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Capitalization of secondary school education into property values: A case study in Hong Kong

Wadu Mesthrige Jayantha [a, *], Siu Oi Lam [b]

[a] Department of Building and Real Estate, The Hong Kong Polytechnic University, Hong Kong
[b] Kowloon, Hong Kong

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ABSTRACT

Investment in quality education in the neighbourhood would be supported by the people as it is often cited as an important attribute that distinguishes a community. A good quality school-network thus can be viewed as a positive amenity that is capitalized into residential property values. The study employs two hedonic models based on two large samples in order to explore the intuition that *quality-school environment* is *capitalized* into house prices. Results suggest that there is a significant effect of school-quality on house price. Potential buyers are ready to pay a large premium ranging from 27% to 39% for housing units in the top-tier school-networks. Results further reveal that the extent of capitalization of school quality into house price varies across locations. Results also suggest that property buyers rank variables such as *quality school-network* higher than such profile issues as *age*, *floor level*, and *accessibility* to transport and shopping. The findings imply that investment in quality education in the neighbourhood enhances the house property value significantly; and well-known elite schools add value to properties and increases in property price. These findings shed light on the market's ability to capitalize quality-school environment into property value though the extent of capitalization may vary across locations.

1. Introduction

The locational choice of a house (investment as well as a consumer good) is determined by many factors and hence house price is determined by those same factors. One of the very important factors that affect housing choice is family events (demographic factors). One such important family event is the birth of a child. This leads to subsequent parental decisions about the child's education. Quality schooling is often upheld as decisive in life (Gibbons, Machin, & Silva, 2013), and parents normally go to great lengths to secure places to give the best possible education for their children (Sharma, 2013) by sending them to their preferred schools. This phenomenon is very much visible among Hong Kong's parents. One of the very important pre-requisites to securing a place in a 'quality school' (what parents perceive to be the best-performing schools) in Hong Kong is that the households should live in the same neighbourhoods as those schools. This results in an increase in demand for residential properties in the vicinity of those quality schools. In turn, this would then affect the property values and hence price and rent gradients of these properties closer to better school networks. In this context, quality schools can be considered as an amenity, which is capitalized into property prices. This theoretical framework is considered in the context of Hong Kong, where most people live in flats (or apartments) within multi-storey high rise blocks. Any references to 'housing' or 'house prices' within this paper should be understood in this context.

There are plenty of studies that explored the effects of school quality on residential property values in the literature (*e.g.*, Reback, 2005; Barrow & Rouse, 2004; Figlio & Lucas, 2004; Cheshire & Sheppard, 2004; Bogart & Cromwell, 2000). Some of the most recent studies that explore housing valuations through the effects of school quality, using the hedonic approach, include Gibbons et al., 2013; Machin, 2011; Nguyen-Hoang and Yinger, 2011; Gibbons & Machin, 2008. Though most of these studies claim that there is a positive correlation between school quality and the property values, not all the studies agree with that. For instance, a few studies claim that educational expenditure is related negatively with house price, especially with elderly houses (Ladd & Murray, 2001; Alesina, Baqir, & Easterly, 1999). In other words; there is no clear consensus among researchers about the effects of school quality on property values.

* Corresponding author.
E-mail addresses: bsmjwadu@inet.polyu.edu.hk (W.M. Jayantha), oi.lam.siu@connect.polyu.hk (S.O. Lam).

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On the other hand, almost all these studies make the implicit assumption that valuations are under conditions of *uniform capitalization*. This may be true when only the demand factors are considered and assume supply-side factors, in particular elasticity of land supply, are similar across locations; with other supply-side factors being totally negligible. However, with differences in land-use regulations and geographical locations, the magnitude of capitalization may vary from location to location and across jurisdictions (Hwang & Quigley, 2004; Mayer & Somerville, 2000). For example, some studies suggest that it is not appropriate to interpret '*household's willingness to pay for amenities*' as property price capitalization when enough lands are readily available for new developments (Hilber & Mayer, 2009). Likewise, Cheshire and Sheppard (2004) point out that the capitalization of school quality is significantly discounted, particularly in the area where there are new constructions happening. Thus, not only is there no clear consensus among researchers about the effects of school quality on property values; but also the implicit assumption of *uniform capitalization* may be far from realistic, as it may vary across jurisdictions.

To address this research gap, the present study tests the hypothesis that education quality or quality of school network is capitalized into housing property values. Two specific objectives are formulated in order to investigate this hypothesis: (i) to examine the effects of quality school network, if any, on residential property values; and (ii) to investigate (and compare) if there are any differences in the extent of house price capitalization between two different school networks (two locations); and to examine the extent of variation in house price capitalization across two jurisdictions.

