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External effects of neighbourhood parks and landscape elements on high-rise residential value

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ABSTRACT

Neighbourhood parks provide recreation opportunities and amenity to nearby residents and improve the quality of the environment and life. Their provision and protection could be facilitated by a deeper understanding of their multiple values. The hedonic pricing method, using statistical techniques to estimate the part of a price due to a particular attribute of a commodity, assessed the external effects of neighbourhood parks on the transaction price of high-rise private residential units in Hong Kong. The empirical results derived from 1471 transactions in a district indicated that neighbourhood parks could lift price by 16.88%, including 14.93% for availability and 1.95% for view. Comparing with other landscape elements, neighbourhood parks induced the heaviest investment intention in home-buying behaviour. Harbour view attracted a premium of 5.1%, but mountain view was surprisingly not welcomed. Street view, considered as unappealing, suppressed price. Residents were insensitive to building landscape due to its ubiquity in the compact city. The scarcity of neighbourhood parks in the city has pushed their hedonic value to an exceptionally high level, providing guidance to revamp the policies, planning and management of urban greenspaces in tandem with the sustainable city quest.

Introduction

Neighbourhood parks constitute an essential part of the urban infrastructure. Modern planning standards usually prescribe a minimum threshold of reckoned in square meters of greenspaces per person. In the hierarchical urban greenspace system that spans the local, district and city levels, neighbourhood parks form the basic units that are literally provided at the doorstep of the local residents. District or municipal authorities would strive to reach or exceed the target, offering the councillors and citizens a source of pride (Lemonides and Young, 1978). Conversely, lacking this public facility could be construed as a sign of planning deficiency or even planning blight. The quantity and quality of urban greenspaces could contribute to the quest of sustainable cities (Chiesura, 2004). A functional network of park system contributes importantly to the ecological ingredients of a sustainable urban landscape (Cranz and Boland, 2004).

Neighbourhood parks are designed to provide a certain range of active and passive leisure opportunities, such as children's play, exercise, relaxation, and social interaction (Bengochea-Morancho, 2003), usually in an attractively landscaped ambience. They serve as social and recreational focal points for residents dwelling in a hinterland with a limited spread (Gold, 1972; Ferris et al., 2001), commonly within a radius of about 800 m (Gedikli and Özbilen, 2004). They need to be situated within a reasonable walking distance, and particularly they should be conveniently, easily and safely accessible by families with children. In addition, they provide an aesthetically pleasing natural landscape, either created semblance of nature or remnant nature, which is at a premium in most cities. The quality of life could be notably uplifted by a well located, designed and managed neighbourhood park.

The inherent qualities of neighbourhood parks would to a certain extent determine their patronage and hence the benefits bestowed on the surrounding community. Their spill over effects would also offer welcome externalities for nearby residents. Within their visual sphere of influence, the adjacent residents could enjoy beautiful views and associated mental relief, and a pleasant diversion from the monotonous buildings. Although neighbourhood parks are small scale, they play a key role in establishing a desirable living environment and quality of life to adjoining residents. Scientific assessment of the intrinsic and extrinsic services of neighbourhood parks could offer convincing justifications to fund their capital and maintenance expenditures (More et al., 1988). The findings could help to resist the increasing development pressure to usurp their land, especially in compact cities (Jim, 2000).

Several methods could empirically assess the value of urban parks (Price, 2003). The hedonic pricing method could gauge urban park effects on residential price, to serve as a surrogate measure of

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the economic value of urban greenspaces. For instance, in Columbus, OH, higher transaction price was accorded to houses facing a park, but lower for backing to a park, and also lower for facing a heavily used park (Weicher and Zerbst, 1973). A study of the large Pennypack Park in Philadelphia, PA, showed a notable increase in land value due to proximity to the greenspace (Hammer et al., 1974). The study in Worcester, MA, indicated that a house located at 6.1 m (20 ft) from a park would sell at US$ 2675 more than a comparable one 61 m (200 ft) away, and the positive effect was lost after approximately 610 m (2000 ft) (More et al., 1988).

Some studies found negative effects of urban parks on residential price. In Tucson, AZ, properties located near busy regional-district and neighbourhood parks could depress house price by US$ 79 and US$ 457, respectively. In contrast, large natural areas and wildlife habitats could increase housing price by US$ 65 and US$ 345, respectively (Shultz and King, 2001). In Portland, OR, Lutzenhiser and Netusil (2001) found that well landscaped urban parks would increase the value of houses within 457 m (1500 ft) by 1.8% (equivalent to US$ 1214 in 1990). The joint effect of gardens and water bodies induced a notable increase in house price by 28% (Luttik, 2000). Anderson and West (2006) showed increase average home value by 0.0035% for every percent decrease in the distance to the nearest neighbourhood park. This distance-dependent progressive positive effect is also density-reliant, as it could be augmented in dense residential areas (near the CBD) than in suburbia.

