. The standard hedonic estimation involves an inelastic supply of housing with different types of consumers whose preferences differ. In equilibrium, all consumers with identical preferences and income can achieve the same level of satisfaction where price compensates for better services, such as education. A hedonic price function describes the equilibrium, where the sales price is described as a function of the housing characteristics and its location, and the price that is associated with each characteristic represents that of the marginal purchaser. The relationship is as follows:

$$(8)\log(price_{ismy}) = \beta_m + teacherquality_{sy} + housing_{smy} + schoolattributes_{smy} + schoolgrade_{sy} + \eta_{smy} + \varepsilon_{isnmy}$$

where $price_{ismy}$ is the sale price of house i in neighborhood n in school zone area s in season m in year y; $teacherquality_{sy}$ is the weighted average value-added teacher rating in school zone s in year y (these variables take on a value of zero prior to February 2012); $housing_{smy}$ is a vector variable that includes square footage, home type, age of structure in school zone s in season m in year y; $schoolattributes_{smy}$ is a vector

variable that includes school characteristics that are available through school report cards (i.e.:, percent FRPL); η_{smy} reflects neighborhood fixed effects in school zone s in season m in year y; and β_m reflects all factors that are relevant to sales in a particular season in order account for any seasonality in the housing markets.

This model estimates the impact of the teacher quality release on housing prices in New York City while holding previous school report card grades constant. In addition, it holds housing variables like square footage, home type, and age of structure constant. It is a fixed effects model holding both the Public-Use Microdata Areas and seasons constant to ensure that the neighborhood characteristics are taken into account when measuring the impact of the teacher quality release on housing prices. In addition, by using the estimated coefficients from Model 1 and regressing those against neighborhood demographic variables from the American Community Survey will help to answer how neighborhood demographics have changed in response to the teacher quality release.

Model 2- Teacher Quality and School Segregation

A similar model can be used when examining the second set of questions that look at the impact of the value-added teacher data on the racial/ethnic segregation of schools.

$$(9) School\ Diversity\ Indices = \gamma_s + \eta schoolattributes_s + \lambda teacherquality_s + \varepsilon_s$$

where the school diversity indices are calculated using equation (7); $schoolattributes_s$ is a vector variable that includes school characteristics for school zone s; and $teacherquality_s$ is the weighted average value-added teacher rating in school zone s.

This model measures the impact of the release of teacher quality ratings on changes in school demographics. The estimated coefficient λ measures the estimated impact of teacher quality on school diversity indices while controlling for other school attributes.

Model 3 - Teacher Quality Disparities and Title I School Status

The New York City value added rankings, and school report card data will also be used to calculate the proportions of teachers that have high value add in Title I schools in comparison to non-Title I schools. Schools are identified in the data as being eligible for participation in programs authorized by Title I. Comparing the proportions of high, above average, average, below average, and low quality teachers from Title I and non-Title I schools will examine if there is a disparity in teacher quality between Title I and non-Title I schools and a T-test will indicate the significance of the disparities. Previously the arguments for closing the Title I salary loophole were financial in nature. Here, we look to see if there is evidence of differences in teacher quality and if those differences are consistent with finance findings.

Investigating the differences between school and neighborhood quality between non-Title I schools with higher proportions of high quality teachers and Title I schools with lower proportions of high quality teachers and even looking at the differences between non-Title I schools with low proportions of high quality teachers and Title I schools with higher proportions of high quality teachers will help to examine what contributes to the disparities in teacher quality.

By estimating the value added teacher quality of Title I and non-Title I schools from the estimated coefficient δ in equation (6), the teaching quality gap was calculated by subtracting the average value added teacher quality for Title I schools from the average value added teacher quality for non-Title I schools. In other words, the teacher quality gap in each neighborhood would simply be how much the average value added teacher quality of non-Title I schools exceeds or is less than that of the average Title I school in the same neighborhood. Therefore, if Title I schools have lower value added teacher quality, the non-Title I schools would have a higher value added teacher quality estimate and the neighborhood's teacher quality gap would be greater than zero. If non-Title I schools have lower value added teacher quality then Title I schools would have a higher value added teacher quality estimate and the neighborhood's teacher quality gap would be less than zero.

In addition, using the real dollar accounting for salaries of total per pupil spending and Title I per pupil spending data when the teacher quality data was released and analyzing the relationship between school spending and teacher quality will provide some insight into whether or not schools with higher teacher quality are spending more total and Title I money than schools with lower teacher quality.

CHAPTER 4

TEACHER QUALITY AND HOUSING PRICES

Teacher Value Added Does Impact Housing Prices

As expected, the results show that the release of value added teacher quality scores does have an impact on housing prices in these three boroughs in New York City. Model 1 shows that the effect of teacher quality on housing prices is similar when looking at the impact of average career value added scores of elementary and middle school teachers in Math, ELA, and the average between the two subjects. Several regressions were done using the hedonic fixed effects model presented in Model 1. The regressions were done separately for elementary and middle school zones. For each school zone, three different types of regressions were done – all teachers, Math teachers and ELA teachers. As previously mentioned, different independent variables were used in Model 1 because the New York Times School Book website published career teacher value added measures, 2010 teacher value added measures, and the percentage of teachers who were rated above average or high. These data points were used as independent variables in Model 1. The unweighted and weighted average of both the career and 2010 value added measures were both included as well. There is a stronger impact on housing prices when looking at the teacher quality of elementary schools. Appendices B through E show the regression results for all three boroughs and overall for both ELA and math teachers in elementary schools and Table 5 summarizes the elementary school coefficients for the teacher value added in these regressions.

A ten percentage point increase in the average career value added of all teachers increased housing prices by 3.1% in elementary school zones. When looking at the

unweighted average career value added, there is little difference between the impact that the quality of Math and ELA teachers had on housing prices. Appendices F through M show the results for the overall regression and by borough for Math and ELA teachers, respectively, in elementary school zones. Math teachers in elementary school zones increased housing prices by 3.0% when a ten percentage point increase occurred in the average career teacher quality scores. A ten percentage point increase in ELA teacher average career value added increased housing prices by 2.9% in elementary school zones. These results would suggest that home buyers value the teacher quality of both ELA and Math elementary school unweighted career average teacher quality equally when buying homes in these three boroughs of New York City. This is not the case when using the weighted average of career teacher quality.

Table 5. Summary table of Coefficients (with T-stats underneath) from Regressions for Elementary School Teachers from Appendices B, F, and J

	All	Math	ELA
Average teacher career VAM	0.3085** (8.72)	0.3046** (8.84)	0.2925** (8.35)
Average teacher VAM in 2010	0.3122** (8.57)	0.3061** (8.65)	0.2976** (8.19)
% of Teachers Rated Above Average or High	0.5048** (7.62)	0.4200** (6.89)	0.34471** (7.25)
Weighted teacher career VAM	0.7783** (8.15)	0.7721** (8.31)	0.7299** (7.78)
Weighted teacher VAM in 2010	0.7921** (8.01)	0.7848** (8.16)	0.7494** (7.59)
* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)			

The impact on housing prices is similar when looking at the unweighted average value added of teachers in 2010. However, the impact on housing prices is stronger when looking at the percentage of teachers who are rated above average or high (i.e.: the top

quartile of all rated teachers). Overall, a ten percentage point increase in teachers rated above average or high at the zoned elementary schools increases housing prices by 5.0%. There were slightly different effects on housing prices based on differences in teacher quality for Math and ELA in this case. There is a 4.2% increase in housing prices for a ten-point percentage change in the percentage of Math teachers rated above average or high. The impact of ELA teacher quality on sales prices is lower at 3.4%. The difference between the two is not statistically significant and therefore, the results suggest that home buyers do not value Math teacher quality in the upper quartile more so than that of ELA teachers.

Using the weighted value added measures for teachers – where the averages are weighted using the percentage of total teachers who are actually rated – shows that there is a stronger impact on housing prices. A ten percentage point increase in the weighted average career value added of all teachers increased housing prices by 7.8% in elementary school zones. Math teachers in elementary school zones increased housing prices by 7.7% when a ten percentage point increase occurred in the weighted average of career teacher quality scores. A ten percentage point increase in ELA teachers weighted average career value added increase housing prices by 7.3% in elementary school zones. Using the Wald test, these increases of 4.4 to 4.7 percentage points higher were found to be statistically significant. This indicates that home buyers value teacher quality in elementary schools where a higher percentage of the teachers have been rated.

In addition, a Wald test was conducted to see if home buyers valued ELA and Math teachers differently and the results show that the difference between how much people value teacher quality of Math versus ELA teachers is statistically significant. This

would indicate that home buyers indeed value the weighted average teacher quality of ELA which suggests that home buyers indeed value the weighted average teacher quality of Math teachers more strongly than that of ELA teachers in elementary schools.

As previously mentioned, there is a statistically significantly stronger impact on housing prices when looking at the teacher quality of elementary schools. This is to be expected because as the teacher quality data was made public, New York City began implementing middle school choice in some districts and there is not necessarily a one-to-one match of residential choice and middle school attendance. Appendices N through Q show the regression results for all three boroughs and overall for both ELA and math teachers in middle schools and Table 6 summarizes the coefficients for the teacher value added in these regressions. Overall, housing prices increased by 2.4% for every ten

Table 6. Summary table of Coefficients (with T-stats underneath) from Regressions for Middle School Teachers from Appendices N, R, and V

	All	Math	ELA
Average teacher career VAM	0.2419** (5.74)	0.2451** (6.15)	0.1955** (4.65)
Average teacher VAM in 2010	0.2455** (5.84)	0.2407** (5.94)	0.2170** (5.21)
% of Teachers Rated Above Average or High	0.4200** (5.02)	0.3317** (4.84)	0.2642** (3.57)
Weighted teacher career VAM	0.4959** (6.19)	0.4897** (6.49)	0.4063** (5.04)
Weighted teacher VAM in 2010	0.5102** (6.33)	0.4904** (6.33)	0.4552** (5.67)
* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)			

percentage point increase in middle school career teacher quality. Math teachers in middle school zones increased housing prices by 2.5% in comparison to a 2.0% increase

for ELA middle school teachers for every ten percentage point increase in teacher quality. This small difference of 0.5 percentage points between ELA and Math is statistically significant and indicates that parents value middle school Math teachers more so than ELA teachers, which is similar to how home buyers value Math elementary school teachers more so than ELA elementary school teachers.

Similar to the results for elementary schools, the effect on housing prices is similar when looking at the unweighted average value added of teachers in 2010, but the impact on housing prices is stronger when looking at the percentage of teachers in the top quartile. Overall, a ten percentage point increase in teachers rated above average or high at zoned middle schools increases housing prices by 4.2%. There were different effects on housing prices based on differences in teacher quality for math and ELA teachers. There was a 3.3% increase in housing prices for a ten-point percentage change in the percentages of Math teachers rated above average or high. The impact of ELA teacher quality is lower at 2.6%. The difference between the two may imply that parents favor higher quality math teachers over ELA teachers.

Using the weighted value added measures for teachers shows that there is a stronger impact on housing prices. A ten percentage point increase in the weighted average career value added of all teachers increased housing prices by 5.0% in middle school zones. Math teachers in middle school zones increased housing prices by 4.9% when a ten percentage point increase occurred in the weighted average of teacher quality scores. A ten percentage point increase in middle school ELA teachers weighted average career value added increase housing prices by 4.1% in middle school zones. These increases are 2.1 to 2.6 percentage points higher and statistically significant. This

indicates that home buyers value teacher quality in middle schools where a higher percentage of the teachers have been rated.

The difference between how much people value teacher quality of Math versus ELA teachers is statistically significant. This is similar to the findings for elementary school teachers. This would indicate that home buyers indeed value the weighted average teacher quality of Math teachers more strongly than that of ELA teachers in middle schools.

Overall, the results from Model 1 show that the teacher quality of elementary teachers had a stronger impact on housing prices than the teacher quality of middle school teachers. The results also indicate that home buyers favor higher quality Math teachers over ELA teachers. Furthermore, home buyers value teacher quality in schools where a higher percentage of teachers received value added scores.

In order to verify that these results reflect causation and not causation, the regressions were run with the value added measures included for all the housing data. The teacher quality data that was released was from the 2009-2010 school year. The results in Table 7 show that the impact of value added is a lot lower when it is included for all the housing prices. Although the coefficients are positive, they are not statistically significant. In fact, when looking at the coefficients for the unweighted averages, it shows that a 10% increase in unweighted elementary school teacher quality increases housing prices by only 0.7%, which is statistically significantly less than 3.1% when looking at the impact since the release. These results provide some evidence that the release of the teacher quality data is causing the increase in housing prices and it is not just occurring at the same time as the release.

Table 7. Comparison of Coefficients (with T-stats underneath) from Regressions for Elementary School Teachers

	VAM=0 before Feb 2012	VAM included for all sales
Average teacher career VAM	0.3085** (8.72)	0.0695 (1.04)
Average teacher VAM in 2010	0.3122** (8.57)	0.0656 (0.94)
Weighted teacher career VAM	0.5048** (7.62)	0.2434 (1.71)
Weighted teacher VAM in 2010	0.7783** (8.15)	0.1917 (1.29)
* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)		

A robustness check was conducted using the schools with that had 25% or more its teachers included in the released teacher quality scores in comparison to schools with 25% or less of its teachers rated using unweighted elementary school teacher quality. For all elementary school teachers, ELA elementary school teachers and Math elementary school teachers, impact on housing prices was significantly higher in areas where 75% or more of its teachers received a value added teacher quality score than it was in areas where 25% or less of its teachers received a value added teacher quality score. The difference in the impact ranged from 4.5 percentage points to 6.1 percentage points (Table 8). This also indicates that home buyers value teacher quality in elementary schools where a higher percentage of teachers received value added scores.

Table 8. Coefficients and Wald Test Results for Top and Bottom Quartile Elementary School Teachers (T-Stats Underneath)

	Top Quartile	Bottom Quartile	Difference	Chi Squared	Prob > chi^2
All	0.65* (2.12)	0.17 (1.57)	0.48	4.07	0.0438
ELA	0.76* (2.13)	0.15 (1.29)	0.61	5.13	0.0235
Math	0.58* (2.12)	0.13 (1.41)	0.45	4.54	0.0331
*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (Dependent variable is weighted career teacher quality)					

The robustness check of areas with the 75% or more of teachers rated and 25% or less of teachers rated for middle schools was not successful because only eight different neighborhoods had schools with 25% or less of the teachers receiving a value added teacher quality score. In contrast, there were thirty-four of forty-two different neighborhoods in the three boroughs that had teachers with 25% or less of their teachers receiving a value added teacher quality score. Because of the fact that only eight neighborhoods were in this sample, the robustness check was unsuccessful and the results were highly singular. Instead of using the bottom and top 25% of teachers with ratings, the robustness check for middle school teachers was conducted using the top and bottom 45% of teachers who received a value added teacher quality rating.

For all middle school teachers, ELA middle school teachers and Math middle school teachers, impact on housing prices was significantly higher in areas where 55% or more of its teachers received a value added teacher quality score than it was in areas where 45% or less of its teachers received a value added teacher quality score. In fact, the impact of the release of middle school teacher quality on housing prices ranges from 3.0% to 3.6% for areas that have schools where 55% or more of its teachers received a value added teacher quality score. However, areas with schools that have 45% of its

middle school teachers with a value added teacher quality score have a negative impact on housing prices and decrease housing prices from 0.2% to 0.7%, The difference in the impact ranged from 3.2 percentage points to 4.1 percentage points (Table 9). This again indicates that home buyers value teacher quality in middle schools where a higher percentage of teacher received value added scores.

Table 9. Coefficients and Wald Test Results for Top and Bottom 45% Middle School Teachers (T-stats underneath)

	Top 45%	Bottom 45%	Difference	Chi Squared	Prob > chi2
All	0.36** (5.38)	-0.04 (-0.32)	0.4	8.52	0.0035
ELA	0.30** (4.27)	-0.02 (0.18)	0.32	5.81	0.0159
Math	0.34** (5.70)	-0.07 (-0.61)	0.41	10.47	0.0012
*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (Dependent variable is weighted career teacher quality)					

Differences by Borough

While these trends found in the results from Model 1 are consistent in all three boroughs, the impact of teacher quality on housing prices is not uniform throughout the three boroughs. For every ten percentage point increase in the unweighted average career teacher quality in elementary schools, housing prices increase by 3.3%, 2.9% and 2.6% for Queens, the Bronx, and Brooklyn, respectively. The impact on housing prices is higher when looking at the weighted average career teacher quality in elementary schools. For every ten percentage point increase in the weighted average career teacher quality in elementary schools, housing prices increase by 8.4%, 8.7%, and 6.1% for Queens, the Bronx, and Brooklyn, respectively.

Similar to the overall results, the impact on housing prices is not as strong when looking at teacher quality in middle schools. As seen in Table 10, for every ten percentage point increase in the unweighted average career teacher quality in middle schools, housing prices increased by 2.9%, 1.9%, and 2.0% in Queens, the Bronx, and Brooklyn, respectively. And for every ten percentage point increase in weighted average career teacher quality in middle schools, housing prices increased by 5.5%, 5.2% and 4.0% in Queens, the Bronx and Brooklyn, respectively.

Table 10. Summary table of Coefficients from Regressions for Elementary and Middle School teachers by Borough from Appendices B, C, D, E, N, M, N, and O

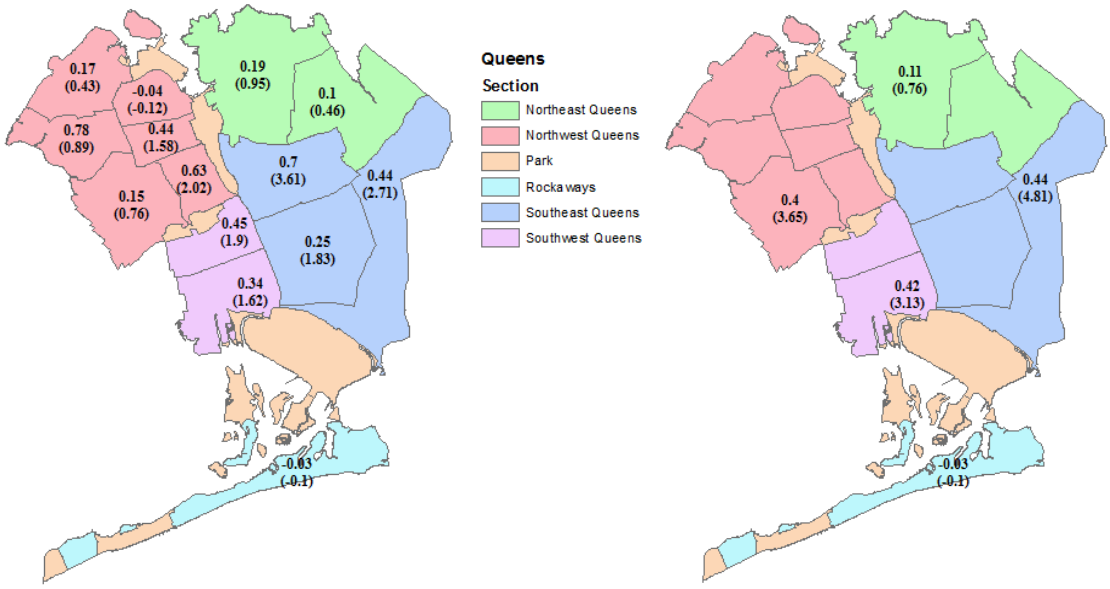
	Unweighted Career Teacher Quality		Weighted Career Teacher Quality	
	Elementary School Zones	Middle School Zones	Elementary School Zones	Middle School Zones
Bronx	2.9%*	1.9%	8.7%*	5.2%
Brooklyn	2.6%**	2.0%**	6.1%**	4.0%**
Queens	3.3%**	2.9%**	8.4%**	5.5%**
Overall	3.1%**	2.4%**	7.8%**	5.0%**
*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (Dependent variable is weighted career teacher quality)				

Queens

Housing prices in Queens increase at a higher rate than in the other boroughs when looking at the impact of unweighted average teacher quality in both elementary and middle schools. In Queens, a ten percentage point increase in the unweighted career average teacher quality rating increases housing prices by 3.3%, which is 0.2 percentage points higher than the overall housing increase for all three boroughs. Housing prices increase as high as 7.8% and decrease as low as -0.4% in Queens neighborhoods for every ten percentage point increase in the unweighted average career teacher quality at

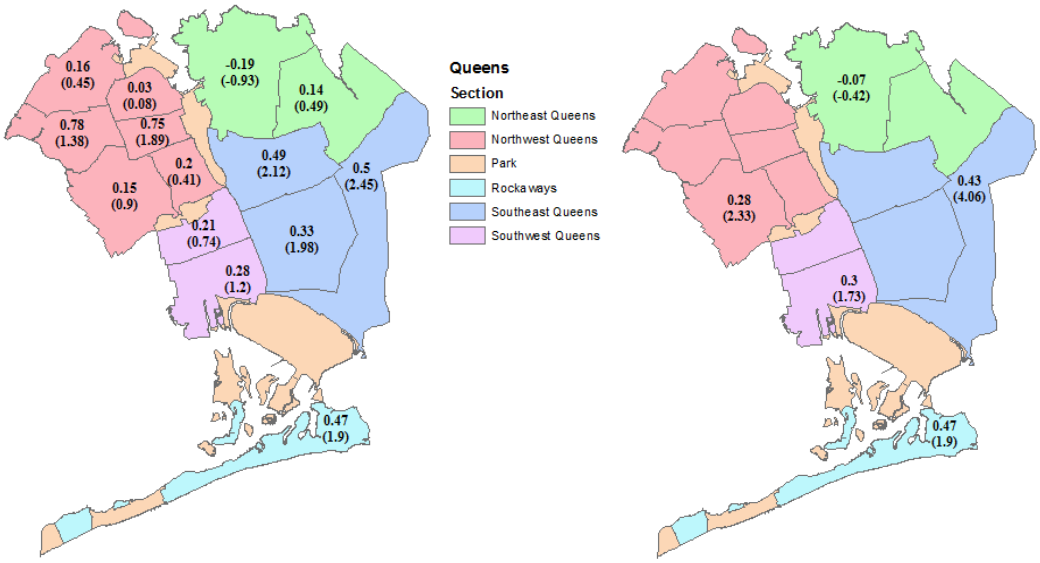
elementary schools (Appendix Z). The differences are related to the position of neighborhoods in relation to Queens Boulevard. The Northwest, Southeast, and Southwest sections of Queens experienced the largest average increases in housing prices at 4.0%, 4.4%, and 4.2%, respectively, for every ten percentage point increase in the unweighted average career teacher quality for elementary school zones. Housing prices in Northeast Queens increased by 1.1% and decreased by 0.3% in the Rockaways for every ten percentage point increase in the unweighted average career teacher quality for elementary school zones (Appendix LL).

Figure 2. Maps of Coefficients (with T-stats) for Unweighted Average Elementary Teacher Quality in Queens Neighborhoods by PUMA (left) and borough section (right) which summarize coefficients from Appendices Z and LL



A ten percentage point increase in the unweighted average career teacher quality rating in Queens middle school zones increases housing prices by 2.9%, which is 0.5 percentage points higher than the overall housing increases for all three boroughs.

Figure 3. Maps of Coefficients (with T-stats) for Unweighted Average Middle School Teacher Quality in Queens Neighborhoods by PUMA (left) and borough section (right) which summarize coefficients from Appendices AA and MM

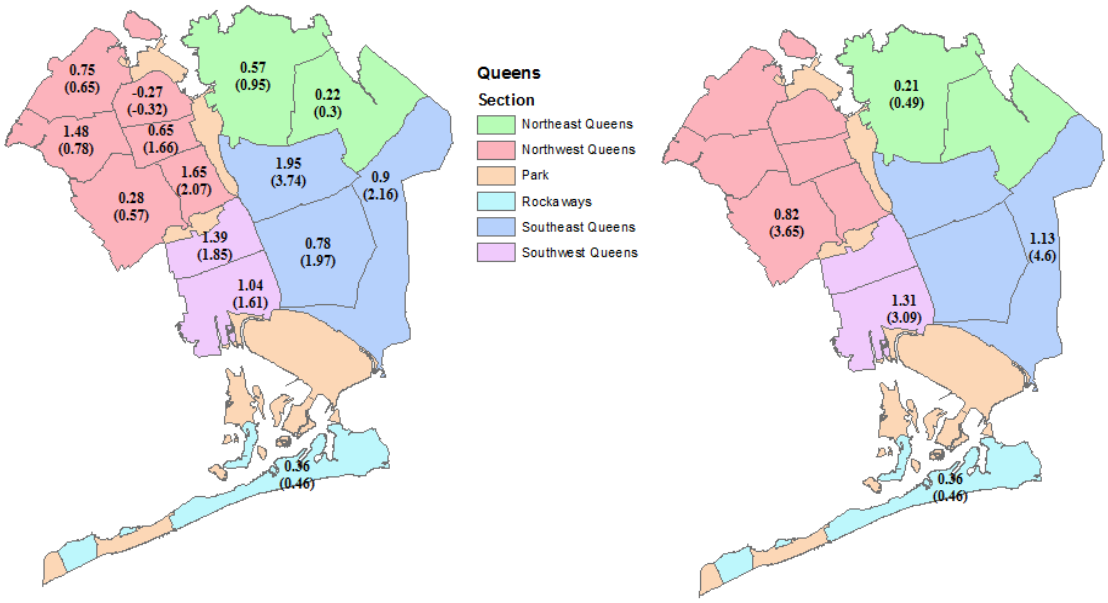


Similar to the results for elementary school zones, housing prices increase as high as 7.8% and decrease as low as 1.9% (Appendix AA) in Queens neighborhoods for every ten percentage point increase in the unweighted average career teacher quality at middle schools. These differences are also related to the position of the neighborhood to Queens Boulevard. The Southeast and Southwest sections of Queens experienced two of the largest average increases in housing prices at 4.3% and 3.0%, respectively, for every ten percentage point increase in the unweighted average career teacher quality at middle school zones. Housing prices in Northwest Queens increased by 2.8% and decreased by 0.7% in Northeast Queens for every ten percentage point increase in the unweighted average career teacher quality at middle school zones. In contrast to the elementary school results, the housing prices in the Rockaways increase by 4.7% for every ten percentage point increase in the unweighted average career teacher quality in middle school zones. This is the highest increase in housing prices, which is in direct contrast

with the 0.3% decrease experienced using the unweighted average career teacher quality in elementary school zones (Appendix MM).

The results for weighted average career teacher quality are slightly different than the unweighted average career teacher quality. A ten percentage point increase in the weighted average career teacher quality of elementary school zones increases housing prices by 8.4%, which is 0.6 percentage points higher than the overall housing increase for all three boroughs. When looking at the impact of weighted average career teacher quality at elementary schools, housing prices increase as high as 19.5% and decrease as low as -2.7% in Queen's neighborhoods for every ten percentage point increase. (Appendix BB).

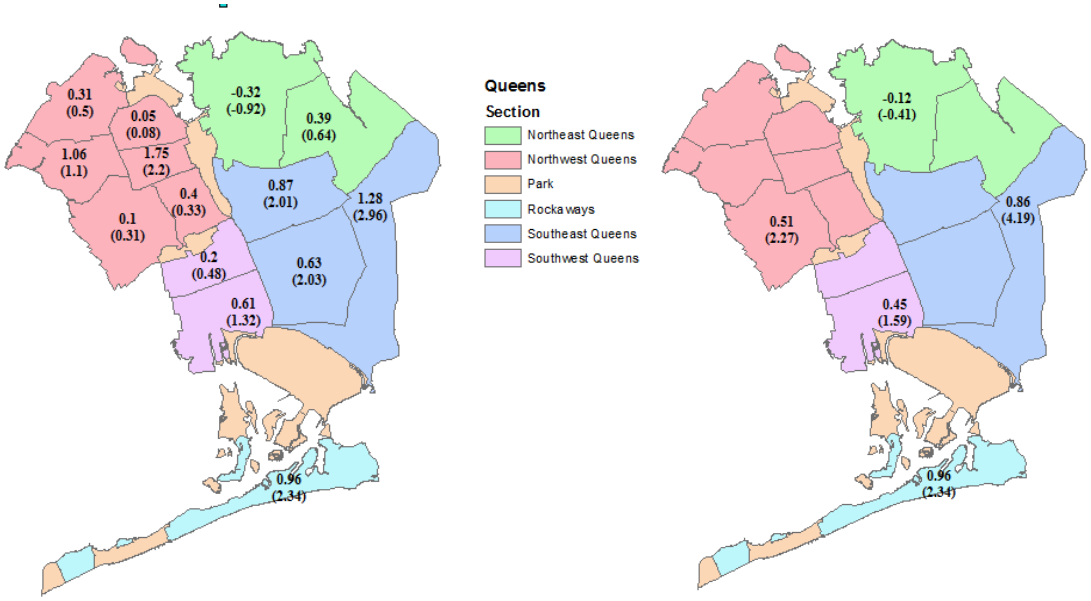
Figure 4. Maps of Coefficients (with T-stats) for Weighted Average Elementary Teacher Quality in Queens Neighborhoods by PUMA (left) and borough section (right) which summarize coefficients from BB and NN



Similar to the results for unweighted average career teacher quality, the difference in the impact of teacher quality on housing prices in Queens is related to the position of the neighborhood to Queens Boulevard. The housing prices in the southern half of

Queens increase by 11.5% (3.1 percentage points higher than the overall for Queens) for every 10 percentage point increase in the weighted average teacher quality at zoned elementary while the northern half of Queens increases by 6.4% (2.0 percentage points lower than the overall for Queens). Separating the borough further into five distinct areas – Southeastern, Southwestern, Northeastern, Northwestern and the Rockaways – it is clear that the area of Queens that teacher quality has the least impact on housing values is the Northeastern section because it only increases by 2.2% while the Southeastern, Southwestern and Northwestern sections increase by 11.3%, 13.1% and 8.2% respectively (Appendix NN).

