



Do educational facilities affect housing price? An empirical study in Hangzhou, China



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A B S T R A C T

Keywords:

Educational facilities
Housing price
Capitalization rate
Hedonic price model
Spatial econometric model

Using data on housing prices and educational facilities of 660 communities in Hangzhou, China, this study develops hedonic price models to quantitatively evaluate the effect of various educational facilities on housing prices. Results show that the spatial econometric model can efficiently eliminate the spatial dependence of housing price, and the traditional hedonic price model overestimates the capitalization rate of educational facilities. Educational facilities have a positive capitalization effect on housing price. Elementary and junior high schools have a significant school district effect. When the education quality of elementary and junior high schools improves by each level, the housing price in this school district increases by 2.020% or 5.443%. The presence of kindergarten schools, high schools, and college institutions improve the surrounding housing prices through accessibility. Adding one kindergarten within 1 km from the community can promote 0.300% of the housing price. The housing price increases by 2.737% or 0.904% when the house is located less than 1 km from the high school or college. Results reveal the importance of educational facilities in the housing market in China. The findings also disclose the additional price that buyers and investors are willing to pay for education quality or accessibility.

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Introduction

Urban infrastructure facilities have the economic characteristics of public goods, and their external effect on the housing market has attracted the attention of scholars around the world. Typically based on the hedonic price perspective, many studies have established models to quantitatively evaluate the effect of public facilities on housing price and have examined the direction and degree of public goods capitalization. Using cities in China as the sample and financial expenditure or output as the measure of investment situation, several Chinese scholars (Liang & Tang, 2008; Lu, 2010; Zhou & Wu, 2009) analyzed how public goods affect the housing market at the macro level. Focusing on the inner city, a great number of studies further analyzed how subway and light rail transport (Zhang, Ma, & Zhu, 2007; Zheng & Liu, 2005), transportation hubs (Shi & Zhang, 2009), and parks and greenbelts (Shi & Guo, 2010) affect the housing market at the micro level. Studies on the capitalization of educational facilities in the inner city in China require further exploration and in-depth examination.

Along with various factors, such as building quality, neighborhood atmosphere, residential location, and business facilities, educational resource remains the key consideration of buyers. Therefore, concepts such as “school district house” and “educational real estate” have become popular topics in the housing market in China. Children benefit from receiving a good initial education when their house is located in a good school district where their primary or junior high school can be found. The belief of “never letting a child fail at the starting line” increases the desirability of such houses for investors and parents. Studies on the effect of educational facilities on housing price in China are scarce because of the limited available data. Chinese researchers generally use the “existence” of educational facilities within a certain distance as a dummy variable to be included in a model, instead of the scope of the school district and education quality, when using hedonic price models for empirical study. As a result, only a few studies concluded that educational facilities positively influence housing prices. For example, Wen and Jia (2004) selected 15 factors as housing characteristics to establish a hedonic model. Their results show that six variables, including school and kindergarten, cannot be included in the model because they are insignificant. Li and Fu (2010) found that the effect of key primary and secondary schools with high education quality on housing price is positively capitalized in surrounding houses in Guangzhou, whereas the

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effect of those with general quality is insignificant; the effect of universities is also insignificant. Wang (2006) concluded that every addition of kindergarten schools, primary schools, and secondary schools within 500 m from the communities improves housing price by 2.7%. In a study on the accessibility of public service in Beijing, Wang, Zheng, and Feng (2007) found that the distance to key high schools had already capitalized into the housing price. Similar results were reported by Huang (2010), Zhang (2010), and Wang and Ge (2010). However, the extremely limited samples (in the three studies, the primary school samples were 1, 2, and 4, and the community samples were 163, 30, and 26, respectively) greatly weakened the persuasion and representativeness of these studies.

Feng and Lu (2010) conducted a more detailed study in Shanghai. With 52 regional distributions of high schools and monthly panel data of housing price, they used two factors (i.e., school quality and school quantity) and two batches of the government naming process of “experimental model high schools” (EMHS) as variables. Their results reveal that in April 2007, each addition of the first batch of EMHS increased the housing price by 21.7% on average. Compared with the first batch, the second batch of EMHS, whose education quality was inferior, contributed only one-fourth positive effect to the housing price. This consequence sufficiently proves that the divergence of qualities and quantities of educational facilities already capitalized in the housing market. However, one of the limitations of this study is that no strict regime has existed for the high school district since 2005 in Shanghai. Therefore, the use of high school as a subject in this study is debatable. In a non-school district system, a better explanatory variable may be the distance from a house to the school.

