Economics Letters 134 (2015) 102–106

Contents lists available at ScienceDirect

Economics Letters

journal homepage: www.elsevier.com/locate/ecolet

Capitalization of school quality into housing prices: Evidence from Boston Public School district walk zones

Vincent La *,[1]

Federal Reserve Board, Washington, DC, 20551, USA

HIGHLIGHTS

- Previous estimates of the effect of school quality on housing prices may be biased.
- I exploit a novel setting that better accounts for omitted unobservables.
- Houses more likely to have children are more affected by school quality.
- I test for heterogeneity along student oversubscription levels.

ARTICLE INFO

Article history:
Received 18 March 2015
Received in revised form
30 June 2015
Accepted 1 July 2015
Available online 11 July 2015

JEL classification:
I20
H75
R21

Keywords:
Housing demand
School quality
Capitalization

ABSTRACT

Using Boston Public School District's unique walk zone feature to better account for unobservables, I estimate a significant positive effect of school quality on house sale prices. This effect increases for homes more likely to be bought by families with children and diminishes in areas with already oversubscribed schools.

Published by Elsevier B.V.

1. Introduction

One way to quantify potential benefits of school reforms is to assess the premiums parents are willing to pay for houses located near good schools. However, estimating this willingness to pay is complicated by the fact that public school quality and other neighborhood characteristics are often correlated.

The most common approach to estimate the causal effect of public school quality on housing prices exploits school district boundaries using regression discontinuity design (RDD) (Black, 1999). This literature generally finds that a 1 standard deviation increase in test scores is found to, on average, raise house prices by approximately 3 percent (Black and Machin, 2010; Nguyen-Hoang and Yinger, 2011).

The geographic RDD at school catchment area boundaries may still yield biased results if unobservable characteristics also change discontinuously at the boundary. For example, school district lines may be drawn in accordance with town boundaries where property tax rates differ. Furthermore, school district lines are often drawn to coincide with geographic characteristics that clearly divide neighborhoods, such as large rivers, parks, or golf courses. Bayer et al. (2007) find that neighborhood sociodemographic characteristics, in particular race and education, can change discontinuously at school catchment area boundaries as well. In particular, they find that geographic RDD estimates at school catchment area boundaries that do not account for more precise neighborhood sociodemographic characteristics are still positively biased.

I address this concern by exploiting the unique "walk zone" feature of the Boston Public School District (BPS) where each BPS elementary school gives priority for admission to students living

* Tel.: +1 202 973 6915.
E-mail address: Vincent.La@frb.gov.

[1] The opinions expressed are those of the author and do not necessarily reflect views of the Board of Governors of the Federal Reserve System.

http://dx.doi.org/10.1016/j.econlet.2015.07.001
0165-1765/Published by Elsevier B.V.

Table 1
Summary statistics.

Variables	(1) Mean	(2) SD	(3) Number of observations
School characteristics			
Proficient or advanced[a]	50.20%	23.94%	70
Average class size	18.09	1.978	70
Percentage black	31.71%	20.23%	70
Percentage male	52.04%	2.528%	70
Percentage students limited English	32.70%	17.64%	70
Percentage students low income	73.01%	12.82%	70
Total number of teachers	29.90	23.94	70
House characteristics			
ln (Sale price)	12.98	0.576	20,963
Parcel total size in square feet	1898	2028	20,601
Living area in square feet	1338	821.0	20,601
Total number of bedrooms	2.374	1.599	20,568
Total number of bathrooms	1.768	0.887	20,568
Age of building in years	85.52	42.96	20,591

[a] Denotes the sum of the average percentage of fourth-grade students scoring proficient or advanced across all years in both ELA and Math.

within the school's walk zone, defined as a one-mile radius centered at that school. These walk zones are drawn without consideration for any geographic characteristics. Thus, my estimates are less likely to suffer from omitted variables bias stemming from neighborhood characteristics changing discontinuously along the same boundaries of schools' walk zones.