Figure 5. Maps of Coefficients (with T-stats) for Weighted Average Middle School Teacher Quality in Queens Neighborhoods by PUMA (left) and borough section (right) which summarize coefficients from Appendices CC and OO



A ten percentage point increase in the weighted average career teacher quality in Queens middle school zones increases by 5.5%, which is 0.5 percentage points higher than the overall housing increases for all boroughs. The results using weighted averages were stronger than the results using unweighted averages; however the results were not as

strong for middle school zones as they were for elementary school zones. Housing prices increase as high as 17.5% and decrease as low as 3.2% (Appendix CC) in Queens neighborhoods for every ten percentage point increase in the weighted average career teacher quality at middle schools. These differences are also related to the position of the neighborhood to Queens Boulevard. The Southeast, Southwest, and Northwest sections of Queens experienced three of the largest average increases in housing prices at 8.6%, 4.5%, and 5.1%, respectively, for every ten percentage point increase in the weighted average career teacher quality at middle school zones. Housing prices in decreased by 1.2% in Northeast Queens for every ten percentage point increase in the weighted average career teacher quality at middle school zones. In contrast to the elementary school results but similar to the middle school results, the housing prices in the Rockaways increase by 9.6% for every ten percentage point increase in the weighted average career teacher quality in middle school zones. This is the highest increase in housing prices, which is in direct contrast with the 0.3% decrease experienced using the unweighted average career teacher quality in elementary school zones (Appendix OO).

The Northeastern section of Queens, which had the lowest increase in housing prices since the teacher quality release (2.2%), had higher average household income, housing values, and educational attainment than the rest of the sections in Queens before the release of the teacher quality data. The Northeastern section of Queens is also the only part of Queens to have the average value of housing prices increase (0.3%) since the teacher quality data was released. The three areas of Queens with the largest increases in housing prices due to the release Southwestern section of Queens, which had the largest

increase in housing prices since the teacher quality release (13.1%) experienced a decrease in average housing values of 5.1% (Table 11).

Table 11. Percent Change in Demographics in Queens Neighborhoods Before and After Value Added Data Release

	Average Household Income	Average Housing Prices	% of Pop. with at least a BA Degree	Diversity Indices	% of Pop. who were White	% of Pop. who were Black	% of Pop. Hispanic
Queens	*2.2%*	*-3.3%*	*5.2%*	*-1.4%*	*-2.6%*	*1.1%*	*5.6%*
Northeast	**-3.6%**	**0.3%**	**-21.2%**	**1.8%**	**-18.1%**	**59.2%**	**47.8%**
Flushing, Murray Hill & Whitestone	-5.2%	5.8%	-20.6%	2.3%	23.3%	7.9%	57.1%
Bayside, Douglaston & Little Neck	-0.9%	-6.8%	-19.7%	0.1%	7.3%	532.4%	19.1%
Northwest	**2.6%**	**-5.5%**	**18.2%**	**-2.8%**	**-2.6%**	**21.9%**	**7.2%**
Astoria & Long Island City	21.9%	6.9%	56.3%	-10.8%	25.7%	3.1%	9.2%
Jackson Heights & North Corona	1.9%	-9.2%	9.2%	-8.2%	4.7%	45.2%	4.0%
Elmhurst & South Corona	-6.6%	-9.3%	3.1%	-11.0%	23.8%	41.4%	16.3%
Forest Hills & Rego Park	0.1%	-13.6%	14.1%	4.0%	1.2%	989.9%	1.2%
Sunnyside & Woodside	-1.5%	-4.2%	10.8%	-3.5%	5.9%	63.5%	11.0%
Ridgewood, Glendale & Middle Village	-4.7%	-4.6%	-4.4%	-2.8%	2.1%	48.6%	3.0%
Rockaways	**9.8%**	**-10.0%**	**1.8%**	**2.7%**	**-13.1%**	**5.9%**	**-14.1%**
Southeast	**4.0%**	**-1.2%**	**13.2%**	**2.0%**	**15.5%**	**-6.7%**	**-12.9%**
Queens Village, Cambria Heights & Rosedale	-3.3%	0.4%	1.2%	5.2%	20.2%	9.3%	19.7%
Briarwood, Fresh Meadows & Hillcrest	12.1%	0.0%	-0.9%	-3.6%	5.8%	18.6%	1.4%
Jamaica, Hollis & St. Albans	8.1%	-5.9%	34.2%	-10.0%	2.1%	12.5%	38.8%
Southwest	**3.5%**	**-5.1%**	**-4.1%**	**-0.3%**	**14.1%**	**-4.5%**	**-2.5%**
Richmond Hill & Woodhaven	6.4%	-7.8%	-6.9%	-1.3%	12.9%	38.9%	3.6%
Howard Beach & Ozone Park	0.8%	-2.5%	0.6%	-0.6%	11.6%	16.8%	4.3%

Although the Northeastern section of Queens is more affluent and this may play a role in pricing out potential home buyers who want to move to this area for the teacher quality, the other sections of Queens do experience a positive change in average household income and average educational attainment since the time of the teacher quality release while Northeast Queens does not. In fact, the Northeastern section of Queens experiences a decrease of 3.6% in household income since the teacher quality data was released (Table 11).

While the Northeastern section of Queens experiences a 10.0% decrease in household income since the teacher quality data was released, the Southeastern and Southwestern sections experienced increases of 0.2% and 2.6% respectively[9]. Furthermore, the average household income for the Southeastern section of Queens now exceeds that of the Northeastern section of Queens (Tables 11 and 12).

At the time of the teacher quality release, the Northeastern section of Queens had a higher proportion (28.7%) of its residents that had at least a Bachelor's degree, which was higher than the rest of the areas in Queens (ranging from 13.5% to 21.1%). Similar to what occurred with the average household income, the Northeastern section experienced decreases in both the percentage of people with Bachelor's and graduate degrees (23ng.0% and 19.3% respectively) since the release of the teacher quality data. The Southeastern and Northwestern experienced increases in the percentage of people with Bachelor's and graduate degrees. In fact, the growth in the percentage of people with a Bachelor's or graduate degree in Northwest and Southeast Queens caused it to exceed that of the Northeast with 24.8% of Northeast and 22.9% of Southeast Queens

[9] The household income of Northwestern section of Queens increased slightly by less than 0.1% since the teacher quality data was released.

Table 12. Demographics in Queens Neighborhoods Before and After Value Added Data Release (*Income and Housing Prices is in $100,000)

	Average Household Income*		Average Housing Prices*		% of Pop. with at least a BA Degree		% of Pop. who are White		% of Pop. who are Black		% of Pop. who are Hispanic	
	2011	2013	2011	2013	2011	2013	2011	2013	2011	2013	2011	2013
Queens	*0.69*	*0.70*	*4.72*	*4.57*	*0.21*	*0.22*	*0.25*	*0.24*	*0.17*	*0.17*	*0.31*	*0.33*
Northeast	**0.76**	**0.74**	**5.42**	**5.43**	**0.28**	**0.22**	**0.32**	**0.26**	**0.01**	**0.02**	**0.16**	**0.23**
Flushing, Murray Hill & Whitestone	0.72	0.68	5.25	5.55	0.24	0.19	0.28	0.21	0.02	0.02	0.16	0.25
Bayside, Douglaston & Little Neck	0.85	0.85	5.65	5.27	0.38	0.30	0.41	0.38	0.00	0.03	0.14	0.17
Northwest	**0.65**	**0.66**	**4.90**	**4.63**	**0.20**	**0.24**	**0.30**	**0.29**	**0.04**	**0.05**	**0.43**	**0.47**
Astoria & Long Island City	0.58	0.71	6.09	6.51	0.25	0.39	0.43	0.54	0.07	0.07	0.31	0.28
Jackson Heights & North Corona	0.56	0.57	4.17	3.79	0.13	0.15	0.09	0.09	0.05	0.03	0.67	0.70
Elmhurst & South Corona	0.58	0.55	4.44	4.03	0.12	0.12	0.06	0.05	0.08	0.11	0.53	0.62
Forest Hills & Rego Park	0.81	0.81	4.64	4.01	0.40	0.45	0.56	0.55	0.01	0.06	0.18	0.18
Sunnyside & Woodside	0.69	0.68	5.01	4.81	0.24	0.27	0.26	0.24	0.01	0.01	0.38	0.42
Ridgewood, Glendale & Middle Village	0.66	0.63	5.18	4.95	0.15	0.14	0.46	0.47	0.01	0.02	0.43	0.44
Rockaways	**0.64**	**0.70**	**4.92**	**4.43**	**0.14**	**0.14**	**0.29**	**0.25**	**0.40**	**0.43**	**0.28**	**0.24**
Southeast	**0.72**	**0.75**	**4.13**	**4.08**	**0.20**	**0.23**	**0.12**	**0.14**	**0.47**	**0.44**	**0.20**	**0.17**
Queens Village, Cambria Heights & Rosedale	0.89	0.86	3.94	3.96	0.20	0.21	0.12	0.14	0.57	0.52	0.11	0.14
Briarwood, Fresh Meadows & Hillcrest	0.70	0.78	4.96	4.96	0.31	0.31	0.29	0.27	0.14	0.11	0.23	0.23
Jamaica, Hollis & St. Albans	0.58	0.63	3.79	3.56	0.12	0.16	0.01	0.01	0.59	0.67	0.25	0.15
Southwest	**0.69**	**0.72**	**4.44**	**4.22**	**0.18**	**0.17**	**0.22**	**0.25**	**0.11**	**0.10**	**0.35**	**0.34**
Richmond Hill & Woodhaven	0.67	0.71	4.37	4.03	0.20	0.18	0.16	0.18	0.10	0.06	0.46	0.44
Howard Beach & Ozone Park	0.72	0.72	4.50	4.38	0.15	0.16	0.27	0.31	0.12	0.14	0.25	0.26

having a Bachelor's or graduate degree compared to 22.4% of the Northeast (Tables 11 and 12).

The Southeastern and Southwestern areas of Queens experienced the highest impact on housing prices as a result of the teacher quality release and the Northeast Queens experienced the smallest impact on housing prices. Before the release, Southeast and Southwest Queens had the smallest portion of White residents in the borough at 11.8% and 21.7%. In contrast, Northeast Queens had the highest percentage of White residents (29.8%). Since the release of the teacher quality data, the only areas of Queens where the percentage change of White residents increased were Southeast and Southwest Queens.

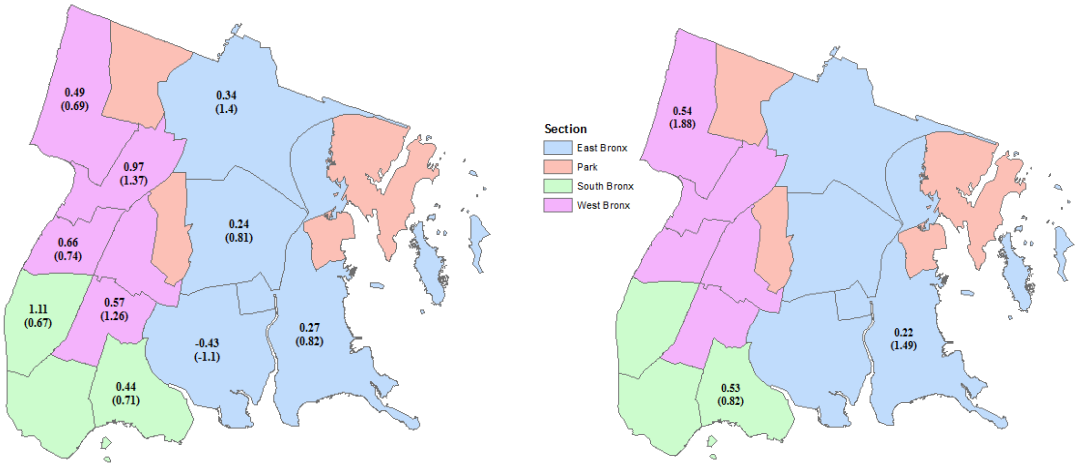
Additionally, Southeast Queens had the highest portion of Black residents in comparison to the other areas in Queens (46.9%) before the release of the teacher quality data. The percentage change of Black residents in both Southeast and Southwest Queens decreased since the release of the teacher quality data by 6.7% and 4.5%, respectively. These are the only two areas on Queens that experienced a decrease in the Black population. However, in Northeast Queens, the Black population increased by 59.2%. Similar findings occur for the Hispanic population, where the percentage of Hispanics in Southeast and Southwest Queens decreased by 12.9% and 2.5%, respectively, and the Hispanic population increased by 47.8% in Northeast Queens (Tables 11 and 12). These results imply that the areas in Queens that had the highest increases in housing prices since the release of the teacher quality data had an increase in their White population and a decrease in their Hispanic and Black populations.

The Bronx

For the most part, housing prices in the Bronx increase at a higher rate than Brooklyn, but a lower rate than Queens (Table 9). When looking at the impact of the weighted average career teacher quality, the impact on housing prices in the Bronx is higher than the overall average for all three boroughs and in elementary schools, it's higher than the rate in Queens. In the Bronx, a ten percentage point increase in the unweighted career average teacher quality rating increases housing prices by 2.9%, which is 0.2 percentage points lower than the overall housing increase for all three boroughs. Housing prices increase as high as 11.1% and decrease as low as -4.3% in the neighborhoods in the Bronx for every ten percentage point increase in the unweighted average career teacher quality at elementary schools (Appendix DD). The differences are related to the position of neighborhoods in the Bronx. The West and South Bronx experienced the largest average increased in housing prices at 5.4% and 5.4%, respectively, for every ten percentage point increase in the unweighted average career teacher quality for elementary school zones. Housing prices in East Bronx increased by 2.2% for every ten percentage point increase in the unweighted average career teacher quality for elementary school zones (Appendix LL).

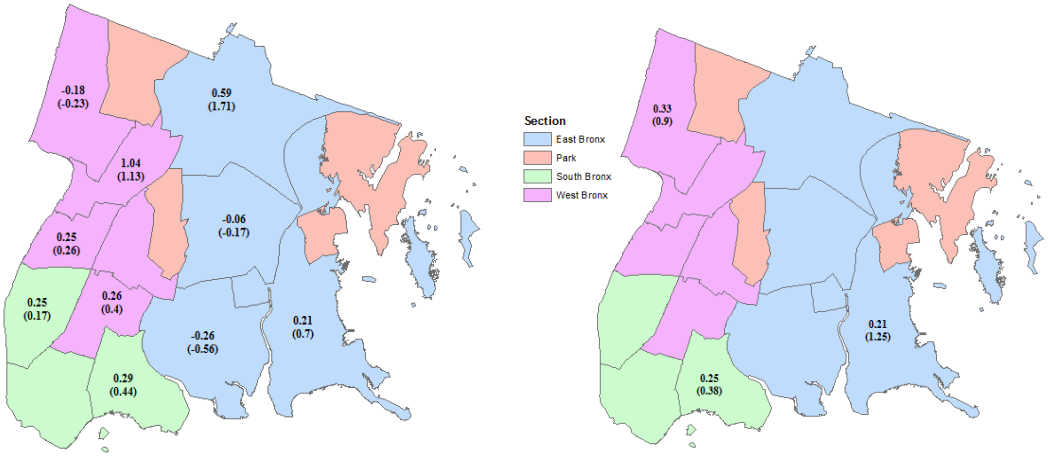
A ten percentage point increase in the unweighted average career teacher quality rating in the Bronx middle school zones increases housing prices by 1.9%, which is 0.5 percentage points lower than the overall housing increases for all three boroughs and the lowest for all three boroughs (Table 10). Similar to the results for elementary school zones, housing prices increase as high as 10.0% and decrease as low as 2.6% (Appendix AH) in Bronx neighborhoods for every ten percentage point increase in the unweighted

Figure 6. Maps of Coefficients (with T-stats) for Unweighted Average Elementary Teacher Quality in Bronx Neighborhoods by PUMA (left) and borough section (right) which summarize coefficients from Appendices DD and LL



average career teacher quality at middle schools. Unlike the results from the elementary school regressions for the Bronx, the results are not vastly different for the neighborhoods based on the location in the Bronx. While the West and South Bronx experienced the highest increase in housing prices at 3.3% and 2.5%, respectively, for every ten percentage point increase in the unweighted average career teacher quality at middle school zones, the results are not statistically significant. In addition, housing prices in the East Bronx increased by 2.1% for every ten percentage point increase in the unweighted average career teacher quality at middle school zones, which is only 0.4 percentage points less than the increase in the South Bronx and the results are also not statistically significant (Appendix MM).

Figure 7. Map of Coefficients (with T-stats) for Unweighted Average Middle School Teacher Quality in Bronx Neighborhoods by PUMA (left) and borough section (right) which summarize coefficients from Appendices EE and MM

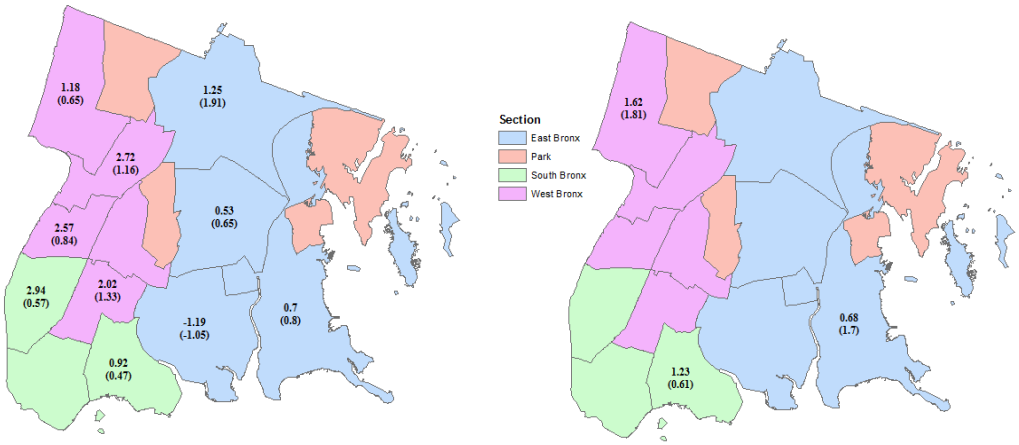


As previously mentioned, the results for weighted average career teacher quality are slightly different than the unweighted average career teacher quality with the increases being higher than the overall average for all three boroughs. A ten percentage point increase in the weighted average career teacher quality of elementary school zones increases housing prices by 8.7%, which is 0.9 percentage points higher than the overall housing increase for all three boroughs and the highest of all three boroughs. When looking at the impact of weighted average career teacher quality at elementary schools, housing prices increase as high as 29.4% and decrease as low as -11.9% in Bronx neighborhoods for every ten percentage point increase. (Appendix FF).

Similar to the results for unweighted average career teacher quality, the difference in the impact of teacher quality on housing prices in Bronx is related to the location of the neighborhood in the Bronx. The housing prices in the West and South Bronx increase by 16.2% and 12.3% (7.5 and 3.6 percentage points higher than the overall for the Bronx) for every 10 percentage point increase in the weighted average teacher quality at zoned elementary while the housing prices in the East Bronx increases by 6.8% (1.9 percentage

points lower than the overall for the Bronx) (Appendix FF). However, the results from the South Bronx are not statistically significant.

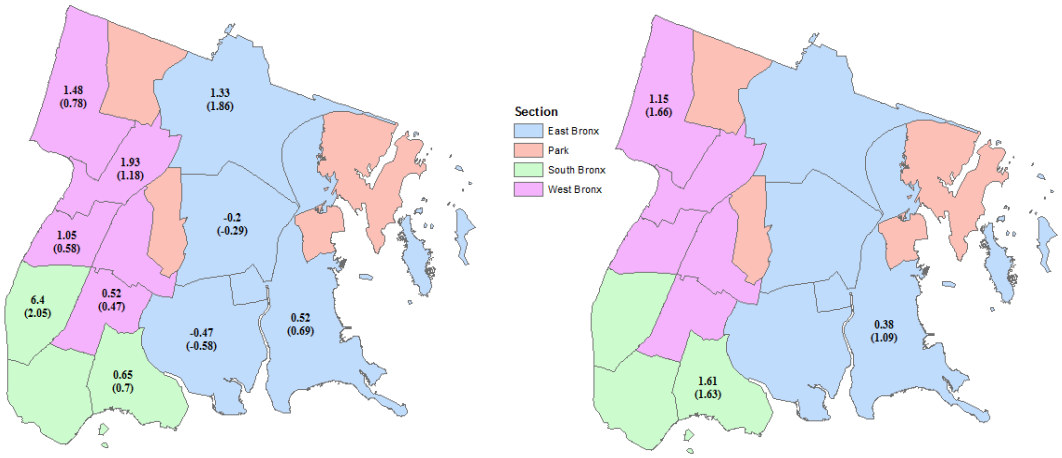
Figure 8. Map of Coefficients (with T-stats) for Weighted Average Elementary Teacher Quality in Bronx Neighborhoods by PUMA (left) and borough section (right) which summarize coefficients from Appendices FF and NN



A ten percentage point increase in the weighted average career teacher quality in Bronx middle school zones increases by 5.2%, which is 0.2 percentage points higher than the overall housing increases for all boroughs (Table 9). The results using weighted averages were stronger than the results using unweighted averages; however the results were not as strong for middle school zones as they were for elementary school zones. Housing prices increase as high as 19.3% and decrease as low as 4.7% (Appendix GG) in Bronx neighborhoods for every ten percentage point increase in the weighted average career teacher quality at middle schools. These differences are also related to the location of the neighborhood in the Bronx. The housing prices in the West and South Bronx increase by 11.5% and 16.1% (6.3 and 10.9 percentage points higher than the overall for the Bronx) for every 10 percentage point increase in the weighted average teacher quality at zoned elementary while the housing prices in the East Bronx increases by 3.8% (1.4 percentage points lower than the overall for the Bronx) (Appendix OO). With the

exception of the West Bronx results being statistically significant at the .10 level, the other results are not statistically significant.

Figure 9. Maps of Coefficients (with T-stats) for Weighted Average Middle School Teacher Quality in Bronx Neighborhoods by PUMA (left) and borough section (right) which summarize coefficients from Appendices GG and OO



The West and South Bronx have similar demographics in comparison to the East Bronx. With the exception of the Riverdale, Fieldston and Kingsbridge PUMA in the Northwestern portion of the Bronx, the Northwestern and Southern sections of the Bronx had lower average housing values, average household incomes and educational attainment. However, although the Northwestern section of the Bronx experienced significant decreases in the value of housing (-29.5%), it did have larger growths in household income and average educational attainment than the other areas of the Bronx since the teacher quality data was released. For instance, while the average change in household income and average value of homes was 3.5% and -3.8% respectively for all three boroughs, the Northwestern section of the Bronx (not including the Riverdale, Fieldston and Kingsbridge PUMA) had an 8.0% increase in household income. The Eastern section of the Bronx experienced a higher increase in household income at 6.7%,

Table 13. Demographics in Bronx Neighborhoods Before and After Value Added Data Release (*Income and Housing Prices is in $100,000)

	Average Household Income		Average Housing Prices		% of Pop. with at least a BA Degree		% of Pop. who are White		% of Pop. who are Black		% of Pop. who are Hispanic	
	2011	2013	2011	2013	2011	2013	2011	2013	2011	2013	2011	2013
Bronx	*0.46*	*0.48*	*4.11*	*3.46*	*0.11*	*0.11*	*0.10*	*0.09*	*0.31*	*0.32*	*0.55*	*0.56*
West Bronx	**0.42**	**0.47**	**4.64**	**3.53**	**0.11**	**0.11**	**0.09**	**0.08**	**0.24**	**0.22**	**0.63**	**0.65**
Riverdale, Fieldston & Kingsbridge	0.71	0.89	5.21	3.97	0.29	0.27	0.29	0.30	0.14	0.14	0.50	0.51
Belmont, Crotona Park East & East Tremont	0.29	0.31	4.54	2.93	0.04	0.05	0.03	0.03	0.30	0.32	0.65	0.64
Bedford Park, Fordham North & Norwood	0.39	0.42	3.26	2.34	0.07	0.11	0.06	0.07	0.21	0.13	0.66	0.69
Morris Heights, Fordham South & Mount Hope	0.33	0.33	3.17	3.05	0.06	0.08	0.01	0.01	0.27	0.24	0.70	0.74
East Bronx	**0.54**	**0.56**	**4.07**	**3.52**	**0.14**	**0.14**	**0.16**	**0.12**	**0.37**	**0.41**	**0.41**	**0.42**
Wakefield, Williamsbridge & Woodlawn	0.51	0.53	4.50	3.70	0.12	0.17	0.08	0.05	0.66	0.69	0.24	0.24
Co-op City, Pelham Bay & Schuylerville	0.62	0.72	3.41	3.69	0.19	0.17	0.36	0.20	0.29	0.47	0.32	0.30
Pelham Parkway, Morris Park & Laconia	0.55	0.57	4.76	3.74	0.15	0.13	0.26	0.23	0.17	0.21	0.48	0.51
Castle Hill, Clason Point & Parkchester	0.49	0.47	3.72	2.82	0.11	0.09	0.03	0.02	0.35	0.29	0.55	0.61
South Bronx	**0.35**	**0.33**	**2.72**	**2.64**	**0.06**	**0.07**	**0.01**	**0.01**	**0.30**	**0.31**	**0.68**	**0.67**
Concourse, Highbridge & Mount Eden	0.36	0.38	1.95	2.25	0.06	0.09	0.00	0.02	0.34	0.36	0.65	0.61
Hunts Point, Longwood & Melrose	0.35	0.29	3.37	2.96	0.05	0.04	0.01	0.01	0.27	0.25	0.71	0.73

but a decrease in housing values by 14.3% and the Southern section of the Bronx experienced a decrease in household income by 5.7% and an decrease in housing values by 12.2% (Tables 13 and 14).

Table 14. Percent Change in Demographics in Bronx Neighborhoods Before and After Value Added Data Release

	Average Household Income	Average Housing Prices	% of Pop. with at least a BA Degree	Diversity Indices	% of Pop. who were White	% of Pop. who were Black	% of Pop. who were Hispanic
Bronx	*5.3%*	*15.7%*	*4.7%*	*-2.1%*	*15.0%*	*3.0%*	*1.6%*
West Bronx	**11.4%**	**-24.1%**	**7.6%**	**-3.1%**	**4.8%**	**8.9%**	**3.3%**
Riverdale, Fieldston & Kingsbridge	25.0%	23.9%	5.5%	-1.7%	2.7%	1.1%	1.2%
Belmont, Crotona Park East & East Tremont	5.9%	35.4%	25.1%	-0.3%	6.7%	4.8%	0.9%
Bedford Park, Fordham North & Norwood	7.2%	28.2%	48.4%	-4.3%	7.7%	36.9%	5.2%
Morris Heights, Fordham South & Mount Hope	2.1%	3.9%	23.0%	-9.0%	21.0%	8.9%	5.2%
East Bronx	**4.6%**	**-13.6%**	**2.0%**	**-3.9%**	**23.8%**	**9.5%**	**2.8%**
Wakefield, Williamsbridge & Woodlawn	3.5%	-17.8%	38.1%	-8.1%	30.6%	5.1%	1.4%
Co-op City, Pelham Bay & Schuylerville	15.7%	8.2%	12.1%	-4.6%	43.9%	61.0%	7.4%
Pelham Parkway, Morris Park & Laconia	3.6%	-21.5%	14.2%	-5.0%	11.8%	27.1%	7.7%
Castle Hill, Clason Point & Parkchester	-3.9%	-24.3%	18.8%	-5.0%	31.6%	17.4%	10.7%
South Bronx	-5.3%	-3.0%	24.4%	1.0%	105.8%	1.5%	0.8%
Concourse, Highbridge & Mount Eden	5.7%	15.3%	60.5%	5.4%	891.2%	7.6%	5.3%
Hunts Point, Longwood & Melrose	-15.9%	-12.2%	16.6%	-5.7%	28.6%	5.1%	3.1%

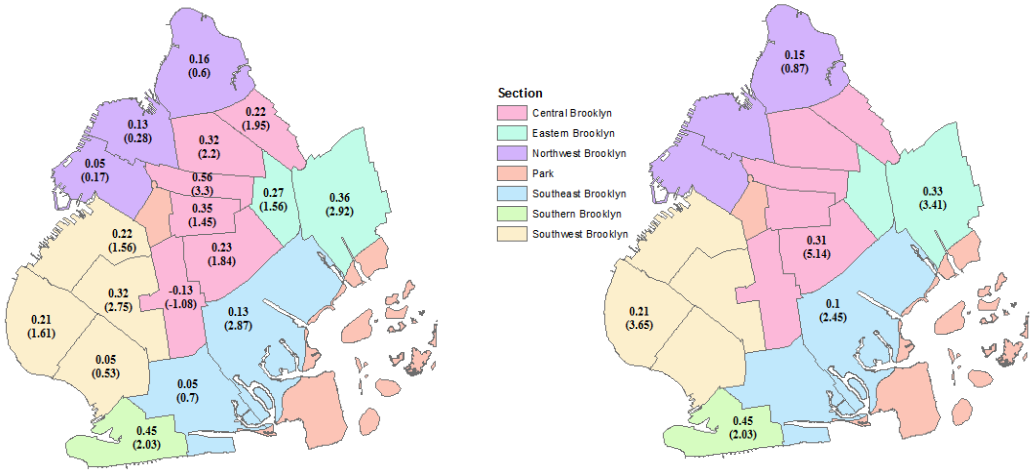
There appears to be no link between the impact of teacher quality on housing prices in the Bronx and the changes in household income and housing values (Table 14). Nonetheless, there does seem to be a link between the impact of teacher quality on housing prices and the educational attainment in these areas. The West section of the Bronx experienced a 32.0% and a 66.3% increase in the percent of people with a Bachelor's degree or a graduate degree respectively. The Southern section of the Bronx experienced similar increases in the percent of people with a Bachelor's degree (14.2% increase) and graduate degrees (51.1% increase) since teacher quality data was released. The Eastern section of the Bronx experienced a decrease in the percent of people with a graduate degree (-9.9%) and only a 4.3% increase in the percent of people with a Bachelor's degree. It should be noted that the Eastern section of the Bronx a higher proportion of their population with a Bachelor's degree or graduate degree (14.5%) compared to the Southern (5.5%) and the Northwestern section of the Bronx (5.6%) prior to the release of the teacher quality data (Table 13).

