



Can improvements in schools spur neighborhood revitalization? Evidence from building investments



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ABSTRACT

For most households in the U.S. the public school to which they send their children is tied to the geographic location of their home. Economic theory predicts that households take into account the quality of the public school when making residential decisions. A large body of literature has documented that school quality alters the demand for housing in a neighborhood as measured by the capitalization of school quality into house prices. Demand for schools may also affect the quality of the housing stock by creating incentives for property owners to better maintain their buildings and units. Exploration of this potential relationship has been absent from the discussion on how schools influence communities. I attempt to fill this gap through investigating the relationship between school quality and capital investments in the housing stock. To investigate whether a relationship exists between schools and property owner capital investment activity, I rely on detailed building level investment data in New York City as well as measures of school performance. I explore whether consistent measures of school performance are associated with higher levels of investment activity. To identify whether this relationship is causal, that good schools can spur investment activity, I incorporate a boundary discontinuity identification strategy. Further, I test whether households respond to changes in school performance, exploring whether improvements in test scores over a five-year period are associated with higher levels of residential investments. Finally, I control for differences in populations across attendance zone boundaries through incorporating information on the composition of students at each school. My results suggest a significant relationship between performance in math and English Language Arts and property owner capital investment behavior. In my preferred specification, I estimate that a one standard deviation improvement in test scores is associated with a 2.5 percent increase in dollars invested in a building.

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1. Introduction

For most households in the U.S. the public school to which they send their children is tied to the geographic location of their home, and almost ninety percent of elementary school aged children in the United States are enrolled in public schools. Economic theory predicts that households take into account the quality of the public school when making residential decisions. Since Tiebout's seminal piece (1956), arguing that households "vote with their feet" in response to preferences over packages of local public goods, this idea has been a central component in theories of local public finance. A large body of literature has documented that school quality alters the demand for housing in a neighborhood as measured by the capitalization of school quality in house prices (Oates, 1969; Black, 1999; Black and Machin, 2010; Nguyen-Hoang and Yinger, 2011). Demand for schools may also affect the supply of housing stock by creating incentives, through increased rents, for property owners to expand or better maintain their buildings. Exploration of this

potential relationship has been absent from the discussion on how schools influence communities.

Beginning with Oates' (1969) research on the capitalization of local public spending it has been widely established that households are willing to pay for a higher quality public school, as measured by the capitalization of school attributes into house prices. Black (1999) introduced the boundary discontinuity method to identify the capitalization of school quality into house prices, finding that a one standard deviation increase in average test scores is associated with a two percent increase in housing values. Summarizing this literature, Black and Machin (2010) and Nguyen-Hoang and Yinger (2011) find that on average a one standard deviation improvement in test scores is associated with a 3 to 5 percent increase in housing values. This literature documents that schools do change the demand for housing in a particular neighborhood. Though some have suggested that schools may also shape the supply of housing in a neighborhood (Figlio and Lucas, 2004; Bayer et al., 2007) there has currently been no empirical investigation of this potential relationship. If it is the case that schools shape the supply of housing in a neighborhood, then estimates from these past studies would be biased upwards, as part of the estimated increase in housing values would actually be driven by unmeasured features of the housing

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stock. In this paper I attempt to fill this gap in our knowledge through investigating the relationship between school quality and capital investments in the housing stock.

To investigate whether a relationship exists between schools and property owner capital investment activity, I rely on detailed building level investment data in New York City as well as measures of school performance. I explore whether consistent measures of school performance are associated with higher levels of investment activity. To identify whether this relationship is causal, that good schools can spur investment activity, I incorporate a boundary discontinuity identification strategy. I test whether this relationship holds when comparing buildings that are very close to one another and thus subject to the same neighborhood forces, but on opposite sides of an elementary school attendance zone boundary. Further, I test whether households respond to changes in school performance, exploring whether improvements in test scores over a five-year period are associated with higher levels of residential investments. Finally, I control for differences in populations across attendance zone boundaries through incorporating information on the composition of students at each school.

My results suggest a significant relationship between performance in math and English Language Arts (ELA) and property owner capital investment behavior. In my preferred specification I estimate that a one standard deviation improvement in test scores is associated with a 2.5 percent increase in dollars invested in a building. When exploring the relationship between long term changes in school performance and investment activity, I again see that property owners are sensitive to these changes in school performance when making the decision to invest in their property. Specifically, I find that a one standard deviation improvement in test scores over 5 years is associated with a 2.4 percent increase in dollars invested in a property.