Education equity is a developing goal of the modern society. In fact, inequality in educational facilities will still exist for a short period in China. Therefore, the quantitative evaluation of educational facilities has great theoretical and practical significance and can provide reference for the development of the education equity policy. Various studies on education capitalization have been conducted in Western countries. However, given the lack of data, studies on this field are insufficient in China. Several concerns still need to be addressed: (1) The scope of several studies is too narrow and thus cannot reflect a comprehensive situation of an entire city. (2) The subjects are insufficient to represent all the educational facilities in a city, and the quantitative measures for the different types of educational facilities should be improved in accordance with the actual situation. (3) When developing a model, not much attention is given to the neighborhood effect of housing price, and the stability of the results should be improved. Therefore, the overall objective of this study is to explore the micro impact of educational resources, such as kindergarten, primary school, junior high school, senior high school, and university, on housing price. Using the main city of Hangzhou as the research scope, this study adopts the traditional hedonic price and spatial econometric models to perform a comparative analysis from the view of the capitalization of public goods.

The rest of this paper is presented as follows. Section 2 reviews the literature on the capitalization of educational facilities. Section 3 describes the data and explanatory variables and the model specification. Section 4 reports the results of the traditional hedonic and spatial econometric models. Several conclusions are drawn in Section 5.

Literature review

Tiebout (1956) connected the provision of public goods (e.g., urban education, medical care, and transportation) with the real estate market and conducted a general equilibrium analysis of local public goods supply. This theory believes that urban residents

should choose their housing and relevant public goods based on their incomes and preferences. Therefore, diversity in the qualities and quantities of public goods reflect on the housing price, that is, the capitalization of public goods. The earliest literature on the effects of school on housing price dates back to Oates (1969). Oates used the per capita expenditure on education as an indicator of public expenditure and verified the results of public goods capitalization. Oates found a significant positive correlation between per capita expenditure and housing price. Afterward, many Western scholars conducted meticulous studies based on Oates' work to verify the relation between school quality or accessibility and housing price. These studies generally used the hedonic price model as the econometric model. The control variables included in a model are structure, neighborhood, and location characteristics. Although differences exist in the modeling, variables, and results in different studies, Western scholars generally confirm that educational facilities have a significant influence on housing price. With the development of the Chinese real estate market, Chinese scholars have focused on this issue. However, as discussed in the introduction, because of the difficulty in data acquisition, simple design of variables, and coarse modeling, the results are unstable and the empirical analysis needs further exploration (Feng & Lu, 2010; Huang, 2010).

To acquire steady and accurate results on school capitalization, school indicators must be selected and quantified. Two types of indicators are commonly used, namely, input and output indicators. The input indicators are per capita expenditure, teachers' salary, teachers' educational background, and teacher–student ratio, among others. The output indicators are examination performance, enrollment rate, acceptance rate, passing rate, dropout rate, and employment salary, among others. Brasington (1999) and Clark and Herrin (2000) provided two typical studies. Using 5 input indicators (e.g., per capita expenditure, teacher–student ratio, and average teachers' salary) and 17 output indicators (e.g., enrollment rate, graduation rate, and examination performance), Brasington developed 12 regression models to summarize the stability of each indicator of education quality. The results show some of the input and output variables are significant and the others are insignificant. Clark and Herrin (2000) established three kinds of education variables, including eight input indicators (e.g., teacher–student ratio, proportion of private school attendance, proportion of other races, and school size) and four output variables (e.g., prerequisite courses, dropout rate, and SAT score). Twelve dummy variables of school district were used to examine the relation between school district and housing price. They found that school district, input indicators, and output indicators significantly affect housing price.

Early studies on the effect of school capitalization generally use input indicators to represent school quality because they are easily accessible (Sedgley, Williams, & Derrick, 2008). Rosen and Fullerton (1977) held a different opinion on the usage of input indicators. They believed that output indicators are more appropriate for measuring school quality. Phuong and Yinger (2011) systematically summarized the literature from 1999 to 2010 and asserted that, compared with input indicators, output indicators are considerably steadier and their results are easier to explain. Many studies used examination performance and school degree classification as output indicators because of the high consistence of study results. This high consistency is also the reason why they are considered the most acceptable variables for measuring school quality. Taking the reading performances of juniors as the proxy variable for school quality, Jud and Watts (1981) proved the highly positive relationship between school quality and housing price in Charlotte County. Haurin and Brasington (1996) discovered that in Ohio, for every 1% addition of passing rate of the ninth grade, housing price in the corresponding communities improved by 1.5%. Hayes and Lori

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