Brooklyn

Housing prices in Brooklyn increase at the lowest rate among the other boroughs when looking at the impact of unweighted average teacher quality in elementary schools. In Brooklyn, a ten percentage point increase in the unweighted average teacher quality increases housing prices by 2.6%, which is 0.4 percentage points lower than the overall housing increase for all three boroughs. Housing prices increase as high as 5.6% and decrease as low as 1.3% in Brooklyn neighborhoods for every ten percentage point increase in the unweighted average career teacher quality at elementary schools (Appendix HH).

Similar to the Bronx and Queens, the differences are related to the location of the neighborhoods around Brooklyn. The Southern, Eastern, and Central sections of Brooklyn experienced the largest average increase in housing prices at 4.5%, 3.3%, and 3.1%, respectively, for every ten percentage point increase in the unweighted average career teacher quality for elementary school zones. Housing prices in Northwest, Southeast, and Southwest Brooklyn increased by 1.5%, 1.0%, and 2.1%, respectively, for every ten percentage point increase in the unweighted average career teacher quality for elementary school zones (Appendix LL). In the case of Brooklyn, the concentration of higher housing increases is located in the middle of the borough rather than on either the South or North side (Figure 10).

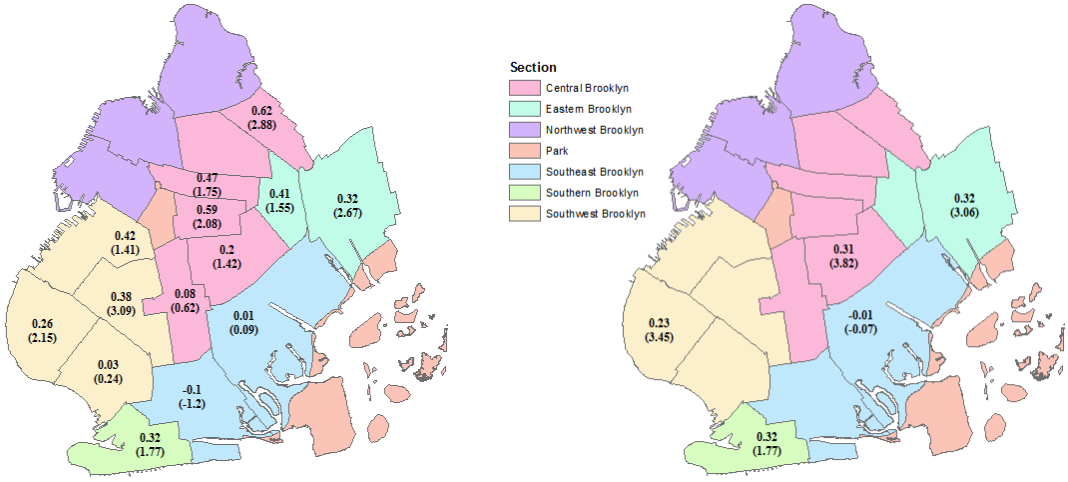
Figure 10. Maps of Coefficients (with T-stats) for Unweighted Average Elementary Teacher Quality in Brooklyn Neighborhoods by PUMA (left) and borough section (right) which summarize coefficients from Appendices HH and LL



A ten percentage point increase in the unweighted average career teacher quality rating in Brooklyn middle school zones increases housing prices by 2.0%, which is 0.4 percentage points lower than the overall housing increases for all three boroughs and just 0.1 percentage points higher than the average for the Bronx. Similar to the results for elementary school zones, housing prices increase as high as 6.2% and decrease as low as

1.0% (Appendix II) in Brooklyn neighborhoods for every ten percentage point increase in the unweighted average career teacher quality at middle schools. On average, the higher housing increases occur in the Southern, Southwest and Eastern areas of Brooklyn with increases of 3.2%, 2.3%, and 3.2%, respectively, for every ten percentage point increase in the unweighted average career teacher quality for elementary school zones. Housing prices in Southeast Brooklyn decreased by 0.1% for every ten percentage point increase in the unweighted average career teacher quality for elementary school zones (Appendix MM and Figure 11).

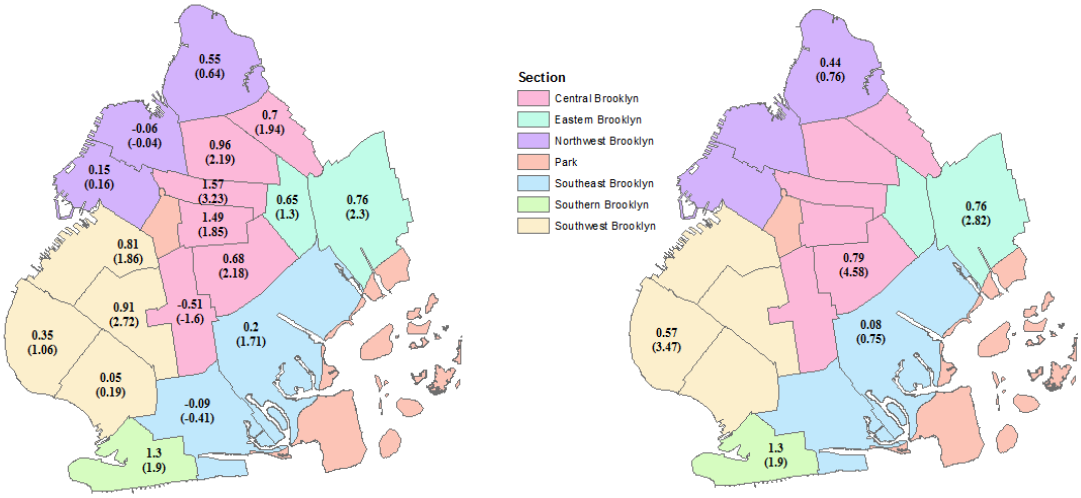
Figure 11. Maps of Coefficients (with T-stats) for Unweighted Average Middle School Teacher Quality in Brooklyn Neighborhoods by PUMA (left) and borough section (right) which summarize coefficients from Appendices II and MM



Housing prices increased at the lowest levels for Brooklyn in comparison to the other boroughs when looking at the results for weighted average career teacher quality both elementary and middle school zones. A ten percentage point increase in the weighted average career teacher quality of elementary school zones increases housing prices by 6.1%, which is 1.7 percentage points higher than the overall housing increase for all three boroughs and the lowest out of all three boroughs (Table 9). When looking

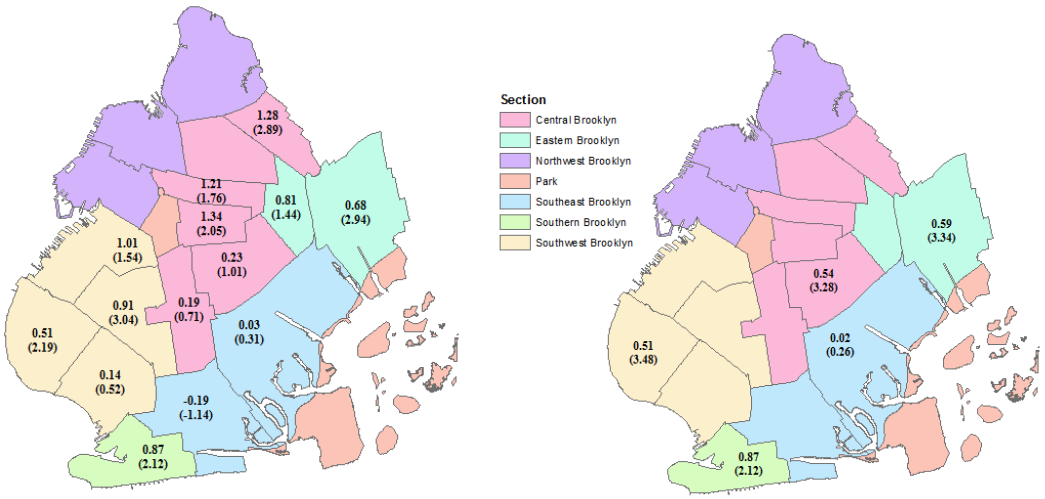
at the impact of weighted average career teacher quality at elementary schools, housing prices increase as high as 15.7% and decrease as low as -5.1% in Brooklyn neighborhoods for every ten percentage point increase. (Appendix JJ and Figure 12).

Figure 12. Maps of Coefficients (with T-stats) for Weighted Average Elementary Teacher Quality in Brooklyn Neighborhoods by PUMA (left) and borough section (right) which summarize coefficients from Appendices JJ and NN



Similar to the results for unweighted average career teacher quality, the difference in the impact of teacher quality on housing prices in Brooklyn is also concentrated in the middle of Brooklyn for the weighted average career teacher quality. The Southern, Eastern, and Central sections of Brooklyn experienced the largest average increase in housing prices at 13.0%, 7.6%, and 7.9%, respectively, for every ten percentage point increase in the weighted average career teacher quality for elementary school zones. Housing prices increased in the Northwest and Southwest sections of Brooklyn at a relatively high rate as well. For every ten percentage point increase in the weighted average career teacher quality for elementary school zones, housing prices in Northwest and Southwest Brooklyn increased by 4.4% and 5.7% respectively (Appendix NN and Figure 12).

Figure 13. Maps of Coefficients (with T-stats) for Weighted Average Middle School Teacher Quality in Brooklyn Neighborhoods by PUMA (left) and borough section (right) which summarize coefficients from Appendices KK and OO



A ten percentage point increase in the weighted average career teacher quality in Brooklyn middle school zones increases by 4.0%, which is 1.0 percentage point lower than the overall housing increases for all boroughs and the lowest for all three boroughs. The results using weighted averages were stronger than the results using unweighted averages; however the results were not as strong for middle school zones as they were for elementary school zones. Housing prices increase as high as 13.4% and decrease as low as 1.9% (Appendix KK) in Brooklyn neighborhoods for every ten percentage point increase in the weighted average career teacher quality at middle schools. On average, the higher housing increases occur in the Southern, Southwest and Eastern areas of Brooklyn with increases of 8.7%, 5.1%, and 5.9%, respectively, for every ten percentage point increase in the unweighted average career teacher quality for elementary school zones. Housing prices in Southeast Brooklyn only increased by 0.2% for every ten percentage point increase in the unweighted average career teacher quality for elementary school zones (Appendix OO and Figure 14).

Table 15. Demographics in Brooklyn Neighborhoods Before and After Value Added Data Release (*Income and Housing Prices is in $100,000)

	Average Household Income		Average Housing Prices		% of Pop. with at least a BA Degree		% of Pop. who are White		% of Pop. who are Black		% of Pop. who are Hispanic	
	2011	2013	2011	2013	2011	2013	2011	2013	2011	2013	2011	2013
Brooklyn	*0.63*	*0.66*	*6.08*	*5.99*	*0.19*	*0.22*	*0.33*	*0.33*	*0.33*	*0.34*	*0.22*	*0.22*
Central Brooklyn	**0.54**	**0.55**	**5.87**	**5.58**	**0.15**	**0.18**	**0.16**	**0.15**	**0.56**	**0.56**	**0.23**	**0.25**
Bushwick	0.49	0.46	5.62	4.48	0.10	0.14	0.08	0.09	0.18	0.15	0.71	0.73
Bedford-Stuyvesant	0.49	0.50	6.21	5.38	0.15	0.17	0.12	0.17	0.59	0.61	0.24	0.19
Crown Heights North & Prospect Heights	0.60	0.65	6.59	6.14	0.22	0.28	0.17	0.16	0.63	0.70	0.15	0.10
East Flatbush, Farragut & Rugby	0.57	0.56	5.32	4.37	0.13	0.12	0.01	0.02	0.90	0.88	0.08	0.08
Crown Heights South, Prospect Lefferts & Wingate	0.49	0.46	5.22	4.73	0.14	0.15	0.15	0.16	0.77	0.70	0.06	0.11
Flatbush & Midwood	0.57	0.61	6.20	7.61	0.18	0.24	0.38	0.32	0.39	0.40	0.13	0.19
Eastern Brooklyn	**0.41**	**0.44**	**3.89**	**4.54**	**0.05**	**0.07**	**0.02**	**0.03**	**0.63**	**0.66**	**0.33**	**0.28**
Brownsville & Ocean Hill	0.39	0.43	3.48	5.58	0.04	0.07	0.00	0.02	0.72	0.76	0.27	0.20
East New York & Starrett City	0.43	0.45	4.15	3.76	0.06	0.07	0.04	0.05	0.56	0.56	0.38	0.36
Northwest Brooklyn	0.96	0.99	8.87	8.89	0.38	0.40	0.52	0.56	0.12	0.13	0.27	0.24
Greenpoint & Williamsburg	0.59	0.70	6.05	7.04	0.26	0.27	0.55	0.61	0.03	0.03	0.36	0.30
Brooklyn Heights & Fort Greene	1.09	1.11	8.38	8.33	0.43	0.47	0.41	0.44	0.25	0.30	0.21	0.17
Park Slope, Carroll Gardens & Red Hook	1.25	1.23	11.04	10.69	0.47	0.53	0.58	0.63	0.08	0.08	0.24	0.21
Southeast Brooklyn	**0.69**	**0.71**	**5.12**	**5.23**	**0.22**	**0.23**	**0.45**	**0.47**	**0.39**	**0.38**	**0.07**	**0.07**
Canarsie & Flatlands	0.72	0.75	4.74	4.69	0.18	0.20	0.24	0.25	0.64	0.66	0.07	0.08
Sheepshead Bay, Gerritsen Beach & Homecrest	0.66	0.67	5.70	5.99	0.27	0.28	0.77	0.71	0.02	0.08	0.06	0.05
Southwest Brooklyn	**0.60**	**0.65**	**6.23**	**6.28**	**0.16**	**0.19**	**0.49**	**0.45**	**0.01**	**0.01**	**0.22**	**0.26**
Sunset Park & Windsor Terrace	0.58	0.62	6.41	5.68	0.17	0.16	0.23	0.21	0.02	0.01	0.44	0.48
Bay Ridge & Dyker Heights	0.69	0.77	5.56	6.48	0.22	0.25	0.52	0.53	0.00	0.01	0.16	0.17
Borough Park, Kensington & Ocean Parkway	0.54	0.61	6.92	6.96	0.12	0.15	0.69	0.68	0.01	0.03	0.14	0.15
Bensonhurst & Bath Beach	0.58	0.61	6.24	5.95	0.13	0.22	0.47	0.44	0.00	0.01	0.17	0.21
Southern Brooklyn	**0.45**	**0.48**	**4.10**	**3.38**	**0.19**	**0.25**	**0.61**	**0.61**	**0.13**	**0.13**	**0.14**	**0.12**

Like with the Bronx and Queens, the areas in Brooklyn that had their housing prices impacted at a higher rate when teacher quality was released – Central, Eastern, and Southern - had lower average household income and housing value than most of the other areas in the borough. The Southeastern area of Brooklyn has average housing values ($508,076.42) that are similar to Central, Eastern and Southern Brooklyn (ranging from $393,157.20 to $591,473.20 in 2011), while Northwestern and Southwestern Brooklyn had higher average housing values at $849,030.22 and $623,412.90 respectively (Table 15).

There were no clear differences between the areas in terms of household income and housing value growth since the teacher quality data was released (Table 15), but there were Central, Eastern and Southern Brooklyn experienced large increases to their average educational attainment in comparison to the other areas. Before the teacher quality data was released, Central, Eastern and Southern Brooklyn had between 5.7% and 19.2% of their population with a Bachelor's or graduate degree while Northwestern Brooklyn had 38.1% of its population with a Bachelor's or graduate degree. Central Brooklyn experienced an 18.2% increase in the proportion of its population with a Bachelor's degree and a 22.7% increase in the proportion of its population with a graduate degree. Eastern Brooklyn had a 36.4% increase in the percentage of its population with a Bachelor's degree and an 8.1% increase in the percentage of its population with a graduate degree. Even more astounding was the increase in Southern Brooklyn. Although they experienced a 0.1% decrease in the percentage of residents with a Bachelor's degree, the area had a 152.1% increase in the percentage of residents with a graduate degree. In fact, Southern Brooklyn had more of its population with a

Bachelor's degree or graduate degree (25.3%) than Southwestern (20.5%) and Southeastern (22.5%) Brooklyn (Tables 15 and 16).

Table 16. Percent Change in Demographics in Brooklyn Neighborhoods Before and After Value Added Data Release

	Average Household Income	Average Housing Prices	% of Pop. with at least a BA Degree	Diversity Indices	% of Pop. White	% of Pop. Black	% of Pop. Hisp.
Brooklyn	*4.1%*	*-1.3%*	*13.9%*	*-0.8%*	*0.6%*	*2.6%*	*0.4%*
Central Brooklyn	**1.3%**	**-5.0%**	**20.5%**	**-0.3%**	**4.2%**	**0.4%**	**5.4%**
Bushwick	-6.1%	-20.2%	39.5%	-2.7%	1.8%	17.0%	2.0%
Bedford-Stuyvesant	3.3%	-13.3%	16.7%	-2.1%	37.7%	2.5%	18.1%
Crown Heights North & Prospect Heights	8.0%	-6.9%	26.8%	-15.2%	10.5%	12.2%	29.8%
East Flatbush, Farragut & Rugby	-2.6%	-18.0%	3.6%	21.4%	66.8%	2.4%	2.4%
Crown Heights South, Prospect Lefferts & Wingate	-5.2%	-9.3%	6.7%	21.5%	5.2%	8.3%	90.9%
Flatbush & Midwood	7.0%	22.8%	32.7%	2.3%	16.5%	2.9%	51.8%
Eastern Brooklyn	**7.3%**	**16.7%**	**32.2%**	**-0.5%**	**44.5%**	**4.1%**	**15.5%**
Brownsville & Ocean Hill	9.8%	60.4%	68.8%	-8.2%	412.4 %	6.4%	27.2%
East New York & Starrett City	5.5%	-9.4%	13.7%	3.4%	19.2%	0.3%	6.5%
Northwest Brooklyn	3.2%	0.2%	5.4%	-5.7%	9.4%	8.8%	13.9%
Greenpoint & Williamsburg	17.3%	16.5%	0.8%	-5.5%	10.5%	15.4%	15.8%
Brooklyn Heights & Fort Greene	1.9%	-0.5%	9.2%	-4.1%	5.1%	17.9%	18.3%
Park Slope, Carroll Gardens & Red Hook	-1.8%	-3.1%	11.8%	-9.1%	9.6%	1.7%	12.8%
Southeast Brooklyn	**3.1%**	**2.1%**	**8.2%**	**-1.3%**	**4.7%**	**4.0%**	**0.2%**
Canarsie & Flatlands	4.4%	-1.2%	6.8%	-5.4%	0.7%	3.3%	13.9%
Sheepshead Bay, Gerritsen Beach & Homecrest	1.6%	5.2%	2.9%	18.7%	7.3%	341.1%	14.2%
Southwest Brooklyn	**8.6%**	**0.9%**	**22.0%**	**1.5%**	**6.3%**	**72.7%**	**15.8%**
Sunset Park & Windsor Terrace	6.8%	11.3%	6.7%	-3.1%	10.8%	9.5%	10.3%
Bay Ridge & Dyker Heights	11.8%	16.5%	11.3%	-4.2%	1.0%	193.7%	1.4%
Borough Park, Kensington & Ocean Parkway	12.2%	0.6%	25.3%	3.4%	1.8%	95.0%	8.5%
Bensonhurst & Bath Beach	5.6%	4.6%	71.1%	2.8%	6.5%	1743.4%	26.8%
Southern Brooklyn	**7.1%**	**-17.4%**	**31.9%**	**-1.8%**	**1.5%**	**4.3%**	**11.2%**

The Southern, Eastern and Central areas of Brooklyn experienced the largest impact on housing prices as a result of the teacher quality release and Southwest, Southeast and Northwest Brooklyn experienced the smallest impact on housing prices. Before the release, Eastern and Central Brooklyn had the smallest percentage of White residents in the borough at 2.3% and 16.1% respectively. In contrast, Southern and Northwest Brooklyn had the highest percentage of White residents (60.6% and 51.6%). Since the release, Eastern Brooklyn had the largest increase in White residents (44.5%).

Additionally, Central and Eastern Brooklyn had the highest portion of Black residents in comparison to the other areas in Brooklyn (56.1% and 63.0%) before the release of the teacher quality data. The percentage change of Black residents in Central Brooklyn decreased since the release of the teacher quality data by 0.4%. However, in Southwest Brooklyn, the Black population increased by 72.7%. Similar findings occur for the Hispanic population, where the percentage of Hispanics in Eastern and Southern Brooklyn decreased by 15.5% and 11.2%, respectively, and the Hispanic population increased by 15.% in Southwest Brooklyn (Tables 15 and 16). These results suggest that the areas in Brooklyn that had the highest increases in housing prices since the release of the teacher quality data had an increase in their White population and a decrease in their Hispanic and Black populations.

Changes in Neighborhood Demographics

In all three boroughs, the areas that had their housing prices impacted the most by the release of their teacher quality data were those areas that were not as affluent as the rest of the three boroughs but also experienced some increases in the average educational attainment, household income and housing values. For that reason, the data were

analyzed by the average housing value and household income quartiles to see if that played a role in the impact of teacher quality on housing prices.

Table 17. Regressions by Housing Value Quartiles

		Coefficient	T-Stat	N
Elementary Unweighted	$0 - $397,119	0.35	4.61	17788
	$397,119-$437,297.90	0.38	4.79	7593
	$437,297.90-$491,410.30	0.27	3.68	14479
	$491,410.30 +	0.19	3.51	16607
Elementary Weighted	$0 - $397,119	0.96	4.49	17788
	$397,119-$437,297.90	0.84	4.69	7593
	$437,297.90-$491,410.30	0.67	3.50	14479
	$491,410.30 +	0.48	2.92	16607
Middle Unweighted	$0 - $397,119	0.37	4.00	17358
	$397,119-$437,297.90	0.33	3.38	7265
	$437,297.90-$491,410.30	0.33	4.17	14382
	$491,410.30 +	0.10	1.44	14178
Middle Weighted	$0 - $397,119	0.79	4.63	17358
	$397,119-$437,297.90	0.66	3.51	7265
	$437,297.90-$491,410.30	0.61	4.08	14382
	$491,410.30 +	0.2	1.47	14178

There are differences in the impact of teacher quality on housing prices based on the housing value quartile of the neighborhood. As hypothesized, housing prices increase by 9.6% (1.8 percentage points higher than the overall) for every 10 percentage point increase in the weighted average teacher quality in zoned elementary schools for neighborhoods that have housing values in the lowest quartile in the three boroughs (less than $397,119). Neighborhoods with housing values in the second lowest quartile ($397,119-$437,29.90) experienced a 8.4% increase in housing prices (0.6 percentage points higher than the overall) for every 10 percentage point increase in the weighted average teacher quality in zoned elementary schools. On the other hand, housing prices

increased by 4.8% and 6.7% for the highest ($497,419.30 and above) and second highest ($437,297.90-$497,419.30) respectively for every ten percentage point increase in the weighted average teacher quality in zoned elementary schools. Both of these were less than the overall by 1.1 to 3 percentage points. Similar results occur for middle school zones (Table 17). The data appear to suggest that housing prices were impacted more in neighborhoods with lower housing values.

Table 18. Regressions by Housing Value Quartiles and Increases since VAM Release

		Housing Prices Decreased since Teacher Quality Released			Housing Prices Increased since Teacher Quality Released		
		Coeff.	T-Stat	N	Coeff.	T-Stat	N
Elementary Unweighted	$0 - $397,119	0.32	3.58	14153	0.39	2.49	3635
	$397,119-$437,297.90	0.39	3.76	5151	0.33	2.84	2442
	$437,297.90-$491,410.30	0.09	1.13	5057	0.37	3.47	9422
	$491,410.30 +	0.25	3.65	7368	0.10	1.09	9239
Elementary Weighted	$0 - $397,119	0.86	3.52	14153	1.11	2.36	3635
	$397,119-$437,297.90	0.80	3.59	5151	0.93	2.93	2442
	$437,297.90-$491,410.30	0.24	1.12	5057	0.93	3.26	9422
	$491,410.30 +	0.73	3.45	7368	0.20	0.8	9239
Middle Unweighted	$0 - $397,119	0.40	3.74	13565	0.24	1.31	3793
	$397,119-$437,297.90	0.25	2.07	5282	0.28	1.6	1983
	$437,297.90-$491,410.30	0.32	3.48	4957	0.35	3.03	9425
	$491,410.30 +	0.20	1.65	4951	0.05	0.53	9227
Middle Weighted	$0 - $397,119	0.89	4.36	13565	0.52	1.64	3793
	$397,119-$437,297.90	0.56	2.36	5282	0.42	1.25	1983
	$437,297.90-$491,410.30	0.69	4.15	4957	0.57	2.59	9425
	$491,410.30 +	0.52	1.89	4951	0.09	0.53	9227

A closer look at the data indicates that neighborhoods with housing values in the lowest two quartiles in the three boroughs before the teacher quality data was released, but had an increase in housing values since the release had higher increases than neighborhoods with housing values in the lowest two quartiles that experienced a

decrease in housing values since the teacher quality data release. Neighborhoods with housing values in the lowest quartile that experienced an increase in housing prices since the data release had housing prices increase by 11.1% while neighborhoods with housing values in the same quartile but experienced a decrease in housing prices since the data release had housing prices increase by 8.6%. This trend occurs in the second lowest quartile as well (Table 18).

The magnitude of housing price increases is different based on the average household income of the neighborhood. Housing prices increase by 8.5% for every 10 percentage point increase in weighted average teacher quality in zoned elementary school in the neighborhoods with the lowest average neighborhood household income. This is 0.7 percentage points higher than the average for all three boroughs. The only neighborhoods that experienced a higher increase in housing prices were the neighborhoods that were in the highest average household income quartile. Housing prices increase by 10.5% for every 10 percentage point increase in weighted average teacher quality in zoned elementary schools in the neighborhoods with the highest average neighborhood household income. This is 2.7 percentage points higher than the average for all three boroughs and 2 percentage points higher than the results for neighborhoods with the lowest average household income. The findings appear to suggest that there are differences on how much housing prices are impacts by the release of the teacher quality data for household income (Table 19).

These results point to some interesting trends in the impact of teacher quality on neighborhood demographics. This chapter is concerned with the issue of whether the K-8 school zones with high value added teachers experience a change in residential

segregation relative to K-8 school zones with low value added teachers. A closer look at the data indicates that there is a relationship between the coefficients from Model 1 and the demographics of the neighborhoods. Scatterplots in figures 14 through 17 show the relationship between the estimated impact that value added had on housing prices for each PUMA on household income, housing values, educational attainment and diversity indices.

Table 19. Regressions by Household Income Quartiles

		Coefficient	T-Stat	N
Elementary Unweighted	$0 - $58,954.39	0.34	6.69	14240
	$58,954.39-$67,458.85	0.18	2.25	13141
	$67,458.85-73,319.43	0.20	2.79	15848
	$73,319.43+	0.44	4.97	13238
Elementary Weighted	$0 - $58,954.39	0.85	6.49	14240
	$58,954.39-$67,458.85	0.53	2.35	13141
	$67,458.85-73,319.43	0.44	2.17	15848
	$73,319.43+	1.05	4.42	13238
Middle Unweighted	$0 - $58,954.39	0.29	4.22	11694
	$58,954.39-$67,458.85	0.30	3.45	13513
	$67,458.85-73,319.43	0.04	0.49	15763
	$73,319.43+	0.37	3.38	12213
Middle Weighted	$0 - $58,954.39	0.54	4.68	11694
	$58,954.39-$67,458.85	0.62	3.88	13513
	$67,458.85-73,319.43	0.07	0.45	15763
	$73,319.43+	0.81	3.66	12213

As the scatterplots show, areas that are impacted by the movements caused by the new teacher quality data were not among the most affluent before the teacher quality data was released. These areas have experienced an increase in household income since the teacher quality data has been released at much higher rates than other areas in the three boroughs (Figure 14). In fact, the data suggest that there is a positive relationship between the average weighted teacher quality coefficient and the percent household

income increase since the value added release. The results from the fixed effects regression that estimates the impact that Model 1's average weighted teacher quality of elementary schools coefficient has on the percent change in household income since the release of the teacher quality data indicate that the coefficient significantly predicts the percentage change in household income. The model accounted for 86.8% of variance in the percentage change in household income. The data show that for every 1 percentage point increase on the impact on housing values increases, the estimated percentage change in household income increases by 0.04 in elementary school zones. Similar results occur in middle school zones as well (Table 20), which indicate that the areas where home buyers moved to areas had lower average household income and this caused an increase in average household income.

