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Spatial spillover effect of urban landscape views on property price

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ABSTRACT

This paper attempts to investigate the spatial spillover effects of urban landscape views and the accessibility to amenities on the property price in CBD of Guangzhou city via spatial econometric analysis. The paper overcomes the shortcomings of the previous studies by employing an improved spatial weight matrix and providing a series of reasonable spatial model selection procedures. In addition to investigating the direct and indirect (spillover) effects, this study further explores the partitioning of direct and indirect effects, and finds out the impacts of the neighboring characteristics from close distance (immediate neighbors) to the far away distance on property price.

Its key finding suggests that people in CBD are willing to pay an extra premium for enjoying a better environment. It provides useful message to urban planners and developers that new properties can be built in the neighborhood of parks, enabling potential investors to have a park view.

1. Introduction

A central business district (CBD), as its name indicates, is an area concentrated with a city's commercial and business activities. It is often synonymous with the city's "financial district". CBD usually has a higher urban density than its surrounding districts, and often consists of the tallest buildings in the city (Murphy, Vance, & Epstein, 1955), depicting a general view of mass business and office buildings. Thus, it is not surprising that previous studies on CBD were mainly grouped into two categories: One is to investigate the office rent in CBD area (Brennan, Cannaday, & Colwell, 1984; Mills, 1992; Webb and Fisher, 1996; Öven & Pekdemir, 2006), whilst another category studies the impact of CBD-to-property distance on property value (Brasington & Hite., 2005; Geoghegan, 2002; Hui, Zhong, & Yu, 2014; Kim, Phipps, & Anselin, 2003; Ottensmann, Payton, & Man, 2008).

Recent figures on urban development show that CBD populations, particularly in the large cities in the Asia-Pacific region such as Adelaide in Australia (Oakley, 2013), Shanghai and Guangzhou (Liu, 2014) in China are fluctuating, though increasing. On one hand, the appealing effect of CBD, attract professionals to move in, causing an obvious increase in population. Some large enterprises and multinational corporations are even willing to provide lodgings near their offices for executives, managerial staff as well as business partners. On the other hand, higher costs for housing services and living lead to a crowding-out effect. People who cannot afford such costs will move to other places, causing a population outflow. The combined impact of the two effects forms a new challenge for city planners and governors to reasonably allocate resources to build up a better living environment. Whilst city planners may pursue a sustainable development, residential developers are usually profit-driven. That being said, the issue of residential pricing in CBD is seldom discussed vigorously enough in previous literature.

CBD is well known to be one of the most valuable places in a city (Glaeser, Gyourko, & Saks, 2003). Its spaces for lodging are rather limited. Needless to say, good urban landscape views such as park view and sea view in CBD are scarce and valuable resources to buyers and real estate developers. It is therefore essential to study buyers' willingness to pay for good urban landscape view. Willingness to pay is often measured through the hedonic pricing approach (Bensen, Hansen, Schwartz, & Smersh, 1998; Luttik, 2000). It reflects the impacts of urban landscape views on property price (Hui, Chau, Lilian, & Law, 2007). It should be noted that the characteristics of neighboring properties, such as urban landscape views and accessibility to amenities, might have certain impact on property prices as well. These additional influences are

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termed as spatial spillover effects. However, not many studies consider these spillover effects on property price.

This paper aims to fill the knowledge gap by investigating the spatial spillover effects of urban landscape views and accessibility to amenities on property price through spatial econometric model in Pearl River New Town (PRNT) – a new CBD of Guangzhou, China (Shin, 2014). According to Fang (2013), PRNT is recognized as one of the three national CBDs by state counsel in China (the other two are Beijing and Lujiazui).

This paper is organized as follows. After a brief introduction, there will be a literature review on urban landscape views and approaches for property evaluation in Section 2. Section 3 describes the research method, including the family of spatial models, model selection procedures and spillover effects of the spatial models. Section 4 illustrates the study area and data selection. Section 5 discusses the results and findings, while Section 6 draws a conclusion.

2. Literature review

2.1. Review of effect of urban landscape view on housing markets

The impacts of urban landscape views on property price have long been studied. According to Wolverton (1997), views are significant contributors to housing value. In particular, Sirmans et al. (2005) and Rodriguez and Sirmans (1994) discover that urban landscape views such as lake view, good view and ocean view would bring about positive effects on the property value. Bensen et al. (1998) estimates the value of an ocean view in single-family residential real estate markets. They conclude that the highest-quality ocean views increase the market price of an otherwise comparable home by around 60%, while the lowest-quality ocean views still enable an appreciation of 8%. A similar study conducted by Hui et al. (2007) addresses that the availability of a sea view for an apartment in Hong Kong would increase the selling price by 4.6%.