While neighborhood characteristics are less likely to change discontinuously across walk zone boundaries at the time the boundaries were drawn, ex-post, there could very well be sorting across walk-zone boundaries. Thus, there are two mechanisms regarding how school quality can affect housing prices. First, wealthier people who care about school quality will directly bid up prices of houses within the walk zones of good schools. Second, this may indirectly generate positive spillovers due to changes in the neighborhood composition. My research design does not attempt to disentangle the two mechanisms but can rather be viewed as the "general equilibrium" impact of a house being in the walk zone of a higher quality school.

Using this novel approach, I find that a 1 standard deviation increase in a school's percentage of fourth-grade students scoring at least proficient on the Massachusetts Comprehensive Assessment System (MCAS) is associated with, on average, a 2 to 4 percent increase in house sales price. Consistent with school quality affecting housing prices, I find that this effect is largely driven by sales of residential units more likely to be bought by families. For housing with at least two bedrooms, I estimate an effect of a 7 percent increase in sales prices. Lastly, I explore heterogeneity along oversubscription levels and find that being inside the walk zone of an already oversubscribed school mitigates the effect of school quality on house sales prices.

2. Data

I obtain data on approximately 20,000 arm's-length transactions of residential house sales from 2009 to 2013 from Boston's Department of Assessing. For each transaction, I observe characteristics such as sales price, street address, building age, building size, number of bedrooms, and number of bathrooms.

To measure quality of BPS elementary schools, I obtain fourth-grade MCAS scores spanning 1998 to 2013 from Massachusetts' Department of Education statewide reports. The MCAS is graded on a scale from 200 to 280. Performance levels are split into four categories: Advanced (260–280), Proficient (240–259), Needs Improvement (220–239), and Warning/Failing (200–219). To measure school quality, I sum the average of each school's percentage of students scoring proficient or advanced in English & Language Arts (ELA) and Mathematics (Math) from 1998 to 2013. Summary Statistics are shown in Table 1.

2.1. Boston public school district

Abdulkadiroglu et al. (2005) documents BPS's student assignment mechanism during the period of this study (2009–2013).

Students generally are placed into their elementary schools when they enter the first grade. In the case of an oversubscribed school, BPS gives higher priority (but does not necessarily guarantee admission) to walk zone students (Boston Public Schools, 2015a). In addition, BPS schools allocate 50% of their seats to walk zone students.

The definition of a walk zone is a one-mile radius around the school, including the entirety of any geocode the circle touches (Pathak and Shi, 2013). During the 2012–2013 school year, 86 percent of Boston Public School families listed a walk zone school as one of their top three choices (Boston Public Schools, 2015b).

3. Empirical design

The key feature of walk zones is that while school assignment priorities change discontinuously at the walk zone boundary, neighborhood characteristics may not. Because these walk zones are drawn without consideration for any other geographic or neighborhood characteristics, walk zone borders may better account for possible omitted variables bias than the standard RDD approach with traditional catchment areas. Following this approach, I focus on differences in housing values near walk zone boundaries. However, similar to Kane et al. (2005), I capture neighborhood effects by dividing the City of Boston into 0.3 square mile cells (I find similar results with different size square mile cells). In essence, I am comparing houses within a square cell on different sides of a walk zone boundary that goes through the cell through the use of square cell fixed effects.

I exploit the walk zone borders to assess the effect of school quality on house sale price by estimating the following regression on pooled cross-sectional house sale price data:

$$\ln \text{Price}_i = \beta_0 + \beta_1 \text{Best School Quality}_i + \beta_2 \mathbf{X}_i + K + \phi + \gamma + \mu_i, \quad (1)$$

where i indexes the property. ln Price is the natural log of the sales price of the property. The regressor of primary interest, Best School Quality, is property i's best walk zone school in terms of the percentage of students scoring proficient or advanced on the MCAS. $\mathbf{X}_i$ is a vector of property-related characteristics such as bedrooms, bathrooms, and size of the house. K is the square cell neighborhood fixed effects. ϕ is a series of dummy variables indicating the year in which the property is sold. γ represents a vector