Figure 14. Household Income and Value Added Coefficient Estimate Scatterplots

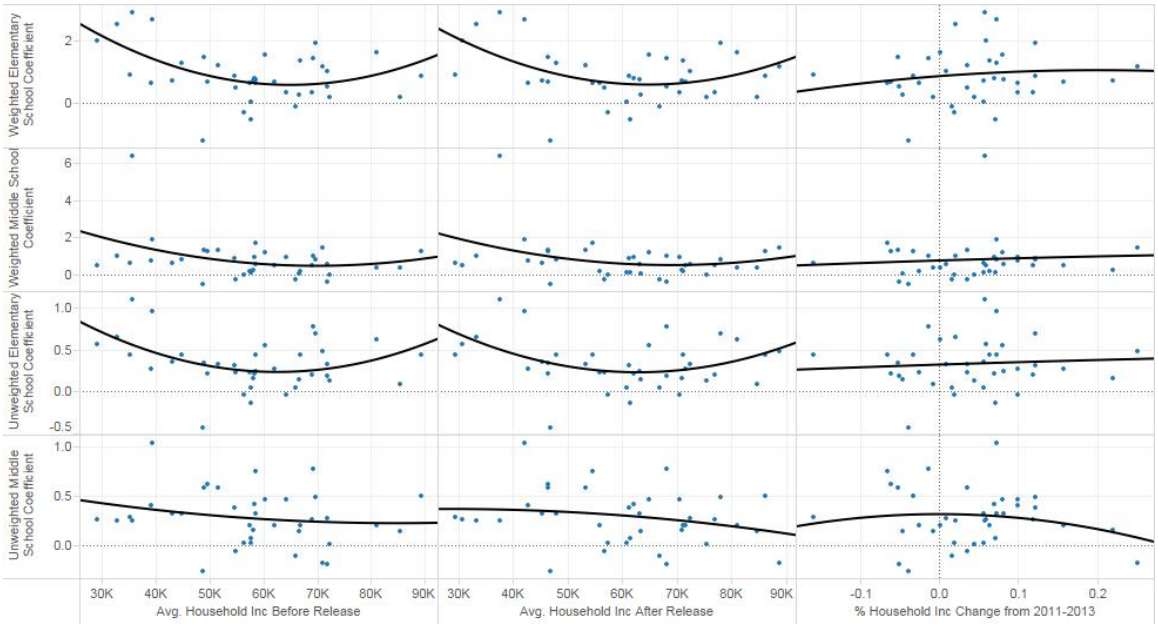


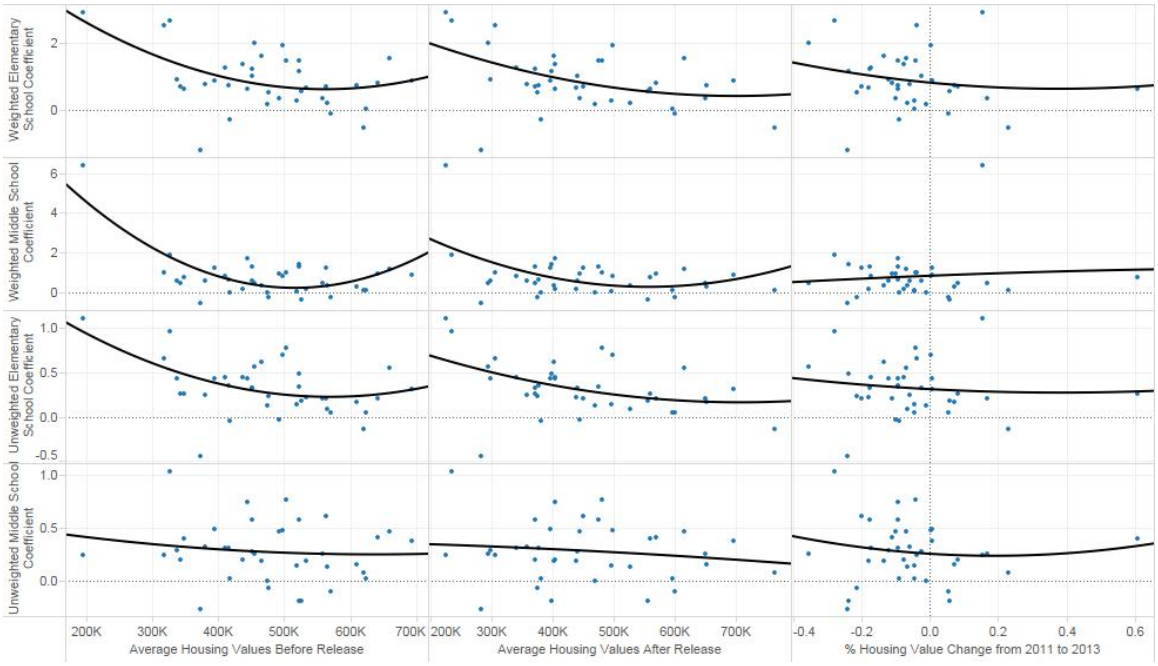
Table 20. Regression Results for Relationship Between Model 1 Coefficient and Neighborhood Demographics

Independent variable – neighborhood fixed effects	Weighted Elementary School coefficient (t-stat) R^2	Weighted Middle School Coefficient (t-stat) R^2
Percentage change in household income since data release	0.04** (92.78) *0.87*	0.01** (18.45) *0.85*
Percentage change in housing values since data release	-0.05** (-52.01) *0.73*	-0.00** (-5.07) *0.79*
Percent change in Population with a BA degree or more since data release	-0.03** (-24.33) *0.86*	0.03** (19.90) *0.87*
Percentage change in White population since data release	0.05** (7.70) *0.67*	0.56** (105.95) *0.78*
Percent change in Black population since data release	-1.51** (-76.74) *0.88*	-0.77** (-36.69) *0.87*
Percent change in Hispanic population since data release	-0.04** (-19.73) *0.79***	0.01** (6.93) *0.79*
Percent change in Diversity Index since data release	0.01 (20.79) *0.76*	0.01** (20.14) *0.77*
*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (Dependent variable is weighted career teacher quality)		

As mentioned previously, the relationship between the magnitude of impact of the teacher quality data on neighborhood housing values was negative. Areas that were most affected by the data release were areas that had lower housing prices. The scatterplots in Figure 14 show the inverse relationship. Furthermore, the results from the neighborhood fixed effects regression that estimates the impact that Model 1's average weighted teacher quality of elementary schools coefficient has on the percent change in neighborhood housing values since the release of the teacher quality data indicate that the coefficient

significantly predicts the percentage change in neighborhood housing values. The model accounted for 73.0% of variance in the percentage change in housing values. The data show that for every 1 percentage point increase on the impact on housing values increases, the estimated percentage change in household income decreases by 0.05 in elementary school zones (Table 20). The results imply that home buyers may have been taking advantage of the new information and decided to purchase homes in areas where housing values were cheaper.

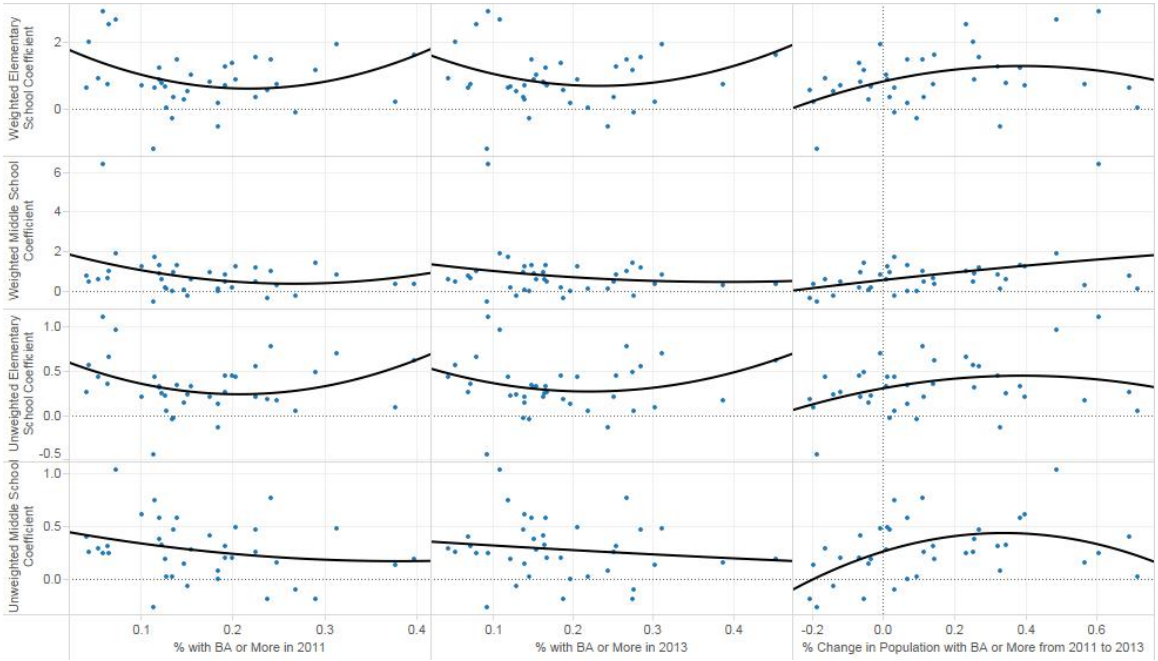
Figure 15. Housing Values and Value Added Coefficient Estimate Scatterplots



The demographic shift of residents with a Bachelor's degree or higher is not as straight forward. The scatterplots show that there is a positive relationship to a certain point and then the relationship becomes negative. The neighborhood fixed effects regression shows that there is a negative relationship overall between the two variables. However, as noted earlier there are some areas with higher estimates of the impact on

housing values since the data release experienced an increase in the percentage of residents with a Bachelor's degree.

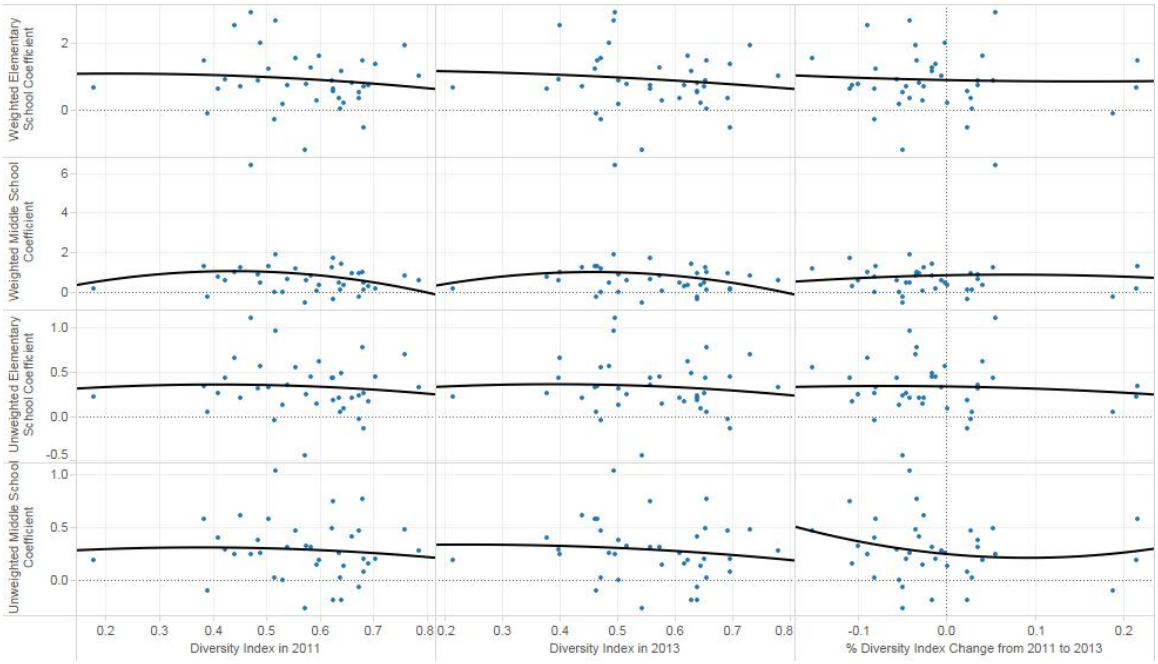
Figure 16. Educational Attainment and Value Added Coefficient Estimate Scatterplots



What is most interesting is the shift in racial demographics since the release of the teacher quality data. There is a negative relationship between the estimated impact of the release on housing prices and the percent of Black residents. This is also the case for the percent of Hispanic residents at a lower rate. However, there is a positive relationship for the percent of White residents. For every 1 percentage point increase on the impact that the release had on housing prices, the percentage of Black residents decreases by 1.51%, the percentage of Hispanic residents decreases by 0.04%, and the percentage of White residents increases by 0.05% in elementary school zones. In middle school zones, the percentage of White residents increases by 0.56%, and the percentage of Black residents decreases by 0.77% (Table 20). These results indicate that the home buyers that are

responding to the data release are predominately White and are displacing Black and Hispanic residents.

Figure 17. Diversity Indices and Value Added Coefficient Estimate Scatterplots



The release of the teacher quality data had some impact on increasing the average household income and educational levels in the less affluent, less educated neighborhoods in the three boroughs. This may imply that the people who may be responding to the new teacher quality data are educated middle-class residents who are interested in living in upcoming neighborhoods that may have schools that are rated average (grades B and C), but have high teacher quality. This may have an impact on diversifying schools as the diversity increases and predominately Black schools see an increase in the percentage of White students.

CHAPTER 5

TEACHER QUALITY AND SCHOOL SEGREGATION

School Demographics and Housing Price Changes

Housing prices respond to the release of the teacher quality data differently based on the demographics of the school zones that the home is located in. As the results in the previous chapter show, housing prices increased by 7.8% for every 10 percentage point increase in the weighted average of elementary teacher quality in the three boroughs and 5.0% for every 10 percentage point increase in the weighted average of middle school teacher quality. Increases in housing prices fluctuate based on the percentage of free or reduced priced lunch students in the school zone at the time of the data release because home buyers respond differently to the information based on the school zone composition.

Housing prices increase at a higher rate for elementary school zones that had less than 91% but more than 79% (the second to highest quartile) of their student body receiving free or reduced lunch when the data was released. Housing prices in these areas increase by an additional 0.5 percentage points (8.5%) than the overall average increase for all three boroughs. In contrast, housing prices in elementary school zones that had less than 64% (lowest quartile) of their student population receiving free or reduced lunch at the time of the data release increased by 1.0% (6.8 percentage points less than the overall) for every 10 percentage point increase in the weighted average of elementary teacher quality.

There are similar results when looking at the housing prices for middle school zones. The prices of homes in middle school zones that had less 99% but more than 84%

(second to highest quartile) of the student body receiving free or reduced price lunch when the teacher quality data was released increased by 8.5% for every 10 percentage point increase in the weighted average middle school teacher quality. Housing prices in middle school zones that had less than 75% (bottom quartile) of the student body receiving free or reduced price lunch when the data was released increased by 1.6% for every 10 percentage point increase in the weighted average middle school teacher quality (Table 21). These results suggest that home buyers were more willing to purchase homes

Table 21. Coefficients (and T-stats underneath) for Weighted Average Teacher Quality by School Zone Demographic Quartiles

School Zone Demographics At VAM Release		Bottom 25% (Bottom Quartile)	25-50%	50-75%	Top 25% (Top Quartile)
Percent Free or Reduced Lunch	Elementary	0.10 (0.52)	0.61** (2.77)	0.83** (4.07)	0.67** (3.15)
	Middle	0.16 (0.95)	0.46** (3.11)	0.85** (4.29)	0.21 1.22)
Percent White Students	Elementary	0.47** (2.52)	0.41 (1.84)	0.56* (2.26)	0.82** (5.03)
	Middle	0.35* (2.18)	0.48** (2.98)	0.32* (2.05)	0.89** (4.27)
Percent Black Students	Elementary	1.01** (5.45)	0.02 (0.08)	0.52* (2.36)	0.76** (4.24)
	Middle	0.53** (3.41)	0.68** (3.83)	0.52** (2.84)	0.36 (2.29)
Percent Hispanic Students	Elementary	0.52* (2.33)	0.31 (1.72)	0.99** (5.03)	1.03** (5.03)
	Middle	0.44** (2.87)	0.54** (3.20)	0.29 (1.51)	0.64** (3.83)
Percent English Language Learners	Elementary	0.65** (3.82)	0.26 (1.30)	0.89** (4.29)	1.28** (5.69)
	Middle	0.39** (2.82)	0.46** (2.81)	0.03 (0.12)	0.84** (5.17)
School Zone Diversity Indices	Elementary	0.32 (1.56)	0.65** (3.04)	0.56 (2.88)	1.13** (5.73)
	Middle	0.11 (0.59)	0.42** (2.72)	0.55** (3.39)	0.74** (4.21)

*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level.

in areas with high quality teachers and a moderate amount of free and reduced price lunch students.

The data indicates that home buyers favor homes in school zones where the percentage of free and reduced price lunch for elementary school students is higher when looking at the teacher quality data. Housing prices increase in areas where the percentage of students receiving free and reduced price lunch decreased since the release of the teacher quality data by 7.7% for every 10 percentage point increase in the weighted average teacher quality in elementary schools. While housing prices increase by only 3.2% for every 10 percentage point increase in the weighted average teacher quality in school zones where the percentage of students receiving free and reduced price lunch decreased since the release (Table 22). This indicates that home buyers are changing the demographics of these schools by increasing the number of students who not eligible for free or reduced lunch. This is not the case for middle schools where housing prices increase 1.2 percentage points more in school zones that had an increase in the percentage of students who qualified for free or reduced lunch.

There are also changes occurring in the diversity of some of the zoned elementary and middle schools in these areas. While looking at the changes in each race did not show any clear trends, the results in Table 21 show that the most diverse school zones had housing prices increase by only 3.2% for every 10 percentage point increase in the weighted average teacher quality in elementary schools. Contrarily, housing prices in the least diverse elementary school zones had housing prices increase by 11.3% for every 10 percentage point increase in the weighted average teacher quality in elementary schools.

Additionally, housing prices in school zones that have become more diverse since the teacher quality data has been released increase at a lower rate of 6.8% than housing prices in school zones that have become less diverse since the data release (8.8%) (Table 22).

Table 22. Coefficients (and T-stats underneath) for Weighted Average Teacher Quality by School Zone Demographic Changes

School Zone Demographic Change Since Release		Positive Change	Negative Change
Percent Free or Reduced Lunch	Elementary	0.32 (1.42)	0.77** (7.03)
	Middle	0.57** (5.44)	0.45** (3.46)
Percent White Students	Elementary	0.79** (5.41)	0.83** (6.36)
	Middle	0.48** (3.81)	0.43** (3.95)
Percent Black Students	Elementary	0.89** (5.46)	0.70** (5.89)
	Middle	0.63** (4.89)	0.40** (3.85)
Percent Hispanic Students	Elementary	0.59** (4.53)	0.84** (5.63)
	Middle	0.52** (4.59)	0.51** (4.29)
Percent English Language Learners	Elementary	0.60** (4.45)	0.93** (6.86)
	Middle	0.29* (2.27)	0.58** (5.35)
School Zone Diversity Indices	Elementary	0.68** (5.34)	0.88** (5.89)
	Middle	0.84** (6.84)	0.35** (3.16)
*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level.			

School demographics were regressed on the coefficient of the weighted average teacher quality coefficient from Model 1 to measure the impact that it had on school demographics over time. The majority of the areas in these three boroughs that experienced the lowest increase in housing prices as a result of the teacher quality release, had the highest percentage of White students prior to the release of the teacher

quality data. However, the areas that experienced the highest increases in housing prices had the largest increases in White student population since the release of the teacher quality data. In fact, the percentage of White students changed by 0.48% for each percentage point increase in the coefficient from Model 1 for weighted teacher quality in elementary school zones (Table 23). The data indicates that the release of teacher quality data increased the percentage of White students in these areas.

Table 23. Coefficients (and T-stats underneath) for Regressions where Independent Variable = Coefficient from Model 1 Elementary Zones Weighted Average with Neighborhood Fixed Effects

Dependent Variables	Coefficient (T-stat)
Percent White Students Before Teacher Quality Release	-0.03** (-55.47)
Percent Change of White Students Since the Teacher Quality Release	0.48** (62.40)
Percent Black Students Before Teacher Quality Release	-0.01** (-10.15)
Percent Change of Black Students Since the Teacher Quality Release	0.89** (131.54)
Percent Hispanic Students Before Teacher Quality Release	-0.00 (-0.33)
Percent Change of Hispanic Students Since the Teacher Quality Release	0.05** (32.17)
Percent ELL Students Before Teacher Quality Release	0.02** (38.06)
Percent Change of ELL Students Since the Teacher Quality Release	0.23** (109.05)
Percent FRPL Students Before Teacher Quality Release	0.03** (45.76)
Percent Change of FRPL Students Since the Teacher Quality Release	0.03** (27.66)
Percent School Diversity Indices Students Before Teacher Quality Release	-0.00** (-3.09)
Percent Change of School Diversity Indices Students Since the Teacher Quality Release	-0.05** (-23.55)
*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level.	

School Demographics and Housing Price Changes for Households with Own Children Present

As the literature states, school demographics change more quickly than neighborhood demographics because some home buyers may not have school age children at the time of their move. The American Community Survey has data on the average number of children for the head of householder. Using this information, quartiles were created by the percentage of children for the head of householder. Areas in the top quartile of the population who live with their own children had the percentage of White students increase by 6.4% for each percentage point increase in the coefficient from Model 1 for weighted teacher quality in elementary school zones. In contrast, areas in the top quartile of the population who live with their own children had an increase of only 2.6%. The findings indicate that neighborhoods in these three boroughs that have a higher percentage of children living within the household have a higher percentage increase in the percentage of white students in the elementary public schools than other neighborhoods in these three boroughs. The data also indicate that neighborhoods in these three boroughs that have a higher percentage of children living within the household and a lower percentage of children in private schools have a higher percentage increase in the percentage of white students in the elementary public schools. These areas had an increase of 17.9% in White students.

On the other hand, the percentage of Black students increases at a higher rate for neighborhoods with a lower percentage of households with their own children present. Overall, the percent of Black students increase by 0.89% since the release of the teacher quality data for each percentage point increase in the coefficient from Model 1 for

weighted teacher quality in elementary school zones. However, in neighborhoods with a lower percentage of households with their own children present, the percent of Black students increases by 2.5% while it increases by 27.4% in other neighborhoods. In other words, the proportion of Black students increases at a higher rate in response to the data release in areas where there are fewer households with children present.

Table 24. Coefficients (T-stats underneath) for Regressions Looking at the Impact of the Coefficient from Model 1 Elementary Zones Weighted Average on Neighborhood Fixed Effects by Top and Bottom Quartile of Population living with Own Children

Dependent Variables	Top Quartile of Population living with Own Children	Bottom Quartile of Population living with Own Children	Top Quartile of Population living with Own Children and Bottom Quartile in Private School
Percent White Students Before Teacher Quality Release	0.02** (8.47)	-0.09** (-22.41)	0.01** (35.66)
Percent Change of White Students Since the Teacher Quality Release	0.63** (17.69)	0.26** (70.28)	1.79** (13.97)
Percent Black Students Before Teacher Quality Release	0.02** (11.60)	0.05** (52.75)	-0.02** (-5.02)
Percent Change of Black Students Since the Teacher Quality Release	0.25** (21.43)	2.74** (135.74)	0.78** (50.96)
Percent Hispanic Students Before Teacher Quality Release	-0.04** (-28.40)	-0.05** (-45.41)	0.01* (2.20)
Percent Change of Hispanic Students Since the Teacher Quality Release	-0.01** (-3.90)	0.24** (69.14)	-0.05** (-5.56)
Percent ELL Students Before Teacher Quality Release	-0.01** (-3.21)	0.04** (13.64)	0.00 (0.70)
Percent Change of ELL Students Since the Teacher Quality Release	0.04** (16.50)	0.16** (27.48)	0.01 (0.81)
Percent FRPL Students Before Teacher Quality Release	-0.01** (-22.66)	0.09** (50.25)	0.01** (40.25)
Percent Change of FRPL Students Since the Teacher Quality Release	0.00** (2.45)	0.06** (19.03)	-0.01** (-48.99)
Percent School Diversity Indices Students Before Teacher Quality Release	0.03** (27.41)	-0.03** (-31.89)	-0.14** (-24.84)
Percent Change of School Diversity Indices Students Since the Teacher Quality Release	-0.14** (23.45)	0.02** (6.85)	-0.45** (-20.87)
*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level.			

Similar results are seen for the proportion of Hispanic students. Overall, the percent of Hispanic students increases moderately in response to the teacher quality release (0.05%). Nevertheless, in neighborhoods with a lower percentage of households with their own children present, the percent of Hispanic students increases by 2.4% while it decreases by 0.1% in other neighborhoods. The data imply that the proportion of Hispanic students increases at a higher rate in response to the data release in areas where there are fewer households with children present.

Looking at the impact that the teacher quality data had on these three races within New York City public elementary schools points to an overall trend where the student composition of schools in areas where home buyers responded to the data release have changed. The composition of these schools has experienced an increase in their White population, a smaller increase in their Black population and a decrease in their Hispanic population. Additionally, the diversity indices of these schools have also changed. School diversity has decreased by 0.05% for each percentage point increase in the Model 1 coefficient for the weighted average elementary school teacher quality. In areas where a higher percentage of the residents have their own children living with them, school diversity indices have decreased by 1.4% while in other areas it has slightly increased by 0.2%. A decrease in school diversity is an indication that the student body is becoming less diverse as a result of the teacher quality release.

These changes in the elementary school student body are not just racial, they are also economic. The percent change of free and reduced priced lunch students since the teacher quality data release has increased only slightly (0.03%) for each percentage point increase in the coefficient for the weighted average elementary school teacher quality. In

areas where a higher percentage of residents have their own children living with them, the percent change of free and reduced priced lunch students decreased by 0.01% while it increased by 0.09% in other areas. The small decrease in free and reduced priced lunch students implies that the study body is becoming slightly wealthier as they respond to the teacher quality data release.

The results imply that housing prices are increasing in school zones that have experienced an increase in White students and a decrease in Latino students. Housing prices are increasing in elementary school zones that have become less diverse since the teacher quality data has been released. That being said, there is some evidence that housing prices are increasing in school zones that are predominately Black and the percentage of White students is increasing as well.

Model 2 is used to empirical investigate these impacts and the results from Model 2 are in Table 25. The data show that the release of the teacher quality data does not have a strong impact on school diversity. Even when looking at the impact by borough, there were no significant impacts observed across the three boroughs. However, there were two areas in Brooklyn where the release of elementary school teacher quality had an impact on school diversity indices - Central and Northwest Brooklyn. Prior to the release of the teacher quality data, Northwest Brooklyn had one of the highest percentages of White residents in comparison to the rest of Brooklyn. In fact, the majority of residents were White in Northwest Brooklyn at the time of the data release. In Central Brooklyn, the majority of the residents were Black and another 25% were Hispanic. As mentioned in the previous chapter, Northwest Brooklyn's White population increased since the data release and Central Brooklyn's Black and Hispanic population increased as well. In

Table 25. Model 2 Coefficients (with T-stats underneath) - Holding Neighborhoods Constant

	Elementary Schools			Middle Schools		
	School Diversity Indices During Data Release	Current School Diversity Indices	Change in Diversity Indices Since Data Release	School Diversity Indices During Data Release	Current School Diversity Indices	Change in Diversity Indices Since Data Release
Overall	0.03** (5.87)	0.03** (6.50)	0.04** (9.46)	0.03** (7.25)	0.02** (3.98)	-0.02** (-7.29)
Bronx	0.04** (3.54)	0.05** (4.29)	-0.01 (-0.81)	-0.04** (-5.99)	-0.06** (-7.98)	-0.01* (-2.41)
West Bronx	0.03 (1.41)	0.01 (0.45)	-0.04 (-1.45)	0.01 (0.48)	0.00 (0.00)	-0.02 (-1.55)
South Bronx	-0.01 (-0.28)	0.02 (0.76)	-0.08** (-2.74)	0.01 (0.80)	-0.06** (-3.07)	-0.05 (-1.24)
East Bronx	0.05** (4.05)	0.07** (5.22)	0.00 (0.11)	0.04** (-5.65)	-0.05** (-7.14)	-0.01 (-1.75)
Brooklyn	-0.01 (-1.19)	0.00 (0.14)	0.13** (12.48)	0.02* (2.85)	0.01 (1.12)	0.02** (4.30)
Central Brooklyn	-0.13** (-8.48)	-0.09** (-5.73)	0.26** (10.93)	-0.01 (-0.39)	0.00 (0.06)	0.10** (5.70)
Eastern Brooklyn	0.00 (0.17)	-0.01 (-0.50)	-0.09** (-4.01)	0.02 (1.38)	0.04* (2.36)	0.03** (3.34)
Northwest Brooklyn	0.03 (0.72)	0.05 (1.26)	0.15 (1.82)	---	---	---
Southeast Brooklyn	-0.01 (-0.77)	-0.00 (-0.15)	0.10** (6.79)	0.01 (0.77)	-0.01 (-1.73)	-0.01 (-1.37)
Southern Brooklyn	-0.07 (-1.52)	-0.05 (-1.16)	0.03 (1.62)	0.03* (1.97)	0.03* (2.00)	0.00 (0.87)
Southwest Brooklyn	0.07** (3.02)	0.03 (1.35)	0.03 (1.95)	0.09** (7.78)	0.04** (4.81)	0.00 (0.11)
Queens	0.04 (8.09)	0.04** (7.18)	0.00 (0.11)	0.04** (6.51)	0.03** (4.90)	-0.03** (-11.44)
Northeast Queens	0.14** (14.07)	0.08** (7.28)	0.00 (1.10)	-0.04** (-5.48)	-0.02* (-2.67)	0.03** (10.23)
Northwest Queens	-0.02* (-2.79)	-0.02** (-3.46)	-0.01** (-4.67)	0.10** (10.05)	0.08** (9.03)	-0.00* (-2.60)
Rockaways	0.00 (0.18)	-0.03 (-1.53)	-0.08** (-4.33)	0.38** (25.02)	0.32* (22.94)	-0.15** (-17.14)
Southeast Queens	0.03* (2.38)	0.02 (1.45)	-0.05** (-4.11)	-0.04** (-3.40)	-0.03* (-2.12)	-0.09** (-11.03)
Southwest Queens	0.11** (14.39)	0.12** (14.58)	0.02** (6.14)	0.04** (5.79)	-0.01 (1.39)	-0.01** (-4.23)
*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level.						

addition, Central Brooklyn experienced an 18.2% increase in the proportion of its population with a Bachelor's degree and a 22.7% increase in the proportion of its population with a graduate degree.