The paper proceeds as follows. I begin by providing some background on property owner investment behavior and laying out a simple theoretical framework which describes the ways in which school performance could induce property owners to invest in their properties. I then describe the data as well as New York City's public schools. I continue with the empirical methodology and results followed by some concluding thoughts.

2. Residential investment behavior

The investment decisions of property owners play a large role in determining the trajectories of America's neighborhoods. Annual expenditures on residential improvements exceeded 237 billion dollars in 2007 which is about half the amount spent on new construction over the same time period.¹ This large sum highlights the importance of understanding which factors influence property owner investment activity.

I begin by laying out the motivations for investment activity of a property owner, who rents out their property, as first laid out by Mayer (1981). This property owner will invest in their property, or increase their capital stock, to the point where the market value of an additional unit of capital is equal to the marginal cost of capital plus the fixed costs of adjusting the current home.² Given the current market conditions there exists an optimal level of capital stock, which is based on the optimal amount of maintenance that allows the property owner to maximize their profits. The likelihood that a property owner will engage in reinvestment activity will be based on the gap between the current capital stock and the optimal capital stock. If the gap is

large and positive this provides an incentive for the property owner to make an investment.

For an owner occupier, the decision to invest is based on the potential resale value of the home (or rents the owner could receive) once an investment is made, as well as on the household's consumption value placed on these investments. If housing needs change, the owner occupier can either decide to move, or to stay and upgrade the unit. Thus, in addition to the motivations explained above, where a large gap between current capital stock and optimal capital stock will motivate a property owner to invest, the owner occupier also weighs the benefits of staying in the unit (which include neighborhood benefits) against the costs of moving. For an owner occupier then, there needs to be both a large gap between the optimal capital stock and the current capital stock, as well as a sufficiently large benefit associated with staying in the unit and neighborhood to overcome the costs associated with moving.

The neighborhood characteristics surrounding this property affect the rents that tenants are willing to pay for a given amount of housing services and the consumption value an owner occupier receives from living in the unit. The property owner then faces a revenue function which is determined both by the neighborhood characteristics and the level of housing services. For neighborhood characteristics to have an impact on investment activity, they must not only increase rents, but they must increase rents associated with the specific improvements made.³ For example, households must be willing to pay more for a two bedroom apartment near a good school, than they would be willing to pay for a two bedroom apartment if there were no such school nearby. From the perspective of an owner occupier, a good school must also increase the consumption value associated with staying in the upgraded unit.

There are a number of reasons why school quality could lead to increased rents from particular types of investments, and why they may increase an owner occupier's consumption value from staying in the upgraded unit. The first theory I present is tied directly to the presence of children. Households with children are those most concerned with school quality, and they may also demand more or better housing. Households with children have different housing needs. They may require additional bedrooms for children, or more space in which their children can play. If households with children do exhibit such complementarities in preferences, this could provide landlords with the necessary incentives to upgrade their properties.

The suggested sorting process above focuses only on the presence of children as a reason why households would select neighborhoods with better schools, but there is some evidence that households without children care about the quality of the local public school in their neighborhood (Hilber and Mayer, 2009).⁴ It is also possible that higher income households, regardless of whether they have children, are attracted to neighborhoods with higher performing schools and that they also demand higher quality units. This sorting process will lead to the same outcome, that we observe increased maintenance in neighborhoods with high performing schools, though the mechanism is different. If these complementarities (i.e. preferences for both schools and housing) are independent from the presence of children we may still expect to see increased dollars invested, but it is not as clear what types of investments these households would most prefer, for example when choosing between a new kitchen and extra square footage.

Another possible explanation is that households choosing neighborhoods with better schools are also more likely to stay, or expect to stay,

¹ Based on estimates from the 2007 Census of Buildings, which is the most recent year reported (the Census Bureau stopped collecting this information after 2007). Historical estimates range from 156 billion in 2000 to 201 billion in 2004, up to 237 billion in 2007.

² Fixed costs include factors such as disturbing tenants and meeting with contractors, and in part explain why landlords do not continuously invest in the property.

³ If a neighborhood characteristic only affects the rents in a neighborhood, but not the rents associated with a particular improvement, this in itself will not widen the gap between the optimal capital stock and the current level of capital stock necessary to induce an improvement.

⁴ This relationship could arise as households without children view the performance of the public school as a signal of the general neighborhood quality or the future neighborhood quality which will shape the value of their asset.

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