The structure of the study is organized as follows. The following section reviews the previous studies related to school quality and its influence on house price capitalization. The theoretical framework for a Hedonic Price Model (HPM) to explore the capitalization of school networks into house prices is then presented in Section 3. The empirical analysis of the estimated HPM is provided in Section 4, while Section 5 concludes the study together with suggestions for further research.

2. Literature review

House price is determined by a broader spectrum of factors: *i.e.*, structural attributes, neighbourhood attributes and locational attributes. Structural attributes comprise of building age, size or saleable area, floor level, number of rooms and bathrooms, construction quality, etc., while neighbourhood and locational attributes consist of accessibility to transportation, distance to office and shopping malls, view and orientation and proximity to other amenities such urban parks, sports centres etc. The effects of these attributes on property values have been well discussed in the literature. For example, the effects of structural attributes (Tse & Love, 2000; Mok, Chan, & Cho, 1995), views (Benson, Hansen, Schwartz, & Smersh, 1998), local amenities (Cheshire & Sheppard, 2002), noise and air pollution (Espey & Lopez, 2000) on residential property values have been well explored in the literature through HPM approaches.

Neighbourhood attributes mainly refer to various amenities, community services and the surrounding environment. One of the important neighbourhood attributes that influences property price is the school quality. There is a large body of literature that examines the relationship between school quality and the house property prices (*e.g.*, Brasington & Haurin, 2006; Figlio & Lucas, 2004; Downes & Zabel, 2002; Brasington, 2000; Bogart & Cromwell, 2000; Clark & Herrin, 2000).

Three approaches have been used to measure school quality: *input-based*, *output-based* and *value-added* in the literature. Public school spending (per pupil) (*input-based*) has been used by most of the early studies (*e.g.*, Oates, 1969) as the measurement of school quality. However, some researchers (*e.g.*, Rosen & Fullerton, 1977) claim that the proficiency test scores are superior to others as an indicator of school output. Consequent *output-based* studies on house value capitalization extensively use students' achievement measures as an indication of school quality. The other approach that some previous studies used to measure school quality is the '*value-added*' approach. For example, Hayes and Taylor (1996) claim that it is the marginal change in school outcomes that influence house price capitalization. Based on a set of data in Dallas, they found no impact of school expenditures on housing values. Yet, they also found there is a statistically significant effect of school achievement on house values, but when school achievement is decomposed into value-added, only the value-added was found to have an effect on property value. However, their findings were criticized on three grounds: (i) the sample size of the study is too small (288 houses); (ii) the value-added measure is limited to a single year; and (iii) inclusion of the school's past achievement as an independent variable in the house-capitalization equation. Past test score levels can easily be regarded as the result of school-specific attributes which are obviously a value-added measure (Brasington & Haurin, 2006).

In complete contrast to the findings of Hayes and Taylor, using a larger data set of 1173 housing transactions in Chicago, Downes and Zabel (2002) conclude that there is no impact of any single school value-added measure on house value, but average levels of school achievement do have. They argue that a value-added approach can theoretically be preferred, but what is more important is a generic school quality attribute that is valued by households. However, their value-added measure does not capture complete attributes of value-added. They have used only an eighth grade proficiency test as the value-added measure, which only captures small part of the total value-added. Brasington (1999), comparing 37 school quality measures (based on 444 hedonic housing price estimations), also finds that both expenditure per pupil (input) and proficiency test (output) results have impact on house prices, but find no effects of value-added measures. However, the value-added measure in his study is based only on the data set of one year's proficiency test score instead of performance over a longer period of time.

There are numerous other research works that investigate the effect of school quality on house prices. A very recent set of studies (Gibbons et al., 2013; Machin, 2011; Nguyen-Hoang and Yinger, 2011; Gibbons & Machin, 2008) show that school average test scores influence house price significantly. They provide a consensus estimate: a house price increase of 3–4% to one standard deviation increase in average school test scores. Another set of studies that claim scores of proficiency test in primary schools are capitalized into housing values include Bogart and Cromwell (2000); Brasington (2000); Figlio and Lucas (2004). On the other hand, the earliest approach to measure school quality, *i.e.*, school expenditure (input based approach) has not been neglected by the researchers. For example, Brasington (1999) finds that education expenditure per pupil has a strong effect on house values, by consistently capitalizing into housing property prices. Other recent studies that use the same measure as the school quality and record the same results include Hilber and Mayer (2009) and Bradbury, Mayer, and Case (2001).

In terms of studies conducted world-wide and published in English language media, most of those that investigate capitalization of school quality into house prices are grounded in the United States (Jud & Watts, 1981; Downes & Zabel, 2002; Brasington, 1999; Brasington & Haurin, 2006; Kane, Riegg, & Staiger, 2006; Seo and Simons, 2009), with only few studies in Europe: the United