These two areas in Brooklyn experienced two of the largest changes in residential demographics since the release of the data and to the portion of the population that was already the majority. The fact that these changes are so large at the residential level is probably why the findings at the school demographic level are more apparent than the rest of the three boroughs. On top of that, in Central Brooklyn, an increase in elementary and middle school teacher quality ratings has a positive impact on the percent change in school enrollment. A 10 percentage point increase in teacher quality in Central Brooklyn increases enrollment by 1.8% in elementary schools and 1.1% in middle schools.

In the three boroughs, school zones with higher teacher quality experienced a greater increase in its population than their counterparts. Overall, a 10 percentage point increase in teacher quality increased enrollment by 10.0% in elementary schools and 20.5% in middle schools. While there is some movement occurring at the school level in terms of demographics, it is not happening at the same rate for all neighborhoods as it has for residential demographics. However, areas with a high percentage of residents with their own children and a low percentage of children in private school had school racial profiles change since the teacher quality data release. Areas that had their housing prices impacted by the data release had an increase in White and Black students and a decrease in school diversity indices.

CHAPTER 6

TEACHER QUALITY AND TITLE I SCHOOLS

Using the value added rankings and school report card data, proportions of teachers with high teacher quality in Title I and non-Title I schools were created. This chapter analyzes student access to effective teaching based on whether or not they attend a Title I school and the findings show that students in Title I schools do not have equal access to effective teaching. In order to do so, the Title I teaching gap was calculated. This gap measures the average teacher quality of students in Title I schools in comparison to the average teacher quality of students in non-Title I schools. A positive gap means that on average students in Title I schools have lower quality teachers than the students in non-Title I schools. A negative gap means that the Title I schools have higher quality teachers and a zero gap implies that there teacher quality is equal between Title I and non-Title I schools in each community district.

Teacher Quality Gap between Title I and non-Title I Schools

The results show that students in Title I schools do not have equal access to high teacher quality on average across the Public Use Microdata Areas (which are similar to the Community School Districts). Teachers in Title I schools have lower teacher quality than teachers of non-Title I schools. Put differently, the typical student in a Title I school has access to a lower quality teacher than the average student in a non-Title I school by 16% in Elementary Schools.

Access to high quality teachers varies across community school districts. The weighted average of career teacher quality ranged from community school districts with nearly equal access to community school districts with gaps as large as 0.30. The gaps

are statistically significantly larger for middle school zones than for elementary school zones and are similar across ELA and Math teachers within elementary and middle school zones (Table 26).

Table 26. Descriptive Statistics for Title I vs non-Title I Teacher Quality Gaps

	Average	Std. Dev.	Min	Max
Non-Title I vs Title I Gap in Elementary Schools for All Teachers	0.16	0.03	0.09	0.29
Non-Title I vs Title I Gap in Elementary Schools for ELA Teachers	0.16	0.04	0.07	0.26
Non-Title I vs Title I Gap in Elementary Schools for Math Teachers	0.16	0.03	0.09	0.31
Non-Title I vs Title I Gap in Middle Schools for All Teachers	0.21	0.05	0.07	0.32
Non-Title I vs Title I Gap in Middle Schools for ELA Teachers	0.20	0.05	0.08	0.30
Non-Title I vs Title I Gap in Middle Schools for Math Teachers	0.21	0.06	0.07	0.35

Title I vs Non-Title I Schools Teacher Quality Gap and Student Demographics

In order to examine the reasons for the teacher quality gap, differences across neighborhood and school demographics in comparison to the teacher quality gap were analyzed. There is a direct relationship between the elementary school teacher quality gap and the percent change in English Language Learners at the elementary schools (Table 27). There was a larger teacher quality gap between Title I and non-Title I schools in areas that experienced an increase in English Language Learners since the data release. This most likely exists because there are more English Language Learners in Title I schools.

There is also a direct relationship between the percent change in Hispanic students since the data release and the teacher quality gap. The teacher quality gap is larger in elementary school districts that have experienced an increase in Hispanic students since

the teacher quality data was released. This relationship does not exist for middle school districts. The findings lend support to the claim that Hispanic students are put at a disadvantage when they are in Title I schools since their teachers are of lower quality. The gap between Title I and non-Title I schools has negative implications for both English Language Learners and Hispanic students.

Table 27. Non-Title I vs Title I Gap in Teacher Quality and Selective School and Residential Demographics Correlations (with p-values)

	% Change in Hispanic Students Since Release	% Change in Black Students Since Release	% Change in ELL Students Since Release	% Change in Household Income Since Release	% Change in Educational Attainment Since Release
All Elementary Teachers	0.31* (0.05)	0.19 (0.24)	0.35* (0.02)	-0.29 (0.07)	-0.10 (0.53)
ELA Elementary Teachers	0.29* (0.07)	0.25 (0.11)	0.36* (0.02)	-0.20 (0.21)	-0.10 (0.52)
Math Elementary Teachers	0.29* (0.07)	0.11 (0.50)	0.29 (0.06)	-0.37* (0.03)	-0.09 (0.57)
All Middle School Teachers	-0.40** (0.01)	-0.11 (0.51)	-0.02 (0.90)	-0.16 (0.35)	-0.13 (0.43)
ELA Middle School Teachers	-0.25 (0.12)	0.06 (0.70)	0.08 (0.63)	-0.26 (0.12)	-0.10 (0.52)
Math Middle School Teachers	-0.36* (0.03)	-0.06 (0.74)	-0.04 (0.79)	-0.22 (0.18)	-0.11 (0.49)
*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level.					

The data generated by the correlations found in Table 27 also show that there is a direct relationship between the percent change in Black elementary students since the data release and the teacher quality gap. The relationship is not statistically significant, but the trend is similar to that found in the percent change in Hispanic elementary school

students. The gap between Title I and non-Title I schools also has negative implications for Black students.

There is an inverse relationship between both household income and the percent of the population with a Bachelor's degree or higher in comparison to the teacher quality gap. As the average household income decreases in school zones, the teacher quality gap between Title I and non-Title I schools increases. The relationship is statistically significant for all elementary school teachers and elementary Math teachers. Although the relationship between educational attainment and the teacher quality gap is not statistically significant, as the percentage of residents with a Bachelor's degree or higher decreases, the teacher quality gap increases. This implies that there may be a reshuffling of wealthy White parents and there is some crowding out taking place.

The results yielded by this analysis provides convincing evidence that students in Title I schools have access to lower quality teachers than students in non-Title I schools. The data also appears to suggest that the students who are most impacted by this gap are English Language Learners, Black students and Hispanic students – three of the most underrepresented populations in high educational attainment and achievement. These school zones with large gaps between Title I and non-Title I schools are less educated and less affluent than school zones with smaller gaps that are closer to zero.

The foregoing chapters point out that areas with low educational attainment and housing household were not among the areas where home buyers responded to the teacher quality data release. Home buyers were drawn to areas that were in the second to lowest quartile in both household income and educational attainment. Home buyers also responded to the teacher quality data release in areas that experienced an increase in both

household income and educational attainment. Areas with low household income and educational attainment at the time of the release and a decrease in both since the release had lower housing prices in response to teacher quality data.

However, when investigating the impact of the teacher quality release on housing prices in Title I school zones versus non-Title I school zones, housing prices increase at a much higher rate in Title I elementary school zones. Table 28 provides the coefficients for the impact of teacher quality on housing prices for elementary school zones. The data indicate that housing prices increase by 11.5% in Title I school zones for every 10 percent increase in teacher quality. On the other hand, housing prices increase by 1.5% for non-Title I elementary school zones. These differences between Title I and non-Title I schools are also seen for elementary ELA teachers and elementary math teachers.

Table 28. Coefficients (with T-stat underneath) from Regressions for Weighted Career Elementary School Teacher Quality by Title I School Status

	All	Math	ELA
Title I	1.15**	1.20**	1.04**
	(5.00)	(5.29)	(4.55)
Non-Title I	0.15	0.17	0.12
	(0.66)	(0.84)	(0.58)
*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)			

In middle school zones, housing prices increased at a lower rate for Title I school districts for all teachers and for Math teachers. Nevertheless, as the weighted career average teacher quality of ELA teachers in middle schools increases by 10 percentage point, housing prices in Title I middle school districts increase by 4.4%. Housing prices increase by 1.4% for every 10 percentage point increase in the weighted career average teacher quality for ELA middle school teachers (Table 29).

Table 29. Coefficients (with T-stat underneath) from Regressions for Weighted Career Middle School Teacher Quality by Title I School Status

	All	Math	ELA
Title I	0.52* (2.71)	0.51* (2.75)	0.44* (2.30)
Non-Title I	0.54** (3.04)	0.60** (3.77)	0.14 (0.88)
*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)			

There are some slight differences by borough when looking at the impact of teacher quality on housing prices by Title I school status. The most significant finding is in Brooklyn. Housing prices increase by 11.8% in Title I school districts for every 10 percentage point increase in weighted career teacher quality, while housing prices decrease by 4.3% in non-Title I school districts (Table 30). This data would imply that home buyers are responding to the teacher quality data release in Title I school districts more strongly than they are in non-Title I school districts.

Table 30. Coefficients (with T-stat underneath) from Regressions for Weighted Career Elementary School Teacher Quality by Title I School Status and Borough

	Bronx	Brooklyn	Queens
Title I	1.88* (2.14)	1.18** (5.32)	0.95** (2.78)
Non-Title I	1.21 (1.63)	-0.43** (-3.97)	0.59 (1.39)
*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)			

Title I Funding and Teacher Quality Gap

Through the Title I program, the federal government spends billions of dollars a year to districts to ensure that students from low-income families get extra services and supports. Before Title I money is distributed, it presumes that there are equal educational

opportunities for all students and that the Title I funds provides extra money for these students. However, the way that teachers are assigned to schools makes the assumption demonstrably false.

As the results show, there is a gap in teacher quality between Title I and non-Title I schools. The schools that have the most low-income children get the most Title I money, but they also get the least in terms of teacher quality. Title I schools are more likely to have lower quality teachers and for the most part, these teachers are paid less because they are the less experienced teachers. Consequently, schools actually spend less money in Title I schools than in other schools, even after the addition of Title I funds.

For every 1 percentage point increase in the weighted average teacher quality for Elementary school teachers, total per pupil funding decreases by $5589.74. Total per pupil funding decreases at a lower rate in Bronx Elementary schools. For every 1 percentage point increase in weighted average career teacher quality, per pupil funding in the Bronx decreases by $21831.43 (Table 31). These results provide evidence that there is an inverse relationship between total per pupil funding and teacher quality in Elementary schools and especially in the Bronx where 99% of schools are Title I schools.

There is also an inverse relationship between Title I funding and Elementary school teacher quality. For every 1 percentage point increase in the weighted average teacher quality for Elementary school teachers, Title I per pupil funding decreases by $455.23. Title I per pupil funding decreases at a lower rate for the Bronx and Queens Elementary schools. For every 1 percentage point increase in weighted average career teacher quality, Title I per pupil funding in the Bronx decreases by $1154.49 and $976.37 in Queens (Table 31).

Table 31. Per Pupil Funding Regressions for Elementary Schools (T-Stats underneath Coefficients)

	All Elementary Schools PUMA Fixed Effects (42 categories)		Bronx Elementary Schools PUMA Fixed Effects (10 categories)		Brooklyn Elementary Schools PUMA Fixed Effects (18 categories)		Queens Elementary Schools PUMA Fixed Effects (14 categories)	
	Per Pupil Total Funding	Per Pupil Title I Funding	Per Pupil Total Funding	Per Pupil Title I Funding	Per Pupil Total Funding	Per Pupil Title I Funding	Per Pupil Total Funding	Per Pupil Title I Funding
Weighted Average Career Teacher Quality	-5589.74** (-2.71)	-455.23** (-2.18)	-21831.43** (-4.22)	-1154.49** (-2.61)	2166.21 (0.66)	365.57 (1.07)	-2194.69 (-0.93)	-976.37** (-3.17)
Constant	19359.59	1007.39	22904.94	1425.39	18423.32	953.21	17706.59	791.60
N	923	923	204	204	408	408	311	311
R^2	0.2376	0.5338	0.2475	0.5572	0.1424	0.3271	0.1550	0.4323
Adjusted R^2	0.2368	0.5116	0.2085	0.5342	0.1027	0.2960	0.1151	0.4055
*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (Dependent variable is weighted career teacher quality)								

The results for Middle school total and Title I per pupil funding were not significant for all middle schools in the three boroughs or for the Bronx. There is a direct relationship between total per pupil funding and teacher quality for all three boroughs. For every 1 percentage point increase in the weighted average teacher quality for Elementary school teachers, total per pupil funding increases by $539.09. Total per pupil funding increases at a higher rate in Queens Middle schools. For every 1 percentage point increase in weighted average career teacher quality, per pupil funding in the Bronx increase by $18228.20 (Table 32). There is an inverse relationship between total per pupil spending and teacher quality in Brooklyn, where total per pupil funding decreases by $10414.08 for every 1 percentage point increase in weighted average career teacher quality (Table 31).

Table 32. Per Pupil Funding Regressions for Middle Schools (T-Stats underneath Coefficients)

	All Middle Schools PUMA Fixed Effects 39 categories		Bronx Middle Schools PUMA Fixed Effects 10 categories		Brooklyn Middle Schools PUMA Fixed Effects 15 categories		Queens Middle Schools PUMA Fixed Effects 14 categories	
	Per Pupil Total Funding	Per Pupil Title I Funding	Per Pupil Total Funding	Per Pupil Title I Funding	Per Pupil Total Funding	Per Pupil Title I Funding	Per Pupil Total Funding	Per Pupil Title I Funding
Weighted Average Career Teacher Quality	539.09 (0.37)	-147.21 (-0.64)	-131.33 (-0.07)	-402.29 (-1.00)	-10414.08** (-4.17)	-1094.66** (-3.23)	18228.20** (5.57)	1920.54** (4.38)
Constant	17703.09	1098.97	19407.88	1448.77	20216.20	1415.38	11952.41	249.00
N	558	558	170	170	188	188	200	200
R^2	0.4192	0.5683	0.2102	0.4960	0.3185	0.4505	0.5234	0.5194
Adjusted R^2	0.3752	0.5359	0.1605	0.4643	0.2590	0.4026	0.4873	0.4831
*Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (Dependent variable is weighted career teacher quality)								

There is an inverse relationship between Title I funding and Middle school teacher quality. For every 1 percentage point increase in the weighted average teacher quality for Middle school teachers, Title I per pupil funding decreases by $147.21. Title I per pupil funding decreases at a lower rate for the Brooklyn Middle schools. For every 1 percentage point increase in weighted average career teacher quality, Title I per pupil funding in the Brooklyn decreases by $1094.66 (Table 32).

Although the findings in this chapter show there is a large teacher quality gap between Title I and non-Title I schools, the data also show that home buyers are more inclined to purchase a home in a Title I school district. This may be because they are searching for opportunities to buy lower cost houses served by “hidden” higher quality schools. The correlations between the teacher quality gap and selected school and

neighborhood demographics show that the gap is larger in areas where there are more English Language Learners, Black and Hispanic students and schools are in areas that are not as affluent or educated. However, the regressions by Title I status provide strong evidence that as home buyers respond to the higher teacher quality in some of these Title I school zones, that neighborhood demographics will change and school demographics eventually will as well.

CHAPTER 7

DISCUSSION AND CONCLUSION

Impact on Housing Prices

The results in this study provide the first evidence of the effects of teacher quality measures on the housing market in New York City. The data suggest that the housing market responds significantly to the new information that was provided by the release of the teacher quality information, even when taking into consideration the school grades and other variables that may influence teacher quality measures. These results suggest that the highly debated release of teacher quality information may have large implications on housing choices and policy-makers should be cautious when releasing this information. When teacher quality is high, then housing prices increase and this changes the demographics of both the neighborhood and school zone.

Home buyers value teacher quality in elementary schools where a higher percentage of the teachers have been rated. Teachers who have not been in their school for three years or more did not receive a teacher quality score and as the literature states, teacher retention is low in schools that serve predominately underrepresented populations. Therefore, these schools would have less of their teachers included in the teacher quality data release than higher performing schools where teachers remain for longer periods of time.

Overall, the results from Model 1 show that the teacher quality of elementary teachers had a stronger impact on housing prices than the teacher quality of middle school teachers. Middle school zones have started to become unzoned in many areas in New York City and the unzoning may have contributed to the weaker relationship

between housing prices and teacher quality data. In addition, middle schools are bigger and draw from a wider radius than elementary schools do. Because of this, parents have more control over peers and school quality when selecting housing for elementary school kids. While the wealthy buy out of public school completely, the upper class buy out by either middle school or high school and this may cause the weaker relationship between teacher quality and housing prices for middle schools.

Home buyers also favor the teacher quality of mathematics teachers over English teachers. With the recent push toward science, technology, engineering and mathematics in schools and in society, parents may want to ensure that their children are prepared for both college and the workforce by making sure that they have high quality mathematics teachers.

The data was only provided for one year and there is no indication that the data will be available to the public again. In previous studies where the impact of school grades on housing prices was examined, they had several years of data. Figlio and Lucas (2004) found that as the data continued to be released, the impact on housing prices each year was not as strong as it was in the first year. Imberman and Lovenheim (2013) found that the release of teacher quality data over time was also not impactful, especially when the data is conflicting as it was in Los Angeles where the data was provided from several sources. If the data was released annually for several years, the impact would probably weaken over time as there would be no new information provided each year.

Although these trends found in the results from Model 1 are consistent in all three boroughs, the impact of teacher quality on housing prices is not uniform throughout the three boroughs. Brooklyn experienced the smallest impact on housing prices while the

Bronx experienced the largest impact on housing prices in elementary school zones and Queens had the largest impact of housing prices in middle school zones. This most likely occurred because the Bronx and Queens had lower average housing prices before the teacher quality data was released and therefore had more room to grow than housing prices did in Brooklyn.

Neighborhood Demographic Changes

Areas that had their housing prices impacted the most by the release of their teacher quality data were not among the most affluent, but instead in the second to the lowest quartile for housing values and household income. These areas have experienced an increase in household income, educational attainment and housing values since the teacher quality data has been released. In fact, in some cases, there is evidence that household income in areas that were once in the second to last quartile are now moving into higher quartiles and in some cases exceeding that of other neighborhoods.

The release of the teacher quality data may have had some impact on increasing the average household income and educational levels in the less affluent, less educated neighborhoods in the three boroughs. This may imply that the people who may be responding to the new teacher quality data are educated middle-class residents who are interested in living in upcoming neighborhoods. Furthermore, the results show that home buyers who are responding to the data release are predominately White and are displacing Black and Hispanic residents.

School Demographic Changes

The literature states that school demographics change at a faster rate than residential demographics because home buyers normally have young school aged

children while those who remain in homes are older without school aged children. While the results did not show any drastic changes in school demographics, the data indicate that home buyers favor homes in school zones where the percentage of free and reduced price lunch for elementary school students is higher and teacher quality is also higher. In doing so, the demographics of the school zones should also be impacted. The small decrease in free and reduced priced lunch students implies that the study body is becoming slightly wealthier as they respond to the teacher quality data release.

The findings indicate that neighborhoods in these three boroughs that have a higher percentage of children living within the household have a higher percentage increase in the percentage of white students in the elementary public schools than other neighborhoods in these three boroughs. The composition of these schools has experienced an increase in their White population, a smaller increase in their Black population and a decrease in their Hispanic population. Additionally, the diversity indices of these schools have also changed.

The results show that housing prices are increasing in school zones that have experienced an increase in White students and a decrease in Latino students. Housing prices are increasing in elementary school zones that have become less diverse since the teacher quality data has been released. There is also some evidence that housing prices are increasing in school zones that are predominately Black and the percentage of White students is increasing as well.

Title I

On average, Title I schools do not have equal access to high teacher quality on average across the Public Use Microdata Areas (which are similar to the Community

School Districts). The typical student in a Title I school has access to a lower quality teacher than the average student in a non-Title I school. The teacher quality gap is larger in elementary school districts that have experienced an increase in Hispanic students, Black students or English Language Learners since the teacher quality data was released.

The gap between Title I and non-Title I schools has negative implications for English Language Learners, Black, and Hispanic students – three of the most underrepresented populations in high educational attainment and achievement. These school zones with large gaps between Title I and non-Title I schools are less educated and less affluent than school zones with smaller gaps that are closer to zero. Interestingly, the data also show that home buyers are more inclined to purchase a home in a Title I school district.

Policy Implications

If low- and moderate-income neighborhoods have large price increases because of high valued-added effects, the data release might have a caused a "pricing out" of these families, inadvertently hurting the very people the release was designed to help. The capitalization of teacher quality value added measures into housing prices in New York City has also impacted the demographics of the schools as well. As the demographics of the neighborhood change, the demographics of the neighborhood schools have also changed.

The data release increased housing prices in these three boroughs and therefore increased the tax base from which the school system gets approximately 29% of its funding (Independent Budget Office, 2013). As wealthier people move into these poor areas and increase the housing prices, the tax base increases as well. Table 33 shows that

areas with teacher quality scores in the top quartile produce $78,943,701.36 more in property tax revenues that go toward education funding. Since the difference in total housing sales prices is approximately 15%, it is rational to think that the entire $78.9 million in property tax revenues was caused by the higher teacher quality. However, as the results show, the average housing price increased by 7.9% in these three boroughs for every 10 percentage point increase in teacher quality. Therefore, approximately 50% of the difference in property tax revenue was caused by the teacher quality release.

Table 33. Total Sales and Property Tax Revenue After Release by VAM Quartile

	Sales in Areas with Top Quartile VAM	Sales in Areas with Bottom Quartile VAM	Difference between VAM Top and Bottom Quartile
Total Price of Sales in Tax Class 1	$ 3,206,387,917.80	$ 2,787,998,180.40	$ 418,389,737.40
Total Property Tax Revenue Collected from Sales	$ 605,376,952.46	$ 526,433,251.09	$ 78,943,701.36

If this is the case, the release in teacher quality data has the tax base through the increase in housing prices. The increase in the tax base directly impacts the city budget and therefore the New York City Department of Education budget. The release of this information has caused wealthier people to buy homes in areas where housing was worth less and they have had a direct impact on the housing values in those areas. While Table 33 does not investigate the impact of that the increase in overall housing values in these areas, it is highly likely that these increases in housing values have also contributed to a higher tax base providing the city and the schools with more money for their budget.

Based on this information, the release of the teacher quality data has had a positive impact on not only the lower income neighborhoods (by increasing housing

values, household incomes and educational attainment), but also the tax base and overall city and school budget. Moving forward, school districts and the cities that they are located in should consider these positive impacts when considering the release of teacher quality data. While releasing the names of the teachers with their teacher quality scores might not be advised, the anonymous aggregated release of teacher quality scores by grade and subject may have the same positive impact on the tax base.

At the same time, as districts continue to evaluate teachers based on teacher scores and some scores become public, the impact on residential and school segregation should be considered. Since only the more affluent have the means to respond to the information, it puts the lower classes at a disadvantage and forces them to remain in schools with lower teacher quality. Research shows that segregated schools have fewer resources than schools in more affluent areas and those students who attend these schools receive a substandard education. As more federal initiatives emphasize measuring teacher effectiveness and ensuring that disadvantaged students have equal access to effective teachers, there needs to be stronger efforts to promote the equitable distribution of effective teachers.

The release of the data was released over a year after Joel Klein left his position of almost ten years as New York City School Chancellor. The Children First reforms began in 2003 while he was Chancellor. These reforms evolved over time from an initial focus on establishing coherence, stability and rigor in the system to empowerment, leadership and accountability. These reforms included a combination of mayoral control and fundamental restructuring of the system, introduction of accountability practices, test-based metrics, human capital models from the business sector, and implementation of

popular reform strategies like small high schools, public school choice and school closure.

Among the issues that the Children First reforms addresses is the issue of teacher quality. Improving the quality of teachers has been a core strategy for school improvement in the New York City reform effort. Prior to Children First, data show great variability in the quality of New York City's teachers, which is consistent with a simple theory of teacher labor markets that predicts that lower quality teachers will be disproportionately found in schools with low-achieving, poor and nonwhite students. As part of its Children First education reform initiative, the New York City Department of Education instituted a number of changes in the way it recruits, assigns, develops, retains and evaluates its teachers. In addition to an increase in teacher compensation and incentives to attract teachers to high-need schools, the New York City Department of Education developed an alternative certification program (the Teaching Fellows program) and altered its recruitment efforts, its selection model, and the timing of offers for teachers. Furthermore, the New York City Department of Education developed new tools for teacher evaluation, and intensified expectations for tenure. Part of the initiatives included these value added teacher rankings that were used in teacher's personnel files to decide tenure (O'Day, Bitter, & Gomez, 2011).

O'Day, Bitter and Gomez (2011) found evidence that the efforts to recruit and select more effective teachers, primarily through the Teaching Fellows program, were effective. They also found that the impact of more rigorous evaluation of teachers were too new to understand how they may have affected student outcomes. Even though the qualifications of teachers in New York City's lowest-performing schools have improved,

more needs to be done to increase the quality of teachers in all New York City public schools.

Ineffective teachers in any classroom negatively impacts students and having areas with a concentration of ineffective teachers does students a disservice. New York City needs to address these issues, especially since middle class parents are responding to teacher quality within schools and changing the demographics of areas with high quality teachers. As the literature states, principals are virtually powerless to remove ineffective teachers from their schools and the schools in poor areas have a hard time retaining high quality teachers. Combinations of policies are needed to attract high quality teachers to high needs schools need to be implemented and to allow principals to fire ineffective teachers. Providing high quality teachers with a monetary incentive to work in high needs areas may increase teaching quality at these schools and would be a good use of Title I funds. In addition, changing the tenure process from one that effectively giving all teachers tenure after three years to one that provides more professional development to allow teachers to become high quality teachers before they are granted tenure would allow principals to fire some of their lowest quality teachers while giving their other teachers a chance to improve.

Additionally, as the results in this study show, the more educated and more affluent parents are the ones responding to the teacher quality release. This would imply that some parents are not aware of the teacher quality within the schools and/or classrooms. Similar to how parents are informed of school quality status and given the option to send their child to another school if it is failing, parents should be told if their child is assigned to a class with an ineffective teacher and given the option to request a

different teacher. Of course, there is an issue with having enough high quality teachers to teach students, but at the very least, schools should be forbidden from assigning a student to a class with an ineffective teacher two years in a row. Furthermore, there should be a cap on how many ineffective teachers can be allowed to remain in a school each year so that schools in low-income areas aren't inundated with low quality teachers.

The New York City Department of Education has been dealing with the racial and economic concentration of students for years. While some of the school policies have attempted to address these issues by providing alternate school options like charter schools and having middle and high schools be based on a choice model rather than a residential address, there are still schools in New York City that are predominately minority and low-income. The results from the middle school zones were not as strong as they were in the elementary school zones. This might occur because middle schools are big and draw from a wider radius. Parents have more control over peers and school quality when selecting housing for elementary school kids. While the wealthy buy out of public school completely, the upper class buy out by either middle school or high school.

Since New York City is has a high rate of residential racial and economic segregation, removing address-driven restrictions would desegregate schools and allow students in these areas to attend schools with higher quality teachers. The removal of zoning might also encourage teachers to remain in their schools even if they are in low-income areas since the demographics of the neighborhood may not be reflected in the school demographics.

Addressing residential segregation is another issue that needs to be considered when looking at how neighborhood demographics have shifted since the release of

teacher quality data. As areas with high quality teachers become more affluent, it is important that the lower classes are not priced out of the neighborhoods. The results show that the neighborhoods with the second to lowest concentrations of poverty, and educational attainment are the areas that had the highest increase in housing prices since the release of the teacher quality data. These neighborhoods have become more affluent and more educated. It is important that the original residents of these neighborhoods are not priced out. One way to make sure that gentrification does not displace these residents is to implement inclusionary zoning policies (similar to those in Montgomery County, Maryland). As new housing developments are built, a certain percentage of them should consist of lower-priced housing or workforce housing. This would ensure that the lower class residents can still afford to live in these areas and take advantage of the high quality teachers.

Limitations of Study

While this study has provided the first information about the teacher quality release and the impact that is has had in New York, there are some limitations to the study. For instance, the housing crisis was still underway when the teacher quality data was released. Since the housing crisis was still occurring in 2012, housing prices may not have responded in the same way as it would have if there was not a housing crisis. However, the study looks at housing prices from 2009 to 2013 which all falls into the housing crisis bubble so housing prices should be impacted in the same way throughout the study.