These empirical studies, focusing mainly on low-density single-family houses, are not directly transferable to the high-density and high-rise setting of compact cities. Thus far, little research tackled the effects of small neighbourhood parks on high-rise residential housings. The vertical distance and associated perceived detachment from the land, and the view of local green sites from the elevated domestic units, are worthy of investigation. Some hedonic studies of house price focused on specific issues such as the influence of transport (So et al., 1997; Chau and Ng, 1998), environmental quality (Hui et al., 2007), land lot size (Suen and Tang, 2002), balcony (Chau et al., 2005), and real estate price indices (Mok et al., 1995; Tse and Love, 2000). In particular, little was known about the effects of neighbourhood parks and relationship with other natural landscapes.

This study focused on the effects of neighbourhood parks in the main urban (metro) area of Hong Kong through a hedonic pricing analysis of the private housing market. Home buyers would usually bid up the price of housing with desirable views and amenities such as adjacent greenspaces. The study assessed the magnitude of the price differential that could be attributed to the appreciated environmental goods, and compared it with other perceived local environmental resources such as harbour and mountain views. The results could improve understanding the value of neighbourhood parks in the city's socio-economic context, allow more knowledgeable judgment of existing policies, and optimize the recreation-amenity space provision. The findings could enhance the precision of residential property valuation, and inform planners' and developers' decisions on future residential developments. In addition, it proposed a new and persuasive dimension to justify public funding to build and maintain neighbourhood parks. In a resource-limiting scenario, the choice between a large municipal-level park vis-à-vis some small neighbourhood parks could be based on their perceived values.

Study area and methods

Hedonic pricing method

Three valuation techniques have been used to estimate the benefits (economic value) of urban parks, namely travel cost, contingent valuation, and hedonic pricing (More et al., 1988; Price, 2003; Tajima, 2003). The travel cost method surmises that a person is willing to pay a sum of money to visit a place, such as transport costs, entry fees, on-site expenditures, and outlays on capital equipment necessary for the consumption (Hanley and Spash, 1993). Being at a target place must provide the subject with benefits of a certain level that is worthy of the money spent (Riera, 2000). This method is widely used in assessing the value of the recreation services provided by natural areas (Dwyer et al., 1983), but seldom in the urban context (Baranzini and Schaerer, 2007). It was considered unsuitable for neighbourhood parks because of the small differences in user origins (More et al., 1988), resulting in limited variations in travel cost to develop a representative demand curve (Tajima, 2003).

The contingent valuation method asked a representative sample of individuals to express their willingness to pay for some benefits by answering hypothetical questions (Mitchell and Carson, 1989). It has been widely applied to estimate the value of environmental benefits (Bateman and Willis, 1999). It has been used in empirical studies of urban forest benefits (e.g., Tyrväinen and Väänänen, 1998; Lorenzo et al., 2000; Jim and Chen, 2006). However, the validity of the findings has been questioned because they are based on hypothetical transactions, and lack of systematic relationship between answering a survey question and actually paying for the services (Clark et al., 2000).

The hedonic pricing method, which is based on actual transaction data, offers an instrument to measure the impacts of neighbourhood parks on residential value. Lancaster (1966) established the theoretical foundation of hedonic pricing method, that utility was generated, not by the goods per se, but by the characteristics (attributes) of goods. The concept was further developed by Rosen (1974), Freeman (1974, 1979, 1985), and recently summarized by Palmquist (1991) and Sheppard (1999). The method assumes that a commodity is defined by a set of heterogeneous component characteristics, and the market price of the commodity can be interpreted by these characteristics. For example, people searching for residential properties tend to equate a neighbourhood park's proximity with improved quality of life. For two houses similar in other aspects, the one closer to a neighbourhood park would fetch a higher price. In this manner, people implicitly reveal their willingness to pay for the greenspace benefits.

Theoretically, the relationship between the price of a heterogeneous commodity and its characteristics could be expressed as:

$$P = f(x_1, x_2, \ldots, x_n) \quad (1)$$

where P is the market price of the good, and x_1, x_2, …, x_n are its characteristics. The implicit price of each characteristic could then be deduced by the partial derivatives of the price with respect to the variables $[\partial P/\partial x_i]$. The weaknesses of the hedonic pricing method include subjectivity, market segmentation, assumption of equilibrium (Maddison, 2001), exclusion of non-use value (Garrod and Willis, 1999), and inability of correctly specifying the mathematical model (Garrod, 1994). Despite these shortcomings, the technique has been widely applied in the housing market to identify and weight environmental externalities, such as the improvement of air quality (e.g., Murdoch and Thayer, 1988; Smith and Huang, 1995) and local amenity (e.g., Powe et al., 1995; Benson et al., 1998).

The functional form of the hedonic regression could not be clearly specified on a theoretical basis (Halvorsen and Pollakowski, 1981; Cropper et al., 1988; Malpezzi, 2002). In empirical studies, various equations have been developed, such as linear, semi-logarithmic, double logarithmic, quadratic, reciprocal, and Box-Cox forms (Cassel and Mendelsohn, 1985; Malpezzi, 2002; Bengochea-Morancho, 2003; McConnell and Walls, 2005). Simple forms could reduce errors and inaccuracies associated with complicated com-