Another urban landscape view – park view (or garden view) – has been popular in recent studies. For instance, Luttik (2000) finds that houses with a park view require an extra premium of 8% in the Netherlands. A similar study by Pearson, Tisdell, and Lisle (2002) shows that a park view could generate a 7% increase in land value in Australia. Jim and Chen (2010) find that accessibility to a park view raises housing price by 4.67%. The empirical results of their findings suggest that vicinity parks could push up selling price by 16.88%, of which 14.93% for availability and 1.95% for park view. In the study of Hui, Zhong, and Yu (2012), it further points out that garden views have positive effects on property value, which enables the property sales price increase by 6%.

Nonetheless, these previous studies on impacts of urban landscape view on housing price have overlooked the spatial spillover effects. In reality, property prices may be affected by the characteristics of neighboring properties, but the hedonic method fails to further capture this feature. In the next section, this paper attempts to fill the knowledge gap by exploring the neighbor spatial spillover effect of urban landscape view on property price.

3. Research method

3.1. Family of spatial models and model selection procedures

This section provides an overview of the linear spatial econometric models. Based on previous studies (Anselin, 1988; Anselin et al., 2006; Elhorst, 2014; LeSage & Pace, 2010), there are seven spatial models, namely, Spatial Lag Model, Spatial Error Model, SLX Model, SAC Model, Spatial Durbin Model, Spatial Durbin Error Model, and General Spatial Nesting Model. In general, the spatial models depict the spatial interaction effects on the observations available. There are three basic types of the interaction effects, known as endogenous interaction effects, exogenous interaction effects, and error interaction effects (Elhorst, 2014).

The endogenous interaction effects are regarded as the equilibrium for a spatial interaction (Anselin et al., 2008) in standard economic studies, where the value of the dependent variable for one property is jointly determined with that of neighboring properties. The exogenous interaction effects concern the issue where the dependent variable (e.g. price, tax payment) of a particular property depends on independent variables (e.g. the size, age, and the air condition quality) of other properties (Delgado, Lago-Peñas, & Mayor, 2015; LeSage & Sheng, 2014). The error term interaction effects, however, distinguish the above two types of spatial interactions. It is actually the situation where unobserved or hidden interactions that follow a spatial pattern. The empirical studies for this type of interaction effects fit for the topic of unanticipated fiscal policy changes (Allers & Elhorst, 2005).

Each spatial model is used to investigate one or more spatial interaction effect(s). However, the empirical study for examining the spatial interaction effects may need to estimate and test the parameters for each spatial model, which is a time-consuming process and could lead to subjectivity as well as selection bias. To improve the model selection process, this paper follows the suggestion mentioned by Mur and Angulo (2009).

The spatial model selection procedure in this study follows the flowchart displayed in Fig. 1. Such procedure starts from the standard OLS model. This approach is known as the specific-to-general approach (Hendry, 1995), which aims to test whether this standard OLS model needs to be extended with spatial interaction effects. The first step of spatial model selection is to employ Moran's I test (LeSage, 1999). The test results shall give us some sort of information that the data set is equipped with the features of spatial correlation in a broad sense. The "✓" in Fig. 1 denotes the statistically significant results for the empirical study, whereas "×" denotes the opposite.

3.2. Spatial weighting matrix

The specification of the spatial weighting matrix W_0 plays an important role in determining the appropriate form of the spatial model. For the above models, the spatial weighting matrix has been used to reflect the spatial arrangements of observations in the housing market under investigation. The element of the matrix w_{ij} indicates the strength of the potential interaction between the i^{th} and j^{th} housing observations, where each element w_{ij} in Spatial Weight Matrix W_0 is defined as:

$$w_{ij} = \begin{cases} \frac{1}{d_{ij}}, if\ i \neq j \\ 0, if\ i = j \end{cases} \tag{1}$$

where d_{ij} is the distance between location i and location j. The spatial weight matrix defined in (1) does not have cut-off points. As suggested by Elhorst (2010) that an inverse distance matrix without a cut-off point is also available in an empirical study due to consistency. This is because a reasonable spatial weight matrix should satisfy one of the following two conditions (Elhorst, 2010): (a) the row and column sums of the matrix W before W is normalized should be uniformly bounded in absolute value as N(the number of sample) approaches infinity; or (b) the row and column sums of W before W is row-normalized should not diverge to infinity at a rate equal to or faster than the rate of the sample size N. As for the