New York City is also predominately a renter based market. Since most residents in New York City rent their apartments and home buyers are often not living in these

residences, then it is hard to determine if the relationship between housing prices and teacher quality is as clear as the model makes it out to be. Incorporating rental prices would also give a more in depth look at the property values since rental leases are yearly and homes are not repurchased that often.

Another limitation is the way that segregation was calculated. While segregation indices give an estimate of overall segregation, dissimilarity indices might have been better because it would be a comparison between two subgroups like White and Black residents. It is difficult to ascertain the movement of different races from the segregation indices. Assumptions have to be made based on racial demographic changes over time.

One final limitation is the lack of access to which teachers in the teacher quality release are Title I teachers. Although there are whole schools that are considered Title I, there are other schools that have Title I programming where teachers are designated as Title I teachers. Schools that had some Title I teachers but were not considered Title I schools were not included in the Title I versus non-Title I comparisons. Including these teachers could have provided more thorough results.

Moreover, New York City does not have a one-to-one match between residential address and school location as other cities may have because many of the affluent residents will send their children to private schools and there are a number of homes that may not have any children present. New York City also has a high number of non-owner occupied housing (i.e.: renters) and not including rent prices in the model may bias the results. There is also more information on rent prices because of the nature of leases and rent changing annually in most cases; whereas sales prices will only change if the house,

condo, or co-op is sold. Not only that, but there will be more information in areas with newly developed housing.

Future Research

By gaining access to the list of Title I teachers who received teacher quality scores, the questions about Title I teachers could have been better answered. What contributes to disparities in teacher quality among Title I and non-Title I teachers and did of the teacher quality data have an impact on the gap between Title I and non-Title I schools.

Also looking at the data from a human capital perspective would give some perspective into how teachers use teacher quality ratings to decide which schools they want to work at. Are high quality teachers drawn to schools with other high quality teachers? An analysis of teacher movement across schools in New York City would help to understand the impact of the data release on teachers.

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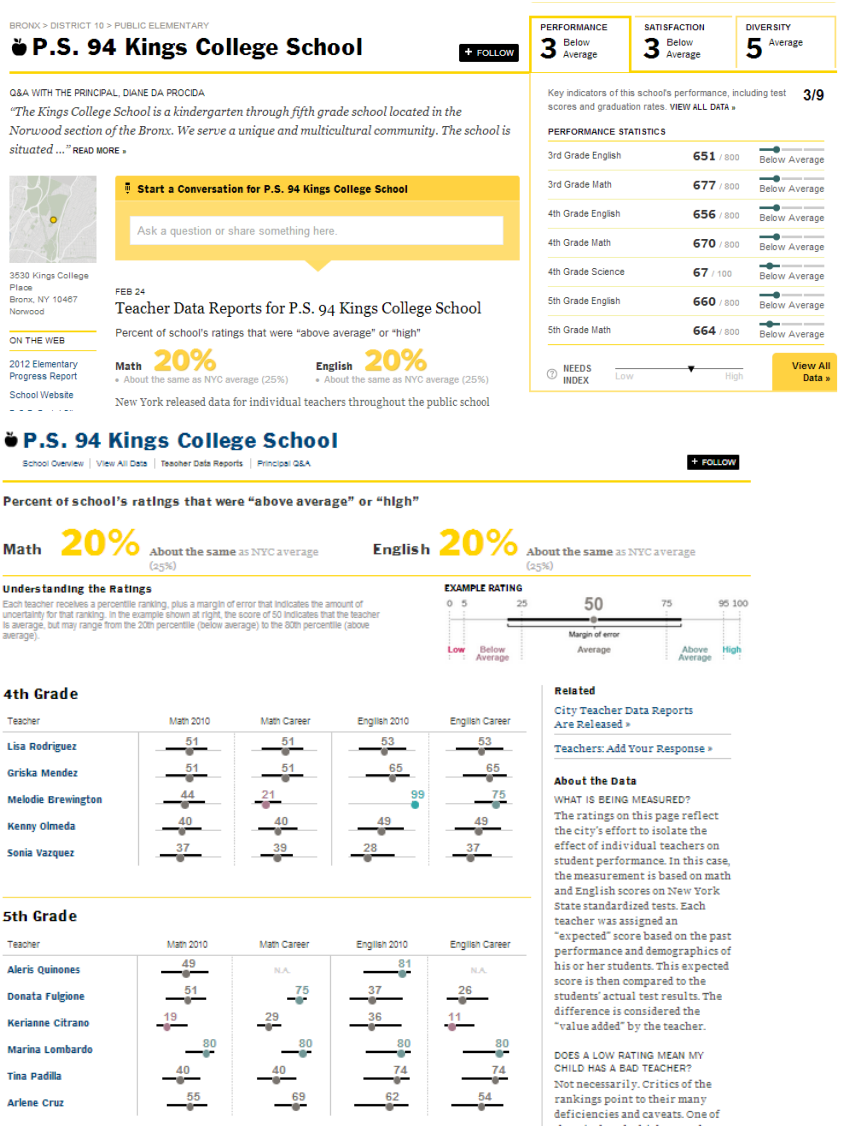
APPENDICES

Appendix A. Snapshots of New York Times School Book Website



BRONX > DISTRICT 10 > PUBLIC ELEMENTARY

P.S. 94 Kings College School

+ FOLLOW

PERFORMANCE 3 Below Average | SATISFACTION 3 Below Average | DIVERSITY 5 Average

Q&A WITH THE PRINCIPAL, DIANE DA PROCIDA

"The Kings College School is a kindergarten through fifth grade school located in the Norwood section of the Bronx. We serve a unique and multicultural community. The school is situated ..." READ MORE »

Key indicators of this school's performance, including test scores and graduation rates. VIEW ALL DATA » 3/9

PERFORMANCE STATISTICS

3rd Grade English	651 / 800	Below Average
3rd Grade Math	677 / 800	Below Average
4th Grade English	656 / 800	Below Average
4th Grade Math	670 / 800	Below Average
4th Grade Science	67 / 100	Below Average
5th Grade English	660 / 800	Below Average
5th Grade Math	664 / 800	Below Average

NEEDS INDEX Low High

View All Data »

Start a Conversation for P.S. 94 Kings College School

Ask a question or share something here.

3530 Kings College Place
Bronx, NY 10467
Norwood

ON THE WEB

2012 Elementary Progress Report

School Website

FEB 24

Teacher Data Reports for P.S. 94 Kings College School

Percent of school's ratings that were "above average" or "high"

Math 20% About the same as NYC average (25%)

English 20% About the same as NYC average (25%)

New York released data for individual teachers throughout the public school

P.S. 94 Kings College School

School Overview | View All Data | Teacher Data Reports | Principal Q&A

+ FOLLOW

Percent of school's ratings that were "above average" or "high"

Math 20% About the same as NYC average (25%)

English 20% About the same as NYC average (25%)

Understanding the Ratings

Each teacher receives a percentile ranking, plus a margin of error that indicates the amount of uncertainty for that ranking. In the example shown at right, the score of 50 indicates that the teacher is average, but may range from the 20th percentile (below average) to the 80th percentile (above average).

EXAMPLE RATING

0 5 25 50 75 95 100

Margin of error

Low Below Average Average Above Average High

4th Grade

Teacher	Math 2010	Math Career	English 2010	English Career
Lisa Rodriguez	51	51	53	53
Griska Mendez	51	51	65	65
Melodie Brewington	44	21	99	75
Kenny Olmeda	40	40	49	49
Sonia Vazquez	37	39	28	37

5th Grade

Teacher	Math 2010	Math Career	English 2010	English Career
Aleris Quinones	49	N.A.	81	N.A.
Donata Fulgione	51	75	37	26
Kerianne Citrano	19	29	36	11
Marina Lombardo	80	80	80	80
Tina Padilla	40	40	74	74
Arlene Cruz	55	69	62	54

Related

City Teacher Data Reports Are Released »

Teachers: Add Your Response »

About the Data

WHAT IS BEING MEASURED?

The ratings on this page reflect the city's effort to isolate the effect of individual teachers on student performance. In this case, the measurement is based on math and English scores on New York State standardized tests. Each teacher was assigned an "expected" score based on the past performance and demographics of his or her students. This expected score is then compared to the students' actual test results. The difference is considered the "value added" by the teacher.

DOES A LOW RATING MEAN MY CHILD HAS A BAD TEACHER?

Not necessarily. Critics of the rankings point to their many deficiencies and caveats. One of

Appendix B. Regressions for Elementary School Zones (T-Stat underneath Coefficient)

	All Fixed effects - PUMA & Seasons (42 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0459** (-2.96)	-0.0467** (-3.01)	-0.0462** (-2.98)	-0.0464** (-2.99)	-0.0464 (-2.99)
All Condos (Compared to 2 Fam Homes)	-4.3193** (-19.50)	4.2226** (-18.88)	-4.3357** (-19.57)	-4.2116** (-18.83)	-4.3245 (-19.52)
Age of Home Sold	-0.0046** (14.99)	-0.0046** (15.09)	-0.0046** (15.10)	-0.0046** (15.08)	-0.0046** (-15.08)
% FRPL at Zoned Elem Schools	0.0068 (-0.18)	-0.0518 (-1.27)	-0.0513 (-1.25)	-0.0300 (-0.75)	-0.0311 (-0.77)
Report Card Grade A Dummy Variable	0.049 (1.29)	0.0807* (2.10)	0.0775* (2.03)	0.0723 (1.89)	0.0694 (1.82)
Report Card Grade B Dummy Variable	0.0264 (0.71)	0.0514 (1.38)	0.0445 (1.20)	0.0456 (1.22)	0.0395 (1.07)
Report Card Grade C Dummy Variable	-0.0157 (-0.41)	0.0022 (0.06)	0.0002 (0.01)	-0.0056 (-0.15)	-0.0073 (-0.19)
% of Teachers Rated Above Average or High	0.5048** (7.62)				
Average teacher career VAM		0.3085** (8.72)			
Average teacher VAM in 2010			0.3122** (8.57)		
Weighted teacher career VAM				0.7784** (8.15)	
Weighted teacher VAM in 2010					0.7921** (8.01)
Constant	13.4324 (191.60)	13.0159 (244.46)	13.0192 (245.26)	13.0118 (244.37)	13.0156 (245.12)
Observations	56467	56467	56607	56467	56607
R Squared	0.0526	0.0525	0.0528	0.0523	0.0527
Adjusted R Squared	0.0517	0.0516	0.0519	0.0514	0.0518

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix C. Regressions for Elementary School Teachers in the Bronx (T-Stat underneath Coefficient)

	Bronx Fixed effects – PUMA and Seasons (10 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.1165* (-2.24)	-0.1163* (-2.23)	-0.1162* (-2.23)	-0.1163* (-2.23)	-0.1162* (-2.24)
All Condos (Compared to 2 Fam Homes)	---	---	---	---	---
Age of Home Sold	-0.0036** (-4.05)	-0.0036** (-4.11)	-0.0036** (-4.09)	0.0037** (-4.14)	0.0036** (-4.12)
% FRPL at Zoned Elem Schools	-0.4004* (-2.45)	-0.4670** (-2.71)	-0.4613** (-2.64)	0.4793** (-2.78)	-0.4766** (-2.73)
Report Card Grade A Dummy Variable	-0.0903 (-0.64)	-0.0619 (-0.44)	-0.0453 (-0.32)	-0.0737 (-0.52)	-0.0569 (-0.40)
Report Card Grade B Dummy Variable	-0.048 (-0.34)	-0.026 (-0.18)	-0.0053 (-0.04)	-0.0407 (-0.29)	-0.0204 (-0.15)
Report Card Grade C Dummy Variable	-0.1064 (-0.77)	-0.0891 (-0.64)	-0.0668 (-0.48)	-0.1047 (-0.75)	-0.0831 (-0.60)
% of Teachers Rated Above Average or High	0.4373 (1.95)				
Average teacher career VAM		0.2857* (2.28)			
Average teacher VAM in 2010			0.2583* (2.06)		
Weighted teacher career VAM				0.8653* (2.42)	
Weighted teacher VAM in 2010					0.8095* (2.25)
Constant	13.1419 (62.12)	13.1608 (61.84)	13.1368 (62.33)	13.1839 (61.51)	13.1616** (62.02)
Observations	6171	6161	6171	6161	6171
R Squared	0.0146	0.015	0.0147	0.0151	0.0148
Adjusted R Squared	0.0116	0.0119	0.0117	0.012	0.0118

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix D. Regressions for Elementary School Teachers in Brooklyn (T-Stat underneath Coefficient)

	Brooklyn Fixed effects – PUMA and Seasons (18 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0771** (-5.51)	-0.0773** (-5.52)	-0.0765** (-5.49)	-0.0767** (-5.47)	-0.0761** (-5.46)
All Condos (Compared to 2 Fam Homes)	---	---	---	---	---
Age of Home Sold	-0.0034** (-12.90)	-0.0035** (-12.95)	-0.0034** (-13.04)	-0.0035** (-12.87)	-0.0034** (-12.95)
% FRPL at Zoned Elem Schools	0.127 (0.30)	-0.0756** (-1.70)	-0.1067** (-2.39)	-0.0333 (-0.76)	-0.0626 (-1.42)
Report Card Grade A Dummy Variable	0.1037** (2.85)	0.1275** (3.41)	0.1224** (3.37)	0.1150** (3.08)	0.1105** (3.05)
Report Card Grade B Dummy Variable	0.0671 (1.87)	0.0798* '(2.17)	0.0708* (1.98)	0.0708 (1.92)	0.0632* (1.76)
Report Card Grade C Dummy Variable	0.1173** (3.19)	0.1245** (3.31)	0.1163** (3.17)	0.1167** -3.1	0.1100** (3.00)
% of Teachers Rated Above Average or High	0.3081** (5.57)				
Average teacher career VAM		0.2647** (9.16)			
Average teacher VAM in 2010			0.3107** (10.24)		
Weighted teacher career VAM				0.6113** (7.49)	
Weighted teacher VAM in 2010					0.7378** (8.59)
Constant	13.218 (241.94)	13.2478 (239.01)	13.2705 (242.34)	13.2336 (238.55)	13.2541 (241.91)
Observations	17070	16943	17070	16943	17070
R Squared	0.1214	0.1235	0.1252	0.1220	0.1236
Adjusted R Squared	0.1200	0.1221	0.1238	0.1206	0.1222

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix E. Regressions for Elementary School Teachers in Queens (T-Stat underneath Coefficient)

	Queens Fixed effects – PUMA and Seasons (14 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.012 (-0.51)	-0.0136 (-0.58)	-0.0124 (-0.53)	-0.0132 (-0.57)	-0.0122 (-0.52)
All Condos (Compared to 2 Fam Homes)	-4.3708** (-17.04)	-4.2694** (-16.50)	-4.3798** (-17.06)	-4.2566** (-16.45)	-4.3575** (-17.02)
Age of Home Sold	-0.0056** (-11.49)	-0.0057** (-11.61)	-0.0057** (-11.62)	-0.0057** (-11.61)	-0.0057** (-11.62)
% FRPL at Zoned Elem Schools	0.0397 (0.75)	-0.0048 (-0.09)	0.0087 (0.15)	0.0165 (0.30)	0.0274 (0.50)
Report Card Grade A Dummy Variable	0.0425 (0.78)	0.0826 (1.51)	0.0756 (1.38)	0.0763 (1.39)	0.0703 (1.29)
Report Card Grade B Dummy Variable	0.0194 (0.37)	0.0545 (1.03)	0.0417 (0.79)	0.05135 (0.97)	0.0402 (0.76)
Report Card Grade C Dummy Variable	-0.0576 (-1.06)	-0.0326 (-0.60)	-0.0388 (-0.71)	0.0408 (-1.72)	-0.0459 (-0.84)
% of Teachers Rated Above Average or High	0.6277** (6.03)				
Average teacher career VAM		0.3345** (6.01)			
Average teacher VAM in 2010			0.3195** (5.60)		
Weighted teacher career VAM				0.8382** (5.80)	
Weighted teacher VAM in 2010					0.8028** (5.38)
Constant	12.9207 (173.88)	12.9082 (174.47)	12.9103 (174.07)	12.9024 (174.57)	12.9038 (174.17)
Observations	33366	33363	33366	33363	33366
R Squared	0.0323	0.0319	0.0322	0.0318	0.0321
Adjusted R Squared	0.0316	0.0312	0.0315	0.0311	0.0314

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix F. Regressions for Mathematics Elementary School Zones (T-Stat underneath Coefficient)

	All Fixed effects - PUMA and Seasons (42 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0447** (-2.88)	-0.0464** (-2.98)	-0.0459** (-2.96)	-0.0462** (-2.97)	-0.0458** (-2.95)
All Condos (Compared to Two Family Homes)	-4.3057** (-19.43)	-4.2217** (-18.88)	-4.3311** (-19.55)	-4.2107** (-18.83)	4.3207** (-19.50)
Age of Home Sold	-0.0046** (-15.01)	-0.0046** (-15.06)	-0.0047** (-15.10)	-0.0046** (-15.05)	-0.0046** (-15.08)
Percent Free Lunch at Zoned Elementary Schools	0.028 (0.73)	-0.0485** (-1.20)	-0.0485** (-1.19)	-0.0269 (-0.67)	-0.0288 (-0.72)
Report Card Grade A Dummy Variable	0.0424 (1.12)	0.0754* (1.96)	0.0731** (1.92)	0.0681 (1.78)	0.0664 (1.74)
Report Card Grade B Dummy Variable	0.02 (0.54)	0.0465 (1.25)	0.0418 (1.13)	0.0417 (1.12)	0.0378 (1.02)
Report Card Grade C Dummy Variable	-0.0192 (-0.51)	0.0004 (0.01)	-0.001 (-0.03)	-0.0067 (-0.18)	-0.0077 (-0.20)
Percent of Teachers Above Average or High	0.4200** (6.89)				
Average teacher career VAM		0.3046** (8.84)			
Average teacher VAM in 2010			0.3061** (8.65)		
Weighted teacher career VAM				0.7721** (8.31)	
Weighted teacher VAM in 2010					0.7848** (8.16)
Constant	13.0082 (244.53)	13.0174 (244.16)	13.0209 (244.92)	13.0122 (244.14)	13.0160 (244.90)
Observations	56602	56462	56602	56462	56602
R Squared	0.0524	0.0525	0.0528	0.0524	0.0527
Adjusted R Squared	0.0515	0.0516	0.0520	0.0515	0.0518

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix G. Regressions for Mathematics Elementary School Zones in the Bronx (T-Stat underneath Coefficient)

	Bronx Fixed effects - PUMA and Seasons (10 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.1170* (-2.28)	-0.1163* (-2.23)	-0.1166* (-2.24)	-0.1162* (-2.23)	-0.1165* (-2.24)
All Condos (Compared to Two Family Homes)	---	---	---	---	---
Age of Home Sold	-0.0036** (-4.03)	-0.0036** (-4.09)	-0.0036** (-4.06)	-0.0037** (-4.12)	-0.0036** (-4.12)
Percent Free Lunch at Zoned Elementary Schools	-0.4088* (-2.48)	-0.4527* (-2.62)	-0.4749** (-2.70)	-0.4652** (-2.69)	-0.4857** (-2.77)
Report Card Grade A Dummy Variable	-0.0991 (-0.70)	-0.0767 (-0.54)	-0.0496 (-0.35)	-0.0854 (-0.60)	-0.0618 (-0.44)
Report Card Grade B Dummy Variable	-0.0594 (-0.42)	-0.0408 (-0.29)	-0.0087 (-0.06)	-0.0524 (-0.37)	-0.0245 (-0.17)
Report Card Grade C Dummy Variable	-0.1147 (-0.83)	-0.1009 (-0.73)	-0.0671 (-0.48)	-0.1131 (-0.81)	0.0839 (-0.61)
Percent of Teachers Above Average or High	0.3977* (2.00)				
Average teacher career VAM		0.2491* (2.08)			
Average teacher VAM in 2010			0.2585 (2.15)		
Weighted teacher career VAM				0.7561* (2.23)	
Weighted teacher VAM in 2010					0.7871* (2.30)
Constant	13.1558 (61.82)	13.1649 (61.48)	13.149 (62.18)	13.1849 (61.19)	13.1715 (61.86)
Observations	6171	6161	6171	6161	6171
R Squared	0.0147	0.0148	0.0148	0.0149	0.0149
Adjusted R Squared	0.0116	0.0118	0.0117	0.0119	0.0118

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix H. Regressions for Mathematics Elementary School Zones in Brooklyn (T-Stat underneath Coefficient)

	Brooklyn Fixed effects - PUMA and Seasons (18 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0758** (-5.42)	-0.0764** (-5.45)	-0.0757** (-5.43)	-0.0760** (-5.42)	-0.0754** (-5.41)
All Condos (Compared to Two Family Homes)	---	---	---	---	---
Age of Home Sold	-0.0034** (-12.83)	-0.0035** (-12.90)	-0.0035** (-12.97)	-0.0034** (-12.79)	-0.0034** (-12.88)
Percent Free Lunch at Zoned Elementary Schools	0.0347 (0.81)	-0.0672 (-1.51)	-0.0949** (-2.13)	-0.0256 (-0.58)	-0.0549 (-1.24)
Report Card Grade A Dummy Variable	0.0956** (2.62)	0.1231** (3.28)	0.1174** (3.22)	0.1120** (2.99)	0.1081** (2.97)
Report Card Grade B Dummy Variable	0.0611* (1.70)	0.0769* (2.08)	0.0676 (1.88)	0.0688 (1.86)	0.0616 (1.71)
Report Card Grade C Dummy Variable	0.1125** (3.05)	0.1222** (3.23)	0.1150** (3.13)	0.1154** (3.05)	0.1102** (2.99)
Percent of Teachers Above Average or High	0.2106** (4.41)				
Average teacher career VAM		0.2421** (8.69)			
Average teacher VAM in 2010			0.2863** (9.79)		
Weighted teacher career VAM				0.5537** (7.01)	
Weighted teacher VAM in 2010					0.6887** (8.27)
Constant	13.2112 (239.96)	13.2463 (237.46)	13.2666 (240.97)	13.2308 (237.01)	13.2502 (240.63)
Observations	17065	16938	17065	16938	17065
R Squared	0.1207	0.1229	0.1246	0.1216	0.1232
Adjusted R Squared	0.1193	0.1215	0.1233	0.1202	0.1218

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix I. Regressions for Mathematics Elementary School Zones in Queens (T-Stat underneath Coefficient)

	Queens Fixed effects - PUMA and Seasons (14 categories)				
One Family Homes (Compared to Two Family Homes)	-0.0106 (-0.45)	-0.014 (-0.60)	-0.0125 (-0.54)	-0.0137 (-0.59)	-0.0124 (-0.53)
All Condos (Compared to Two Family Homes)	-4.3595** (-16.99)	-4.2737** (-16.52)	-4.3790** (-17.06)	-4.2597** (-16.47)	-4.3670** (-17.02)
Age of Home Sold	-0.0056** (-11.51)	-0.0056** (-11.57)	-0.0057** (-11.65)	-0.0056** (-11.57)	-0.0057** (-11.64)
Percent Free Lunch at Zoned Elementary Schools	0.0582** (1.12)	-0.0108** (-0.19)	0.0718 (1.31)	0.0131 (0.24)	0.0254 (0.46)
Report Card Grade A Dummy Variable	0.036 (0.66)	0.0791 (1.45)	0.0401 (0.76)	0.0731 (1.34)	0.0674 (1.24)
Report Card Grade B Dummy Variable	0.0125 (0.24)	0.0515 (0.98)	0.0401 (0.76)	0.0489 (0.93)	0.0393 (0.75)
Report Card Grade C Dummy Variable	-0.0576 (-1.06)	-0.0288 (-0.53)	-0.0387 (-0.71)	-0.0375 (-0.69)	-0.0453 (-0.83)
Percent of Teachers Above Average or High	0.5856** (5.77)				
Average teacher career VAM		0.3542** (6.42)			
Average teacher VAM in 2010			0.3284** (5.86)		
Weighted teacher career VAM				0.8854** (6.22)	
Weighted teacher VAM in 2010					0.8320** (5.69)
Constant	12.9163 (173.90)	12.9113 (174.55)	12.9145 (174.05)	12.9038 (174.69)	12.9075 (174.24)
Observations	33366	33363	33366	33363	33366
R Squared	0.0322	0.0320	0.0323	0.0320	0.0322
Adjusted R Squared	0.0316	0.0314	0.0316	0.0313	0.0315

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix J. Regressions for ELA Elementary School Zones (T-Stat underneath Coefficient)

	All Fixed effects – PUMA and Seasons (42 categories)				
One Family Homes (Compared to Two Family Homes)	-0.0453** (-2.92)	-0.0466** (-3.00)	-0.0460** (-2.96)	-0.0463** (-2.97)	0.0457** (-2.95)
All Condos (Compared to Two Family Homes)	-4.3203** (-19.50)	-4.2191** (-18.86)	-4.3359** (-19.57)	-4.2092** (-18.82)	-4.3248** (-19.52)
Age of Home Sold	-0.0046** (-14.93)	-0.0047** (-15.09)	-0.0046** (-15.07)	-0.0047** (-15.09)	-0.0046** (-15.05)
Percent Free Lunch at Zoned Elementary Schools	0.0181 (0.47)	-0.0436 (-1.07)	-0.0423** (-1.03)	-0.0241 (-0.60)	-0.0233 (-0.58)
Report Card Grade A Dummy Variable	0.0568 (1.50)	0.0838* (2.18)	0.0799* (2.09)	0.0756* (1.97)	0.0713* (1.87)
Report Card Grade B Dummy Variable	0.0351 (0.95)	0.0548 (1.47)	0.0461 (1.24)	0.0492 (1.32)	0.0408 (1.10)
Report Card Grade C Dummy Variable	-0.0124 (-0.33)	0.003 (0.08)	-0.0001 (-0.00)	-0.0045 (-0.12)	-0.0075 (-0.20)
Percent of Teachers Above Average or High	0.34471** (7.25)				
Average teacher career VAM		0.2925** (8.35)			
Average teacher VAM in 2010			0.2976** (8.19)		
Weighted teacher career VAM				0.7299** (7.78)	
Weighted teacher VAM in 2010					0.7494** (7.59)
Constant	13.0001 (245.58)	13.0102 (244.52)	13.013 (245.39)	13.0071 (244.38)	13.0105 (245.17)
Observations	56607	56444	56607	56444	56607
R Squared	0.0525	0.0524	0.0527	0.0522	0.0525
Adjusted R Squared	0.0516	0.0515	0.0518	0.0514	0.0517

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix K. Regressions for ELA Elementary School Zones in the Bronx (T-Stat underneath Coefficient)

	Bronx Fixed effects – PUMA and Seasons (10 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.1156* (-2.22)	-0.1160* (-2.23)	-0.1157* (-2.23)	-0.1160* (-2.23)	-0.1158* (-2.23)
All Condos (Compared to Two Family Homes)	---	---	---	---	---
Age of Home Sold	-0.0036** (-4.04)	-0.0037** (-4.14)	-0.0036** (-4.08)	-0.0037** (-4.17)	-0.00036** (-4.11)
Percent Free Lunch at Zoned Elementary Schools	-0.3617* (-2.26)	-0.4813** (-2.81)	-0.4378* (-2.55)	-0.4937** (-2.88)	-0.4575** (-2.66)
Report Card Grade A Dummy Variable	-0.0805 (-0.57)	-0.0442 (-0.31)	-0.0433 (-0.30)	-0.0597 (-0.42)	-0.0530 (-0.37)
Report Card Grade B Dummy Variable	-0.0354 (-0.25)	-0.0081 (-0.06)	-0.0038 (-0.03)	-0.0265 (-0.19)	-0.0168 (-0.12)
Report Card Grade C Dummy Variable	-0.0948 (-0.68)	-0.074 (-0.53)	-0.0676 (-0.49)	-0.0935 (-0.67)	-0.0821 (-0.59)
Percent of Teachers Above Average or High	0.4517 (1.61)				
Average teacher career VAM		0.3271* (2.56)			
Average teacher VAM in 2010			0.243 (1.90)		
Weighted teacher career VAM				0.9923** (2.70)	
Weighted teacher VAM in 2010					0.7934* (2.15)
Constant	13.1065 (62.57)	13.1539 (62.23)	13.1202 (62.51)	13.1807 (61.91)	13.1458 (62.24)
Observations	6171	6161	6171	6161	6171
R Squared	0.0144	0.0152	0.0146	0.0153	0.0148
Adjusted R Squared	0.0114	0.0121	0.0116	0.0123	0.0117

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix L. Regressions for ELA Elementary School Zones in Brooklyn (T-Stat underneath Coefficient)

	Brooklyn Fixed effects – PUMA and Seasons (18 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0770** (-5.51)	-0.0782** (-5.58)	-0.0771** (-5.53)	-0.0773** (-5.51)	-0.0766** (-5.49)
All Condos (Compared to Two Family Homes)	---	---	---	---	---
Age of Home Sold	-0.0034** (-12.80)	-0.0035** (-12.91)	-0.0035** (-13.04)	-0.0035** (-12.85)	-0.0034** (-12.94)
Percent Free Lunch at Zoned Elementary Schools	0.0148 (0.35)	-0.0729** (-1.66)	-0.1056* (-2.37)	-0.0328 (-0.76)	-0.0604 (-1.37)
Report Card Grade A Dummy Variable	0.1154** (3.16)	0.1321** (3.53)	0.1270** (3.49)	0.1210** (3.24)	0.1143** (3.15)
Report Card Grade B Dummy Variable	0.0779 (2.17)	0.0836* (2.27)	0.0748* (2.09)	0.0761* (2.07)	0.0669** (1.87)
Report Card Grade C Dummy Variable	0.1258** (3.42)	0.1298** (3.34)	0.1185** (3.23)	0.1228** (3.26)	0.1121** (3.06)
Percent of Teachers Above Average or High	0.3303** (6.14)				
Average teacher career VAM		0.2723** (9.39)			
Average teacher VAM in 2010			0.3168** (10.36)		
Weighted teacher career VAM				0.6409** (7.83)	
Weighted teacher VAM in 2010					0.7470** (8.67)
Constant	13.2032 (243.35)	13.2416 (239.41)	13.2658 (242.69)	13.2274 (239.13)	13.2493 (242.29)
Observations	17070	16920	17070	16920	17070
R Squared	0.1217	0.1236	0.1253	0.1222	0.1236
Adjusted R Squared	0.1203	0.1222	0.1239	0.1208	0.1223

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix M. Regressions for ELA Elementary School Zones in Queens (T-Stat underneath Coefficient)

	Queens Fixed effects – PUMA and Seasons (14 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.011 (-0.47)	-0.0124 (-0.53)	-0.0117 (-0.50)	-0.0121 (-0.52)	-0.0113 (-0.49)
All Condos (Compared to Two Family Homes)	-4.3672** (-17.02)	-4.2602** (-16.46)	-4.3758** (-17.05)	-4.2498** (-16.43)	-4.3641** (-17.00)
Age of Home Sold	-0.0056** (-11.51)	-0.0057** (-11.65)	-0.0057** (-11.61)	-0.0057** (-11.65)	-0.0057** (-11.61)
Percent Free Lunch at Zoned Elementary Schools	0.0573 (1.09)	0.0145 (0.26)	0.0238 (0.42)	0.0311 (0.56)	0.0401 (0.72)
Report Card Grade A Dummy Variable	0.0506 (0.93)	0.0829 (1.51)	0.077 (1.41)	0.0770 (1.41)	0.0713 (1.30)
Report Card Grade B Dummy Variable	0.0283 (0.54)	0.0552 (1.04)	0.0422 (0.80)	0.0520 (0.98)	0.0401 (0.76)
Report Card Grade C Dummy Variable	-0.0601 (-1.10)	-0.0386 (-0.71)	-0.0414 (-0.76)	-0.0456 (-0.84)	-0.0484 (-0.89)
Percent of Teachers Above Average or High	0.5102** (5.48)				
Average teacher career VAM		0.2917** (5.39)			
Average teacher VAM in 2010			0.2883** (5.12)		
Weighted teacher career VAM				0.7375** (5.19)	
Weighted teacher VAM in 2010					0.7196** (4.88)
Constant	12.9073 (174.13)	12.9013 (174.43)	12.9024 (174.14)	12.8978 (174.47)	12.8988** (174.15)
Observations	33366	33363	33366	33363	33366
R Squared	0.0322	0.0317	0.0320	0.0316	0.032
Adjusted R Squared	0.0315	0.031	0.0313	0.0309	0.0313

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix N. Regressions for Middle School Zones (T-Stat underneath Coefficient)

	All Fixed effects – PUMA and Seasons (42 categories)				
One Family Homes (Compared to 2 Fa m Homes)	-0.0324* (-2.03)	-0.0332* (-2.07)	-0.0334* (-2.09)	-0.0332* (-2.08)	-0.0334* (-2.09)
All Condos (Compared to Two Family Homes)	-4.309** (-19.22)	-4.3250** (-19.29)	-4.3295** (-19.31)	-4.3224** (-19.28)	-4.3269** (-19.30)
Age of Home Sold	-0.0046** (-14.26)	-0.0047** (-14.36)	-0.0047** (-14.37)	-0.0047 (-14.34)	-0.0047** (-14.36)
Percent Free Lunch at Zoned Elementary Schools	0.1045* (-2.51)	0.0566 (1.26)	0.0526 (1.17)	0.0528 (1.20)	0.0469 (1.06)
Report Card Grade A Dummy Variable	0.0308 (0.83)	0.0309 (0.84)	0.0301 (0.82)	0.0303 (0.83)	0.0292 (0.80)
Report Card Grade B Dummy Variable	-0.0172 (-0.48)	-0.0191 (-0.54)	-0.0204 (-0.57)	-0.0190 (-0.53)	-0.0207 (-0.58)
Report Card Grade C Dummy Variable	-0.0021 (-0.06)	-0.011 (-0.30)	-0.012 (-0.33)	-0.01321 (-0.36)	-0.0146 (-0.40)
Percent of Teachers Above Average or High	0.4200** (5.02)				
Average teacher career VAM		0.2419** (5.74)			
Average teacher VAM in 2010			0.2455** (5.84)		
Weighted teacher career VAM				0.4959** (6.19)	
Weighted teacher VAM in 2010					0.5102** (6.33)
Constant	12.945 (232.26)	12.9764 (228.3)	12.9801 (227.97)	12.9790 (229.84)	12.9840 (229.44)
Observations	53183	53183	53183	53183	53183
R Squared	0.0508	0.051	0.051	0.0511	0.0511
Adjusted R Squared	0.0499	0.0501	0.0501	0.0502	0.0502

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix O. Regressions for Middle School Zones in the Bronx (T-Stat underneath Coefficient)

	Bronx Fixed effects – PUMA and Seasons (10 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0638 (-1.19)	-0.0643 (-1.20)	-0.0642 (-1.20)	-0.0637 (-1.18)	-0.0634 (-1.18)
All Condos (Compared to Two Family Homes)	---	---	---	---	---
Age of Home Sold	-0.0037** (-4.00)	-0.0037** (-4.00)	-0.0037** (-4.01)	-0.0038** (-4.03)	-0.0038** (-4.04)
Percent Free Lunch at Zoned Elementary Schools	-0.1187 (-0.58)	-0.1584 (-0.74)	-0.1612 (-0.75)	-0.2008 (-0.95)	-0.2073 (-0.98)
Report Card Grade A Dummy Variable	-0.0403 (-0.27)	-0.0163 (-0.11)	-0.0171 (-0.11)	-0.0017 (-0.01)	-0.0019 (-0.01)
Report Card Grade B Dummy Variable	-0.1261 (-0.85)	-0.1124 (-0.75)	-0.1138 (-0.76)	-0.0982 (-0.66)	-0.0991 (-0.66)
Report Card Grade C Dummy Variable	-0.0998 (-0.68)	-0.0875 (-0.59)	-0.0898 (-0.61)	-0.0804 (-0.54)	-0.0827 (-0.56)
Percent of Teachers Above Average or High	0.351 (1.17)				
Average teacher career VAM		0.1863 (1.30)			
Average teacher VAM in 2010			0.1966 (1.35)		
Weighted teacher career VAM				0.5211 (1.86)	
Weighted teacher VAM in 2010					0.5582 (1.93)
Constant	12.9289 (53.56)	12.9368 (53.54)	12.9396 (53.54)	12.9536 (53.84)	12.9585 (53.82)
Observations	5840	5840	5840	5840	5840
R Squared	0.0121	0.0121	0.0122	0.0124	0.0125
Adjusted R Squared	0.0089	0.0089	0.0089	0.0092	0.0093

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix P. Regressions for Middle School Zones in Brooklyn (T-Stat underneath Coefficient)

	Brooklyn Fixed effects – PUMA and Seasons (18 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0773** (-5.93)	-0.0785** (-6.03)	-0.0789** (-6.05)	-0.0785** (-6.02)	-0.0787** (-6.04)
All Condos (Compared to Two Family Homes)	---	---	---	---	---
Age of Home Sold	-0.0035** (-12.95)	-0.0035** (-13.09)	-0.0035** (-13.14)	-0.0035** (-13.11)	-0.0035** (-13.16)
Percent Free Lunch at Zoned Elementary Schools	-0.0004 (-0.01)	-0.0723 (-1.52)	-0.0841 (-1.75)	-0.0690 (-1.45)	-0.0785 (-1.64)
Report Card Grade A Dummy Variable	-0.0169 (-0.68)	-0.0259 (-1.05)	-0.0266 (-1.08)	-0.0202 (-1.01)	-0.0254 (-1.03)
Report Card Grade B Dummy Variable	-0.0630** (-2.69)	-0.0695** (-3.00)	-0.0689** (-2.98)	-0.0699 (-3.00)	-0.0689** (-2.97)
Report Card Grade C Dummy Variable	-0.0062 (-0.26)	-0.0183 (-0.76)	-0.0211 (-0.87)	-0.0202 (-0.84)	-0.0228 (-0.94)
Percent of Teachers Above Average or High	0.2789** (4.34)				
Average teacher career VAM		0.2002** (6.03)			
Average teacher VAM in 2010			0.2092** (6.24)		
Weighted teacher career VAM				0.3988** (5.91)	
Weighted teacher VAM in 2010					0.4117** (6.08)
Constant	13.3730 (254.12)	13.4300 (247.74)	13.4400 (236.37)	13.4293 (247.01)	13.4374 (245.81)
Observations	14072	14072	14072	14072	14072
R Squared	0.1431	0.1442	0.1444	0.1441	0.1442
Adjusted R Squared	0.1416	0.1427	0.1428	0.1426	0.1427

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix Q. Regressions for Middle School Zones in Queens (T-Stat underneath Coefficient)

	Queens Fixed effects – PUMA and Seasons (14 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0063 (-0.27)	-0.0072 (-0.31)	-0.0073 (-0.32)	-0.0071 (-0.31)	-0.0073 (-0.31)
All Condos (Compared to Two Family Homes)	-4.3519** (-17.01)	-4.3707** (-17.07)	4.3743** (-17.08)	-4.3638** (-17.05)	-4.3679** (-17.06)
Age of Home Sold	-0.0054** (-11.18)	-0.0055** (-11.24)	-0.0054** (-11.25)	-0.0054** (-11.22)	-0.0054** (-11.22)
Percent Free Lunch at Zoned Elementary Schools	0.1219* (2.25)	0.0725 (1.23)	0.0732 (1.24)	0.0800 (1.40)	0.0765 (1.33)
Report Card Grade A Dummy Variable	0.0711 (1.17)	0.0653 (1.07)	0.0638 (1.04)	0.0674 (1.12)	0.0659 (1.08)
Report Card Grade B Dummy Variable	0.0317 (0.54)	0.0245 (0.41)	0.0216 (0.36)	0.0291 (0.49)	0.0251 (0.42)
Report Card Grade C Dummy Variable	0.0381 (0.64)	0.0228 (0.38)	0.0223 (0.37)	0.0247 (0.41)	0.0231 (0.39)
Percent of Teachers Above Average or High	0.5288** (4.25)				
Average teacher career VAM		0.2920** (4.63)			
Average teacher VAM in 2010			0.2881** (4.62)		
Weighted teacher career VAM				0.5532** (4.80)	
Weighted teacher VAM in 2010					0.5620** (4.87)
Constant	12.8115 (159.55)	12.8481 (156.25)	13.0793 (156.01)	12.8394 (158.01)	12.8440 (157.69)
Observations	33271	33271	33271	33271	33271
R Squared	0.0318	0.0319	0.0319	0.032	0.0320
Adjusted R Squared	0.0311	0.0312	0.0312	0.0313	0.0313

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix R. Regressions for Mathematics Middle School Zones (T-Stat underneath Coefficient)

	All Fixed effects – PUMA and Seasons (42 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0318* (-1.99)	-0.0332* (-2.07)	-0.0333* (-2.08)	-0.0332* (-2.08)	-0.0334* (-2.09)
All Condos (Compared to Two Family Homes)	-4.3070** (-19.21)	-4.3274** (-19.30)	-4.3286** (-19.30)	-4.3236** (-19.29)	-4.3257** (-19.29)
Age of Home Sold	-0.0046** (-14.19)	-0.0047** (-14.33)	-0.0047** (-14.34)	-0.0046** (-14.31)	-0.0046** (-14.32)
Percent Free Lunch at Zoned Elementary Schools	0.1245** (3.10)	0.0498 (1.12)	0.0542 (1.22)	0.0489 (1.12)	0.0509 (1.16)
Report Card Grade A Dummy Variable	0.0322 (0.87)	0.0268 (0.73)	0.0273 (0.74)	0.0264 (0.72)	0.0267 (0.72)
Report Card Grade B Dummy Variable	-0.0202 (-0.56)	-0.025 (-0.70)	-0.0245 (-0.69)	-0.0248 (-0.69)	-0.0246 (-0.69)
Report Card Grade C Dummy Variable	0.0002 -0.01	-0.0143 (-0.40)	-0.0137 (-0.38)	-0.0154 (-0.42)	-0.0152 (-0.42)
Percent of Teachers Above Average or High	0.3317** (4.84)				
Average teacher career VAM		0.2451** (6.15)			
Average teacher VAM in 2010			0.2407** (5.94)		
Weighted teacher career VAM				0.4897** (6.49)	
Weighted teacher VAM in 2010					0.4904** (6.33)
Constant	12.9315 (234.60)	12.9836 (228.67)	12.9809 (228.31)	12.9842 (230.05)	12.9830 (229.63)
Observations	53183	53183	53183	53183	53183
R Squared	0.0508	0.0510	0.0510	0.0511	0.0511
Adjusted R Squared	0.0499	0.0502	0.0501	0.0502	0.0502

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix S. Regressions for Mathematics Middle School Teachers in the Bronx (T-Stat underneath Coefficient)

	Bronx Fixed effects – PUMA and Seasons (10 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0641 (-1.19)	-0.0643 (-1.20)	-0.0644 (-1.20)	-0.0536 (-1.18)	-0.0635 (-1.18)
All Condos (Compared to Two Family Homes)	---	---	---	---	---
Age of Home Sold	-0.0037** (-4.01)	-0.0037** (-4.01)	-0.0037 (-4.01)	-0.0038** (-4.04)	-0.0038** (-4.04)
Percent Free Lunch at Zoned Elementary Schools	-0.101 (-0.50)	-0.1635 (-0.76)	-0.1606 (-0.75)	-0.2121 (-1.00)	-0.2119 (-1.00)
Report Card Grade A Dummy Variable	-0.0529 (-0.35)	-0.0178 (-0.12)	-0.0182 (-0.12)	-0.0032 (-0.02)	-0.0006 (-0.00)
Report Card Grade B Dummy Variable	-0.1394 (-0.94)	0.1174 (0.79)	-0.1174 (-0.79)	-0.1033 (-0.69)	-0.1010 (-0.68)
Report Card Grade C Dummy Variable	-0.1104 (-0.75)	-0.0893 (-0.61)	-0.0908 (-0.62)	-0.0819 (-0.55)	-0.0829 (-0.56)
Percent of Teachers Above Average or High	0.2885 (1.03)				
Average teacher career VAM		0.1844 (1.36)			
Average teacher VAM in 2010			0.1882 (1.37)		
Weighted teacher career VAM				0.5323 (1.95)	
Weighted teacher VAM in 2010					0.5626* (1.97)
Constant	12.929 (53.27)	12.9434 (53.44)	12.9409 (53.53)	12.9648 (53.73)	12.9618 (53.80)
Observations	5840	5840	5840	5840	5840
R Squared	0.012	0.0122	0.0121	0.0125	0.0125
Adjusted R Squared	0.0088	0.0089	0.0089	0.0093	0.0093

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix T. Regressions for Mathematics Middle School Teachers in Brooklyn (T-Stat underneath Coefficient)

	Brooklyn Fixed effects – PUMA and Seasons (16 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0759** (-5.83)	-0.0781** (-6.00)	-0.0788** (-6.05)	-0.0782** (-6.00)	-0.0787** (-6.04)
All Condos (Compared to Two Family Homes)	---	---	---	---	---
Age of Home Sold	-0.0035** (-12.92)	-0.0035** (-13.06)	-0.0035** (-13.07)	-0.0035** (-13.09)	-0.0035** (-13.09)
Percent Free Lunch at Zoned Elementary Schools	0.0259 (0.58)	-0.0709 (-1.49)	-0.0841* (-1.75)	-0.0720 (-1.51)	-0.0818 (-1.70)
Report Card Grade A Dummy Variable	-0.0139 (-0.55)	-0.0297 (-1.19)	-0.0311 (-1.25)	-0.0298 (-1.19)	-0.0304 (-1.22)
Report Card Grade B Dummy Variable	-0.0587* (-2.48)	-0.0723** (-3.10)	-0.0731** (-3.14)	-0.0736** (-3.14)	-0.0738** (-3.16)
Report Card Grade C Dummy Variable	-0.003 (-0.12)	-0.0186 (-0.77)	-0.0229 (-0.94)	-0.0215 (-0.88)	-0.0250 (-1.03)
Percent of Teachers Above Average or High	0.1943** (3.16)				
Average teacher career VAM		0.1930** (5.94)			
Average teacher VAM in 2010			0.2024** (6.24)		
Weighted teacher career VAM				0.3965** (5.94)	
Weighted teacher VAM in 2010					0.4067** (6.16)
Constant	13.3524 (252.28)	13.4315 (246.58)	13.4424 (245.62)	13.4346 (245.54)	13.4425 (244.94)
Observations	14072	14072	14072	14072	14072
R Squared	0.1426	0.1441	0.1444	0.1441	0.1443
Adjusted R Squared	0.1411	0.1426	0.1428	0.1426	0.1428

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix U. Regressions for Mathematics Middle School Teachers in Queens (T-Stat underneath Coefficient)

	Queens Fixed effects – PUMA and Seasons (14 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0057 (-0.25)	-0.0074 (-0.32)	-0.0074 (-0.32)	-0.0073 (-0.32)	-0.0073 (-0.32)
All Condos (Compared to Two Family Homes)	-4.3470** (-16.99)	-4.3740** (-17.09)	-4.3747** (-17.09)	-4.3639** (-17.05)	-4.3662** (-17.06)
Age of Home Sold	-0.0054** (-11.10)	-0.0054** (-11.21)	-0.0054** (-11.22)	-0.0054** (-11.18)	-0.0054** (-11.19)
Percent Free Lunch at Zoned Elementary Schools	0.1521** (2.98)	0.0638 (1.10)	0.0726 (1.25)	0.0795 (1.41)	0.0832 (1.47)
Report Card Grade A Dummy Variable	0.0794 (1.31)	0.0613 (1.00)	0.0612 (1.00)	0.0658 (1.08)	0.0650 (1.07)
Report Card Grade B Dummy Variable	0.0314 (0.53)	0.0171 (0.29)	0.0171 (0.29)	0.0233 (0.39)	0.0223 (0.38)
Report Card Grade C Dummy Variable	0.0469 (0.78)	0.0182 (0.30)	0.0206 (0.34)	0.0231 (0.39)	0.0242 (0.41)
Percent of Teachers Above Average or High	0.3904** (4.15)				
Average teacher career VAM		0.2981** (5.07)			
Average teacher VAM in 2010			0.2887** (4.79)		
Weighted teacher career VAM				0.5338** (5.04)	
Weighted teacher VAM in 2010					0.5341** (4.84)
Constant	12.7874 (161.96)	12.8561 (157.01)	12.8516 (156.45)	12.8414 (158.56)	12.8402 (158.06)
Observations	33271	33271	33271	33271	33271
R Squared	0.0318	0.0321	0.0320	0.0321	0.0320
Adjusted R Squared	0.0311	0.0314	0.0313	0.0314	0.0313

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix V. Regressions for ELA Middle School Zones (T-Stat underneath Coefficient)

	All Fixed effects – PUMA and Seasons (40 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0321* (-2.01)	-0.0328* (-2.05)	-0.0331* (-2.07)	-0.0327* (-2.05)	-0.0331* (-2.07)
All Condos (Compared to Two Family Homes)	-4.2975** (-19.17)	-4.3159** (-19.25)	-4.3249** (-19.28)	-4.3147** (-19.24)	-4.3228** (-19.28)
Age of Home Sold	-0.0047** (-14.35)	-0.0047** (-14.37)	-0.0047** (-14.40)	-0.0047** (-14.36)	-0.0047** (-14.38)
Percent Free Lunch at Zoned Elementary Schools	0.1446** (3.59)	0.0896* (2.03)	0.0719 (1.61)	0.0855* (1.96)	0.0661 (1.50)
Report Card Grade A Dummy Variable	0.044 (1.20)	0.0389 (1.06)	0.0366 (1.00)	0.0386 (1.05)	0.0359 (0.98)
Report Card Grade B Dummy Variable	0.0033 (0.09)	-0.0085 (-0.24)	-0.0118 (-0.33)	-0.0083 (-0.23)	-0.0119 (-0.34)
Report Card Grade C Dummy Variable	0.0118 (0.33)	-0.0013 (-0.04)	-0.0052 (-0.14)	-0.0035 (-0.10)	-0.0079 (-0.22)
Percent of Teachers Above Average or High	0.2642** (3.57)				
Average teacher career VAM		0.1955** (4.65)			
Average teacher VAM in 2010			0.2170** (5.21)		
Weighted teacher career VAM				0.4063** (5.04)	
Weighted teacher VAM in 2010					0.4552** (5.67)
Constant	12.9096 (235.16)	12.9493 (229.32)	12.9633 (228.72)	12.9842 (230.05)	12.9830 (229.63)
Observations	53183	53183	53183	53183	53183
R Squared	0.0506	0.0508	0.0509	0.0511	0.0511
Adjusted R Squared	0.0497	0.0499	0.05	0.0502	0.0502

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix W. Regressions for ELA Middle School Zones in the Bronx (T-Stat underneath Coefficient)

	Bronx Fixed effects – PUMA and Seasons (10 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0633 (-1.18)	-0.0642 (-1.20)	-0.0641 (-1.19)	-0.06356 (-1.18)	-0.0635 (-1.18)
All Condos (Compared to Two Family Homes)	---	---	---	---	---
Age of Home Sold	-0.0037** (-3.99)	-0.0078** (-3.99)	-0.0037** (-4.00)	-0.0038** (-4.04)	-0.0038** (-4.04)
Percent Free Lunch at Zoned Elementary Schools	-0.0941 (-0.47)	-0.1422 (-0.66)	-0.1487 (-0.70)	-0.2121 (-1.00)	-0.2119 (-1.00)
Report Card Grade A Dummy Variable	-0.0346 (-0.23)	-0.0184 (-0.12)	-0.02 (-0.13)	-0.0032 (-0.02)	-0.0006 (-0.00)
Report Card Grade B Dummy Variable	-0.1183 (-0.79)	-0.1103 (-0.74)	-0.1129 (-0.76)	-0.1033 (-0.69)	-0.1010 (-0.68)
Report Card Grade C Dummy Variable	-0.0882 (-0.60)	-0.0864 (-0.59)	-0.0896 (-0.61)	-0.0819 (-0.55)	-0.0829 (-0.56)
Percent of Teachers Above Average or High	0.2588 (0.98)				
Average teacher career VAM		0.1726 (1.17)			
Average teacher VAM in 2010			0.1869 (1.24)		
Weighted teacher career VAM				0.5323 (1.95)	
Weighted teacher VAM in 2010					0.5626* (1.97)
Constant	12.905 (54.02)	12.9254 (53.67)	12.9322 (53.58)	12.9648 (53.73)	12.9618 (53.80)
Observations	5840	5840	5840	5840	5840
R Squared	0.0120	0.0121	0.0121	0.0125	0.0125
Adjusted R Squared	0.0088	0.0089	0.0089	0.0093	0.0093

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix X. Regressions for ELA Middle School Zones in Brooklyn (T-Stat underneath Coefficient)

	Brooklyn Fixed effects – PUMA and Seasons (16 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0783** (-6.00)	-0.0785** (-6.03)	-0.0787** (-6.04)	-0.0782** (-6.00)	-0.0787** (-6.04)
All Condos (Compared to Two Family Homes)	---	---	---	---	---
Age of Home Sold	-0.0035** (-13.08)	-0.0035** (-13.12)	-0.0035** (-13.21)	-0.0035** (-13.09)	-0.0035** (-13.09)
Percent Free Lunch at Zoned Elementary Schools	0.0075 (0.18)	-0.0582 (-1.25)	-0.0674 (-1.43)	-0.0720 (-1.51)	-0.0818 (-1.70)
Report Card Grade A Dummy Variable	-0.0073 (-0.30)	-0.0184 (-0.75)	-0.0181 (-0.74)	-0.0298 (-1.19)	-0.0304 (-1.22)
Report Card Grade B Dummy Variable	-0.0550* (-2.41)	-0.0634** (-2.75)	-0.0607** (-2.65)	-0.0736** (-3.14)	-0.0738** (-3.16)
Report Card Grade C Dummy Variable	0.0008 (0.03)	-0.0144 (-0.60)	-0.0153 (-0.63)	-0.0215 (-0.88)	-0.0250 (-1.03)
Percent of Teachers Above Average or High	0.2695** (5.00)				
Average teacher career VAM		0.1897** (5.87)			
Average teacher VAM in 2010			0.1979** (5.99)		
Weighted teacher career VAM				0.3965** (5.94)	
Weighted teacher VAM in 2010					0.4067** (6.16)
Constant	13.3612 (261.99)	13.415 (251.18)	13.4226 (249.69)	13.4346 (245.54)	13.4425 (244.94)
Observations	14072	14072	14072	14072	14072
R Squared	0.1435	0.1441	0.1442	0.1441	0.1443
Adjusted R Squared	0.142	0.1426	0.1426	0.1426	0.1428

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix Y. Regressions for ELA Middle School Zones in Queens (T-Stat underneath Coefficient)

	Queens Fixed effects – PUMA and Seasons (14 categories)				
One Family Homes (Compared to 2 Fam Homes)	-0.0055 (-0.24)	-0.0064 (-0.28)	-0.0068 (-0.29)	-0.0073 (-0.32)	-0.0073 (-0.32)
All Condos (Compared to Two Family Homes)	-4.3359** (-16.94)	-4.3566** (-17.02)	-4.3657** (-17.05)	-4.3639** (-17.05)	-4.3662** (-17.06)
Age of Home Sold	-0.0055** (-11.26)	-0.0055** (-11.26)	-0.0055** (-11.26)	-0.0054** (-11.18)	-0.0054** (-11.19)
Percent Free Lunch at Zoned Elementary Schools	0.1780** (3.38)	0.1199* (2.06)	0.1011 (1.73)	0.0795 (1.41)	0.0832 (1.47)
Report Card Grade A Dummy Variable	0.0864 (1.42)	0.0776 (1.27)	0.0726 (1.19)	0.0658 (1.08)	0.0650 (1.07)
Report Card Grade B Dummy Variable	0.6017 (1.03)	0.0412 (0.70)	0.0337 (0.57)	0.0233 (0.39)	0.0223 (0.38)
Report Card Grade C Dummy Variable	0.0554 (0.93)	0.0386 (0.65)	0.0317 (0.53)	0.0231 (0.39)	0.0242 (0.41)
Percent of Teachers Above Average or High	0.2874* (2.53)				
Average teacher career VAM		0.2171** (3.44)			
Average teacher VAM in 2010			0.2399** (3.92)		
Weighted teacher career VAM				0.5338** (5.04)	
Weighted teacher VAM in 2010					0.5341** (4.84)
Constant	12.7659 (160.22)	12.8101 (156.44)	13.0903 (156.53)	12.8414 (158.56)	12.8402 (158.06)
Observations	33271	33271	33271	33271	33271
R Squared	0.0315	0.0317	0.0321	0.0321	0.0320
Adjusted R Squared	0.0308	0.031	0.0314	0.0314	0.0313

* Stat. Sig. at 95% level; ** Stat. Sig. at 99% level. (dependent variable is log price of homes)

Appendix Z. Unweighted Average Career Elementary School Teacher Quality Coefficients for Queens PUMAs

		Elementary - All teachers			Elementary - Math teachers			Elementary - ELA teachers		
PUMA Name	Section of Borough	Coeff	T-Stat	N	Coeff.	T-Stat	N	Coeff.	T-Stat	N
Astoria & Long Island City	Northwest	0.17	0.43	740	-0.02	-0.05	740	0.27	0.78	740
Jackson Heights & North Corona	Northwest	-0.04	-0.12	1167	-0.04	-0.12	1167	-0.04	-0.12	1167
Flushing, Murray Hill & Whitestone	Northeast	0.19	0.95	3909	0.15	0.76	3909	0.23	1.15	3909
Bayside, Douglaston & Little Neck	Northeast	0.10	0.46	2026	0.11	0.44	2026	0.1	0.48	2026
Queens Village, Cambria Heights & Rosedale	Southeast	0.44	2.71	5133	0.5	2.85	5133	0.36	2.48	5133
Briarwood, Fresh Meadows & Hillcrest	Southeast	0.70	3.61	3187	0.76	4.19	3187	0.55	2.8	3187
Elmhurst & South Corona	Northwest	0.44	1.58	905	0.42	1.62	905	0.46	1.52	905
Forest Hills & Rego Park	Northwest	0.63	2.02	886	0.69	2.03	886	0.56	1.99	886
Sunnyside & Woodside	Northwest	0.78	0.89	658	0.87	0.97	658	0.67	0.81	658
Ridgewood, Glendale & Middle Village	Northwest	0.15	0.76	2535	0.11	-1.07	2535	0.19	0.92	2535
Richmond Hill & Woodhaven	Southwest	0.45	1.90	1866	0.42	1.79	1866	0.48	1.99	1866
Jamaica, Hollis & St. Albans	Southeast	0.25	1.83	5847	0.26	1.93	5847	0.24	1.7	5847
Howard Beach & Ozone Park	Southwest	0.34	1.62	3042	0.24	1.38	3042	0.43	1.84	3042
Far Rockaway, Breezy Point & Broad Channel	Rockaways	-0.03	-0.10	1462	-0.06	-0.22	1462	0.01	0.04	1462

Appendix AA. Unweighted Average Career Middle School Teacher Quality Coefficients for Queens PUMAs

		Middle - All teachers			Middle - Math teachers			Middle - ELA teachers		
PUMA Name	Section of Borough	Coeff.	T-Stat	N	Coeff.	T-Stat	N	Coeff.	T-Stat	N
Astoria & Long Island City	Northwest	0.16	0.45	740	0.11	0.35	740	0.25	0.58	740
Jackson Heights & North Corona	Northwest	0.03	0.08	1167	-0.04	-0.12	1167	0.13	0.35	1167
Flushing, Murray Hill & Whitestone	Northeast	-0.19	-0.93	3909	-0.17	-0.96	3909	-0.2	-0.85	3909
Bayside, Douglaston & Little Neck	Northeast	0.14	0.49	2026	0.28	0.96	2026	0.02	0.06	2026
Queens Village, Cambria Heights & Rosedale	Southeast	0.5	2.45	4529	0.54	2.42	4529	0.45	2.42	4529
Briarwood, Fresh Meadows & Hillcrest	Southeast	0.49	2.12	3187	0.62	3.45	3187	-0.02	-0.08	3187
Elmhurst & South Corona	Northwest	0.75	1.89	904	0.75	1.98	904	0.74	1.81	904
Forest Hills & Rego Park	Northwest	0.20	0.41	886	0.21	0.39	886	0.19	0.42	886
Sunnyside & Woodside	Northwest	0.78	1.38	661	0.80	1.5	661	0.71	1.18	661
Ridgewood, Glendale & Middle Village	Northwest	0.15	0.90	2535	0.12	0.79	2535	0.18	0.99	2535
Richmond Hill & Woodhaven	Southwest	0.21	0.74	2014	0.33	1.2	2014	0.05	0.2	2014
Jamaica, Hollis & St. Albans	Southeast	0.33	1.98	6194	0.25	1.51	6194	0.37	2.33	6194
Howard Beach & Ozone Park	Southwest	0.28	1.20	3042	0.23	1.06	3042	0.34	1.34	3042
Far Rockaway, Breezy Point & Broad Channel	Rockaways	0.47	1.90	1477	0.52	2.1	1477	0.14	0.67	1477

Appendix BB. Weighted Average Career Elementary School Teacher Quality Coefficients for Queens PUMAs

		Elementary - All teachers			Elementary - Math teachers			Elementary - ELA teachers		
PUMA Name	Section of Borough	Coeff	T-Stat	N	Coeff.	T-Stat	N	Coeff.	T-Stat	N
Astoria & Long Island City	Northwest	0.75	0.65	740	0.32	0.24	740	0.89	0.93	740
Jackson Heights & North Corona	Northwest	-0.27	-0.32	1167	-0.29	-0.31	1167	-0.25	-0.32	1167
Flushing, Murray Hill & Whitestone	Northeast	0.57	0.95	3909	0.44	0.75	3909	0.69	1.16	3909
Bayside, Douglaston & Little Neck	Northeast	0.22	0.3	2026	0.21	0.27	2026	0.21	0.33	2026
Queens Village, Cambria Heights & Rosedale	Southeast	0.9	2.16	5133	1.08	2.34	5133	0.71	1.95	5133
Briarwood, Fresh Meadows & Hillcrest	Southeast	1.95	3.74	3187	2.07	4.27	3187	1.6	3	3187
Elmhurst & South Corona	Northwest	0.65	1.66	905	0.59	1.66	905	0.74	1.64	905
Forest Hills & Rego Park	Northwest	1.65	2.07	886	1.81	2.07	886	1.47	2.04	886
Sunnyside & Woodside	Northwest	1.48	0.78	658	1.72	0.86	658	1.25	0.7	658
Ridgewood, Glendale & Middle Village	Northwest	0.28	0.57	2535	0.18	0.39	2535	0.37	0.73	2535
Richmond Hill & Woodhaven	Southwest	1.39	1.85	1866	1.28	1.75	1866	1.5	1.95	1866
Jamaica, Hollis & St. Albans	Southeast	0.78	1.97	5847	0.77	2.03	5847	0.76	1.88	5947
Howard Beach & Ozone Park	Southwest	1.04	1.61	3042	0.75	1.37	3042	1.35	1.86	3042
Far Rockaway, Breezy Point & Broad Channel	Rockaways	0.36	0.46	1462	0.22	0.28	1462	0.48	0.62	1462

Appendix CC. Weighted Average Career Middle School Teacher Quality Coefficients for Queens PUMAs

		Middle - All teachers			Middle - Math teachers			Middle - ELA teachers		
PUMA Name	Section of Borough	Coeff.	T-Stat	N	Coeff.	T-Stat	N	Coeff.	T-Stat	N
Astoria & Long Island City	Northwest	0.31	0.5	740	0.21	0.4	740	0.47	0.63	740
Jackson Heights & North Corona	Northwest	0.05	0.08	1167	-0.07	-0.13	1167	0.25	0.37	1167
Flushing, Murray Hill & Whitestone	Northeast	-0.32	-0.92	3909	-0.29	-0.95	3909	-0.33	-0.85	3909
Bayside, Douglaston & Little Neck	Northeast	0.39	0.64	2026	0.65	1.05	2026	0.13	0.23	2026
Queens Village, Cambria Heights & Rosedale	Southeast	1.28	2.96	4529	1.37	2.92	4529	1.18	2.94	4529
Briarwood, Fresh Meadows & Hillcrest	Southeast	0.87	2.01	3187	1.13	3.36	3187	-0.17	-0.35	3187
Elmhurst & South Corona	Northwest	1.75	2.2	904	1.68	2.24	904	1.18	2.16	904
Forest Hills & Rego Park	Northwest	0.4	0.33	886	0.41	0.31	886	0.39	0.35	886
Sunnyside & Woodside	Northwest	1.06	1.1	661	1.13	1.23	661	0.93	0.93	661
Ridgewood, Glendale & Middle Village	Northwest	0.1	0.31	2535	0.07	0.24	2535	0.15	0.39	2535
Richmond Hill & Woodhaven	Southwest	0.2	0.48	2014	0.39	0.93	2014	0.00	0.00	2014
Jamaica, Hollis & St. Albans	Southeast	0.63	2.03	6194	0.54	1.69	6194	0.66	2.26	6194
Howard Beach & Ozone Park	Southwest	0.61	1.32	3042	0.51	1.18	3042	0.73	1.46	3042
Far Rockaway, Breezy Point & Broad Channel	Rockaways	0.96	2.34	1477	0.71	1.86	1477	0.49	1.27	1477

Appendix DD. Unweighted Average Career Elementary School Teacher Quality Coefficients for Bronx PUMAs

		Elementary - All teachers			Elementary - Math teachers			Elementary - ELA teachers		
PUMA Name	Section of Borough	Coeff	T-Stat	N	Coeff	T-Stat	N	Coeff	T-Stat	N
Riverdale, Fieldston & Kingsbridge	West	0.49	0.69	271	0.51	0.66	271	0.47	0.7	271
Wakefield, Williamsbridge & Woodlawn	East	0.34	1.40	1574	0.17	0.74	1574	0.57	2.37	1574
Co-op City, Pelham Bay & Schuylerville	East	0.27	0.82	1325	0.23	0.77	1325	0.32	0.9	1325
Pelham Parkway, Morris Park & Laconia	East	0.24	0.81	1219	0.35	1.21	1219	0.11	0.38	1219
Belmont, Crotona Park East & East Tremont	West	0.57	1.26	357	0.46	1.06	353	0.66	1.42	353
Bedford Park, Fordham North & Norwood	West	0.97	1.37	183	0.98	1.4	183	0.93	1.32	183
Morris Heights, Fordham South & Mount Hope	West	0.66	0.74	152	0.62	0.66	152	0.67	0.8	152
Concourse, Highbridge & Mount Eden	South	1.11	0.67	103	1.66	0.91	103	0.67	0.44	103
Castle Hill, Clason Point & Parkchester	East	-0.43	-1.10	808	-0.4	-1.11	808	-0.46	-1.07	808
Hunts Point, Longwood & Melrose	South	0.44	0.71	179	0.44	0.67	173	0.39	0.69	173

Appendix EE. Unweighted Average Career Middle School Teacher Quality Coefficients for Bronx PUMAs

		Middle - All teachers			Middle - Math teachers			Middle - ELA teachers		
PUMA Name	Section of Borough	Coeff	T-Stat	N	Coeff	T-Stat	N	Coeff	T-Stat	N
Riverdale, Fieldston & Kingsbridge	West	-0.18	-0.23	271	-0.52	-0.72	271	0.09	0.12	271
Wakefield, Williamsbridge & Woodlawn	East	0.59	1.71	1448	0.6	1.73	1448	0.55	1.65	1448
Co-op City, Pelham Bay & Schuylerville	East	0.21	0.7	1336	0.18	0.75	1336	0.21	0.57	1336
Pelham Parkway, Morris Park & Laconia	East	-0.06	-0.17	1219	-0.04	-0.1	1219	-0.08	-0.23	1219
Belmont, Crotona Park East & East Tremont	West	0.26	0.4	236	0.25	0.37	236	0.26	0.43	236
Bedford Park, Fordham North & Norwood	West	1.04	1.13	159	1.15	1.22	159	0.78	0.91	159
Morris Heights, Fordham South & Mount Hope	West	0.25	0.26	151	0.11	0.11	151	0.37	0.4	151
Concourse, Highbridge & Mount Eden	South	0.25	0.17	105	0.03	0.02	105	0.48	0.37	105
Castle Hill, Clason Point & Parkchester	East	-0.26	-0.56	743	-0.12	-0.27	743	-0.45	-0.91	743
Hunts Point, Longwood & Melrose	South	0.29	0.44	172	0.26	0.43	172	0.33	0.46	172

Appendix FF. Weighted Average Career Elementary School Teacher Quality Coefficients for Bronx PUMAs

		Elementary - All teachers			Elementary - Math teachers			Elementary - ELA teachers		
PUMA Name	Section of Borough	Coeff	T-Stat	N	Coeff	T-Stat	N	Coeff	T-Stat	N
Riverdale, Fieldston & Kingsbridge	West	1.18	0.65	271	1.18	0.62	271	1.14	0.68	271
Wakefield, Williamsbridge & Woodlawn	East	1.25	1.91	1574	0.82	1.31	1574	1.81	2.76	1574
Co-op City, Pelham Bay & Schuylerville	East	0.7	0.8	1325	0.57	0.74	1325	0.91	0.91	1325
Pelham Parkway, Morris Park & Laconia	East	0.53	0.65	1219	0.79	0.99	1219	0.23	0.27	1219
Belmont, Crotona Park East & East Tremont	West	2.02	1.33	353	1.75	1.2	353	2.2	1.42	353
Bedford Park, Fordham North & Norwood	West	2.72	1.16	183	2.77	1.18	183	2.61	1.11	183
Morris Heights, Fordham South & Mount Hope	West	2.57	0.84	152	2.36	0.74	152	2.65	0.92	152
Concourse, Highbridge & Mount Eden	South	2.94	0.57	103	4.05	0.75	103	1.95	0.4	103
Castle Hill, Clason Point & Parkchester	East	-1.19	-1.05	808	-1.11	-1.07	808	-1.25	-1.02	808
Hunts Point, Longwood & Melrose	South	0.92	0.47	173	0.87	0.44	173	0.86	0.46	173

Appendix GG. Weighted Average Career Middle School Teacher Quality Coefficients for Bronx PUMAs

		Middle - All teachers			Middle - Math teachers			Middle - ELA teachers		
PUMA Name	Section of Borough	Coeff	T-Stat	N	Coeff	T-Stat	N	Coeff	T-Stat	N
Riverdale, Fieldston & Kingsbridge	West	1.48	0.78	271	0.82	0.39	271	1.7	0.99	271
Wakefield, Williamsbridge & Woodlawn	East	1.33	1.86	1448	1.32	1.87	1448	1.24	1.79	1448
Co-op City, Pelham Bay & Schuylerville	East	0.52	0.69	1336	0.49	0.76	1336	0.45	0.52	1336
Pelham Parkway, Morris Park & Laconia	East	-0.2	-0.29	1219	-0.16	-0.24	1219	-0.22	-0.33	1219
Belmont, Crotona Park East & East Tremont	West	0.52	0.47	236	0.55	0.46	236	0.49	0.48	236
Bedford Park, Fordham North & Norwood	West	1.93	1.18	159	2.16	1.28	159	1.5	0.95	159
Morris Heights, Fordham South & Mount Hope	West	1.05	0.58	151	0.91	0.49	151	1.24	0.67	151
Concourse, Highbridge & Mount Eden	South	6.4	2.05	105	7.51	2.04	105	5.51	2.09	105
Castle Hill, Clason Point & Parkchester	East	-0.47	-0.58	743	-0.29	-0.37	743	-0.71	-0.83	743
Hunts Point, Longwood & Melrose	South	0.65	0.7	172	0.58	0.72	172	0.73	0.67	172

Appendix HH. Unweighted Average Career Elementary School Teacher Quality Coefficients for Brooklyn PUMAs

		Elementary - All teachers			Elementary - Math teachers			Elementary - ELA teachers		
PUMA Name	Section of Borough	Coeff	T-Stat	N	Coeff	T-Stat	N	Coeff	T-Stat	N
Greenpoint & Williamsburg	Northwest	0.16	0.60	245	0.15	0.55	244	0.16	0.63	244
Bushwick	Central	0.22	1.95	713	0.19	1.72	668	0.22	2.04	668
Bedford-Stuyvesant	Central	0.32	2.20	1123	0.33	2.37	1223	0.28	1.95	1223
Brooklyn Heights & Fort Greene	Northwest	0.13	0.28	184	0.08	0.17	184	0.16	0.39	184
Park Slope, Carroll Gardens & Red Hook	Northwest	0.05	0.17	252	0.07	0.25	252	0.02	0.08	252
Crown Heights North & Prospect Heights	Central	0.56	3.30	636	0.52	3.05	636	0.64	3.66	613
Brownsville & Ocean Hill	Eastern	0.27	1.56	682	0.24	1.44	682	0.29	1.67	682
East New York & Starrett City	Eastern	0.36	2.92	1397	0.32	3.02	1392	0.37	2.57	1397
Canarsie & Flatlands	Southeast	0.13	2.87	2927	0.07	1.58	2927	0.21	4.33	2927
East Flatbush, Farragut & Rugby	Central	0.23	1.84	874	0.22	1.79	874	0.23	1.84	874
Crown Heights South, Prospect Lefferts & Wingate	Central	0.35	1.45	410	0.41	1.68	410	0.25	1.00	410
Sunset Park & Windsor Terrace	Southwest	0.22	1.56	792	0.21	1.44	792	0.21	1.61	792
Bay Ridge & Dyker Heights	Southwest	0.21	1.61	1299	0.19	1.61	1299	0.21	1.56	1299
Borough Park, Kensington & Ocean Parkway	Southwest	0.32	2.75	892	0.37	2.97	892	0.24	2.38	892
Flatbush & Midwood	Central	-0.13	-1.08	733	-0.12	-1.02	733	-0.13	-1.12	733
Sheepshead Bay, Gerritsen Beach & Homecrest	Southeast	0.05	0.70	1666	-0.02	-0.27	1666	0.12	1.68	1666
Bensonhurst & Bath Beach	Southwest	0.05	0.53	1601	0.04	0.43	1601	0.07	0.71	1601
Brighton Beach & Coney Island	Southern	0.45	2.03	463	0.34	1.89	463	0.52	1.94	463

Appendix II. Unweighted Average Career Middle School Teacher Quality Coefficients for Brooklyn PUMAs

		Middle - All teachers			Middle - Math teachers			Middle - ELA teachers		
PUMA Name	Section of Borough	Coeff	T-Stat	N	Coeff	T-Stat	N	Coeff	T-Stat	N
Greenpoint & Williamsburg	Northwest	--	--	--	--	--	--	--	--	--
Bushwick	Central	0.62	2.88	553	0.5	2.64	553	0.72	3.04	553
Bedford-Stuyvesant	Central	--	--	--	--	--	--	--	--	--
Brooklyn Heights & Fort Greene	Northwest	--	--	--	--	--	--	--	--	--
Park Slope, Carroll Gardens & Red Hook	Northwest	--	--	--	--	--	--	--	--	--
Crown Heights North & Prospect Heights	Central	0.47	1.75	368	0.52	1.83	368	0.41	1.67	368
Brownsville & Ocean Hill	Eastern	0.41	1.55	296	0.34	1.49	296	0.46	1.54	296
East New York & Starrett City	Eastern	0.32	2.67	1528	0.26	2.28	1528	0.37	3.01	1528
Canarsie & Flatlands	Southeast	0.01	0.09	2927	-0.02	-0.41	2927	0.03	0.59	2927
East Flatbush, Farragut & Rugby	Central	0.2	1.42	801	0.2	1.34	801	0.18	1.43	801
Crown Heights South, Prospect Lefferts & Wingate	Central	0.59	2.08	408	0.71	2.3	408	0.46	1.85	408
Sunset Park & Windsor Terrace	Southwest	0.42	1.41	528	0.54	1.73	528	0.24	0.97	528
Bay Ridge & Dyker Heights	Southwest	0.26	2.15	1301	0.22	2.14	1301	0.3	2.14	1301
Borough Park, Kensington & Ocean Parkway	Southwest	0.38	3.09	892	0.43	3.28	892	0.26	2.6	892
Flatbush & Midwood	Central	0.08	0.62	719	0.09	0.67	719	0.07	0.54	719
Sheepshead Bay, Gerritsen Beach & Homecrest	Southeast	-0.1	-1.2	1666	-0.06	-0.65	1666	-0.15	-1.81	1666
Bensonhurst & Bath Beach	Southwest	0.03	0.24	1608	0.01	0.07	1608	0.08	0.56	1608
Brighton Beach & Coney Island	Southern	0.32	1.77	464	0.31	1.91	464	0.28	1.49	464

Appendix JJ. Weighted Average Career Elementary School Teacher Quality Coefficients for Brooklyn PUMAs

		Elementary - All teachers			Elementary - Math teachers			Elementary - ELA teachers		
PUMA Name	Section of Borough	Coeff	T-Stat	N	Coeff	T-Stat	N	Coeff	T-Stat	N
Greenpoint & Williamsburg	Northwest	0.55	0.64	244	0.52	0.59	244	0.55	0.68	244
Bushwick	Central	0.7	1.94	668	0.57	1.65	668	0.74	2.11	668
Bedford-Stuyvesant	Central	0.96	2.19	1223	1.01	2.4	1223	0.84	1.91	1223
Brooklyn Heights & Fort Greene	Northwest	-0.06	-0.04	184	-0.29	-0.18	184	0.16	0.11	184
Park Slope, Carroll Gardens & Red Hook	Northwest	0.15	0.16	252	0.24	0.25	252	0.05	0.05	252
Crown Heights North & Prospect Heights	Central	1.57	3.23	636	1.49	3.03	636	1.74	3.53	613
Brownsville & Ocean Hill	Eastern	0.65	1.3	682	0.61	1.23	682	0.65	1.38	682
East New York & Starrett City	Eastern	0.76	2.3	1397	0.7	2.42	1392	0.76	2.09	1397
Canarsie & Flatlands	Southeast	0.2	1.71	2927	0.07	0.61	2927	0.37	3.03	2927
East Flatbush, Farragut & Rugby	Central	0.68	2.18	874	0.68	2.15	874	0.65	2.15	874
Crown Heights South, Prospect Lefferts & Wingate	Central	1.49	1.85	410	1.66	2.08	410	1.13	1.38	410
Sunset Park & Windsor Terrace	Southwest	0.81	1.86	792	0.85	1.8	792	0.7	1.84	792
Bay Ridge & Dyker Heights	Southwest	0.35	1.06	1299	0.34	1.09	1299	0.35	1.01	1299
Borough Park, Kensington & Ocean Parkway	Southwest	0.91	2.72	892	1.02	2.88	892	0.71	2.4	892
Flatbush & Midwood	Central	-0.51	-1.6	733	-0.49	-1.55	733	-0.51	-1.62	733
Sheepshead Bay, Gerritsen Beach & Homecrest	Southeast	-0.09	-0.41	1666	-0.33	-1.47	1666	0.16	0.7	1666
Bensonhurst & Bath Beach	Southwest	0.05	0.19	1601	0.03	0.14	1601	0.1	0.33	1601
Brighton Beach & Coney Island	Southern	1.3	1.9	463	1.04	1.79	463	1.46	1.84	463

Appendix KK. Weighted Average Career Middle School Teacher Quality Coefficients for Brooklyn PUMAs

		Middle - All teachers			Middle - Math teachers			Middle - ELA teachers		
PUMA Name	Section of Borough	Coeff	T-Stat	N	Coeff	T-Stat	N	Coeff	T-Stat	N
Greenpoint & Williamsburg	Northwest	---	---	---	---	---	---	---	---	---
Bushwick	Central	1.28	2.89	553	1.09	2.71	553	1.44	2.99	553
Bedford-Stuyvesant	Central	---	---	---	---	---	---	---	---	---
Brooklyn Heights & Fort Greene	Northwest	---	---	---	---	---	---	---	---	---
Park Slope, Carroll Gardens & Red Hook	Northwest	---	---	---	---	---	---	---	---	---
Crown Heights North & Prospect Heights	Central	1.21	1.76	368	1.32	1.84	368	1.06	1.67	368
Brownsville & Ocean Hill	Eastern	0.81	1.44	296	0.68	1.39	296	0.91	1.43	296
East New York & Starrett City	Eastern	0.68	2.94	1528	0.57	2.53	1528	0.75	3.26	1528
Canarsie & Flatlands	Southeast	0.03	0.31	2927	-0.01	-0.11	2927	0.07	0.68	2927
East Flatbush, Farragut & Rugby	Central	0.23	1.01	801	0.26	1.02	801	0.19	0.96	801
Crown Heights South, Prospect Lefferts & Wingate	Central	1.34	2.05	408	1.61	2.26	408	1.06	1.82	408
Sunset Park & Windsor Terrace	Southwest	1.01	1.54	528	1.19	1.8	528	0.64	1.12	528
Bay Ridge & Dyker Heights	Southwest	0.51	2.19	1301	0.43	2.17	1301	0.61	2.18	1301
Borough Park, Kensington & Ocean Parkway	Southwest	0.91	3.04	892	0.99	3.14	892	0.63	2.57	892
Flatbush & Midwood	Central	0.19	0.71	719	0.21	0.75	719	0.17	0.64	719
Sheepshead Bay, Gerritsen Beach & Homecrest	Southeast	-0.19	-1.14	1666	-0.1	-0.62	1666	-0.28	-1.71	1666
Bensonhurst & Bath Beach	Southwest	0.14	0.52	1608	0.08	0.35	1608	0.26	0.85	1608
Brighton Beach & Coney Island	Southern	0.87	2.12	464	0.79	2.2	464	0.86	1.85	464

Appendix LL. Unweighted Average Career Elementary School Teacher Quality Coefficients by Borough Areas

		Elementary - All teachers			Elementary - Math teachers			Elementary - ELA teachers		
Borough	Section of Borough	Coeff	T-Stat	N	Coeff	T-Stat	N	Coeff	T-Stat	N
Bronx	West	0.54	1.88	959	0.49	1.72	959	0.57	2.00	959
Bronx	South	0.53	0.82	276	0.67	0.98	276	0.38	0.63	276
Bronx	East	0.22	1.49	4926	0.17	1.22	4926	0.29	1.94	4926
Brooklyn	Central	0.31	5.14	4544	0.31	5.17	4544	0.30	4.99	4521
Brooklyn	Eastern	0.33	3.41	2079	0.30	3.42	2074	0.34	3.17	2079
Brooklyn	Northwest	0.15	0.87	680	0.16	0.9	680	0.14	0.84	680
Brooklyn	Southeast	0.10	2.45	4593	0.03	0.84	4593	0.17	4.20	4593
Brooklyn	Southern	0.45	2.03	463	0.34	1.89	463	0.52	1.94	463
Brooklyn	Southwest	0.21	3.65	4584	0.19	3.41	4584	0.20	3.75	4584
Queens	Northeast	0.11	0.76	5935	0.10	0.67	5935	0.11	0.83	5935
Queens	Northwest	0.40	3.65	6891	0.39	3.47	6891	0.40	3.74	6891
Queens	Rockaways	-0.03	-0.10	1462	-0.06	-0.22	1462	0.01	0.04	1462
Queens	Southeast	0.44	4.81	14167	0.52	5.74	14167	0.32	3.68	14167
Queens	Southwest	0.42	3.13	4908	0.36	2.92	4908	0.46	3.27	4908

Appendix MM. Unweighted Average Career Middle School Teacher Quality Coefficients by Borough Areas

		Middle - All teachers			Middle - Math teachers			Middle - ELA teachers		
Borough	Section of Borough	Coeff	T-Stat	N	Coeff	T-Stat	N	Coeff	T-Stat	N
Bronx	West	0.33	0.90	817	0.20	0.55	817	0.37	1.07	817
Bronx	South	0.25	0.38	277	0.26	0.42	277	0.25	0.38	277
Bronx	East	0.21	1.25	4746	0.22	1.38	4746	0.19	1.07	4746
Brooklyn	Central	0.31	3.82	2849	0.32	3.88	2849	0.28	3.66	2849
Brooklyn	Eastern	0.32	3.06	1824	0.26	2.62	1824	0.38	3.46	1824
Brooklyn	Northwest	--	--	--	--	--	--	--	--	--
Brooklyn	Southeast	-0.01	-0.07	4593	-0.01	-0.13	4593	-0.01	-0.07	4593
Brooklyn	Southern	0.32	1.77	464	0.31	1.91	464	0.28	1.49	464
Brooklyn	Southwest	0.23	3.45	4329	0.19	3.16	4329	0.22	3.51	4329
Queens	Northeast	-0.07	-0.42	5935	-0.03	-0.19	5935	-0.11	-0.65	5935
Queens	Northwest	0.28	2.33	6893	0.26	2.39	6893	0.27	2.11	6893
Queens	Rockaways	0.47	1.90	1477	0.52	2.10	1477	0.14	0.67	1477
Queens	Southeast	0.43	4.06	13910	0.44	4.43	13910	0.35	3.26	13910
Queens	Southwest	0.30	1.73	5056	0.32	1.86	5056	0.25	1.47	5056

Appendix NN. Weighted Average Career Elementary School Teacher Quality Coefficients by Borough Areas

		Elementary - All teachers weighted			Elementary - Math teachers			Elementary - ELA teachers		
Borough	Section of Borough	Coeff	T-Stat	N	Coeff	T-Stat	N	Coeff	T-Stat	N
Bronx	West	1.62	1.81	959	1.5	1.68	959	1.69	1.91	959
Bronx	South	1.23	0.61	276	1.45	0.72	276	0.93	0.47	276
Bronx	East	0.68	1.7	4926	0.54	1.44	4926	0.9	2.14	4926
Brooklyn	Central	0.79	4.58	4544	0.8	4.65	4544	0.75	4.41	4521
Brooklyn	Eastern	0.76	2.82	2079	0.71	2.87	2074	0.74	2.69	2079
Brooklyn	Northwest	0.44	0.76	680	0.45	0.77	680	0.42	0.74	680
Brooklyn	Southeast	0.08	0.75	4593	-0.07	-0.72	4593	0.27	2.45	4593
Brooklyn	Southern	1.3	1.9	463	1.04	1.79	463	1.46	1.84	463
Brooklyn	Southwest	0.57	3.47	4584	0.53	3.24	4584	0.55	3.56	4584
Queens	Northeast	0.21	0.49	5935	0.21	0.49	5935	0.23	0.56	5935
Queens	Northwest	0.82	3.65	6891	0.82	3.65	6891	0.86	3.74	6891
Queens	Rockaways	0.36	0.46	1462	0.36	0.46	1462	0.48	0.62	1462
Queens	Southeast	1.13	4.6	14167	1.14	4.6	14167	0.83	3.5	14167
Queens	Southwest	1.31	3.09	4908	1.31	3.09	4908	1.45	3.26	4908

Appendix OO. Weighted Average Career Middle School Teacher Quality Coefficients by Borough Areas

		Middle - All teachers			Middle - Math teachers			Middle - ELA teachers		
Borough	Section of Borough	Coef	T-Stat	N	Coef	T-Stat	N	Coef	T-Stat	N
Bronx	West	1.15	1.66	817	1.11	1.52	817	1.09	1.67	817
Bronx	South	1.61	1.63	277	1.45	1.54	277	1.88	1.72	277
Bronx	East	0.38	1.09	4746	0.41	1.23	4746	0.34	0.94	4746
Brooklyn	Central	0.54	3.28	2349	0.59	3.45	2849	0.46	3.08	2849
Brooklyn	Eastern	0.59	3.34	1824	0.58	2.89	1824	0.79	3.72	1824
Brooklyn	Northwest	---	---	---	---	---	---	---	---	---
Brooklyn	Southeast	0.02	0.26	4593	0.03	0.29	4593	0.01	0.17	4593
Brooklyn	Southern	0.87	2.12	464	0.79	2.2	464	0.86	1.85	464
Brooklyn	Southwest	0.51	3.48	4329	0.43	3.19	4329	0.52	3.6	4329
Queens	Northeast	-0.12	-0.41	5935	-0.07	-0.25	5935	-0.19	-0.58	5935
Queens	Northwest	0.51	2.27	6893	0.46	2.29	6893	0.52	2.1	6893
Queens	Rockaways	0.96	2.34	1477	0.71	1.86	1477	0.49	1.27	1477
Queens	Southeast	0.86	4.19	13910	0.85	4.57	13910	0.69	3.34	13910
Queens	Southwest	0.45	1.59	5056	0.52	1.81	5056	0.34	1.28	5056