Exploring preference homogeneity and heterogeneity for proximity to urban public services

Ali Ardeshiri[a,*], Ken Willis[b], Mahyar Ardeshiri[c,d]

[a] Institute for Choice - Business School, University of South Australia, Australia
[b] School of Architecture, Planning and Landscape, University of Newcastle upon Tyne, UK
[c] Department of Urban Planning, Shiraz University, Shiraz, Iran
[d] Department of Urban Planning, Pishtazan Higher Education Institute, Shiraz, Iran

ABSTRACT

Given that the majority of the world's population lives in urban places, the quality of the urban environment has emerged as an issue of fundamental concern for citizens, academic researchers, and policy makers. This study explores residents' preferences and valuation of living in proximity to urban amenities in the built environment. The study demonstrates that environmental evaluation techniques can be used as a tool to help relevant decision makers (e.g., urban managers, developers, city officials, planners, realtors and researchers) with policy making, effective decision making and efficient city management procedures. The models indicate how household preference for proximity to urban amenities change as a function of the cost of provision as exemplified by a change (increase or decrease) in annual property tax. The study reports the results for two different models: one which assumes preference homogeneity and the other preference heterogeneity in the sampled population. The results show that older residents and higher educated people are more likely to be willing to pay a higher property tax for having proximity to parks. Middle and low income residents prefer close proximity to bus stops and local shopping centres. This research suggests that a win-win strategy for residents and local government lies in increasing and maintaining residents' accessibility to urban amenities, and in increasing an urban area's sustainability.

1. Introduction

Providing appropriate proximity to urban amenities in neighbourhoods provides communities with essential services, as well as comfort, safety, and aesthetic amenity in addition to various other environmental, social, health and economic benefits (Kim & Nicholls, 2016). Distribution and accessibility of urban amenities plays an important role in people's movements (Geertman & Ritsema Van Eck, 1995), shaping cities and places (Nilsson, 2014; Talen, 1998), densities (Guzman & Bocarejo, 2017), and importantly living quality in the city (Ardeshiri, 2014; D'Acci, 2014; Knox, 1980; Madden, 1993). Among objective neighbourhood characteristics related to the physical environment, living in close proximity to work, shopping centres, schools, leisure activities, parks and other public services affects community welfare, spatial equity and the environment in which we live (Gregory, Johnston, Pratt, Watts, & Whatmore, 2011). The presence of local resources can have an impact on the likelihood of initiating and maintaining social links with community members as well as improving neighbourhood social capital, and health (Altschuler, Somkin, & Adler,

2004), environmental quality (Ardeshiri, Ardeshiri, Radfar, & Hamidian Shormasty, 2016), and spatial equity (Hewko, Smoyer-Tomic, & Hodgson, 2002). Much effort has been invested in urban restructuring, but many restructured neighbourhoods fail to attract more affluent households by not providing the essential "needs" to improve the quality of life in the neighbourhood (Koopman, 2012). Thus understanding how individuals value each amenity, and make trade-off between different urban amenities in a neighbourhood, is important to successful neighbourhood planning. Is proximity to parks more preferable to proximity schools? Or is it the other way around? Is safety important or having access to public transportation is more preferable?

Different methods such as hedonic pricing (Ardeshiri, 2014; Irwin, Jeanty, & Partridge, 2014; Li, Wei, Yu, & Tian, 2016; McGranahan, 2008; Nilsson, 2014), life satisfaction (Ardeshiri, Ardeshiri, Radfar, & Hamidian Shormasty, 2016; Lora, Powell, Praag, & Sanguinetti, 2010), conjoint analysis (Adamowicz, Louviere, & Williams, 1994; Boyer & Polasky, 2004) has been used to value proximity to urban amenities by either having the land value or the house price/rent as the dependent variable.

This paper presents a model for estimating price gradients for several urban amenities that departs from traditional techniques. It examines household behaviour by looking at individuals responses to series of hypothetical choices to determine resident's preferences for proximity to chosen urban amenities. Thus, the main objective of this study is to meet the demands for measuring the monetary value of proximity to urban amenities as a non-market good.

The remainder of the article proceeds as follows. First we review some of the relevant literature. We follow that with a description of the method and data used for the study. In the penultimate section we report the results of our detailed empirical analysis of preferences for proximity to the selected amenities. We conclude with a discussion of the implication of our findings.

2. Literature review

Since the work of Schuler (1974) a growing literature has emerged focusing on amenities and their relation to regional growth and developments and persuading researchers to extended the urban land-use model suggested in the Alonso 1964 work (Nilsson, 2014). For example Yang and Fujita (1983) studied the different income groups location decision optimisation and the influence of urban open space amenities on their choice, Deller, Tsai, Marcouiller, and English (2001) looked at the role of amenities and quality of life in rural economic growth, McGranahan (2008) studied the influence of amenities in rural population growth, Partridge, Rickman, Ali, and Olfert (2007) examined the relationship between job growth and proximity to urban amenities.

Provision of public amenities such as parks, recreational facilities and social and cultural services are beneficial to residents' well-being (Witten, Exeter, & Field, 2003). They provide venues for health-promoting activity, as well as informal meeting-places, outside home and work, where social relationships can be formed and maintained (Olenburg, 1997; Warin, Baum, & Kalucy, 2000; Witten et al., 2003). Amenities are location specific goods and services that attracts migrants and residents (Li et al., 2016). Opportunity structures vary across different localities, so too do residents' perceptions of their neighbourhood, their satisfaction with the social and physical attribute of place and the nature of the social relations that occur in different places (Macintyre, Maciver, & Sooman, 1993). People's feelings about residential housing, and the market value of housing, are affected by proximity to valued public amenities (Ardeshiri, 2014; Ardeshiri, Ardeshiri, Radfar, & Hamidian Shormasty, 2016). Witten et al. (2003) argued that the social inequities can be mitigated or at least offset by compensatory distribution of public amenities and facilities. Access or lack of access to such environments and facilities could potentially have greater impact on the health and well-being of residents in low socio-economic neighbourhoods compared with higher socioeconomic neighbourhoods because of cost and mobility barriers to the use of private or non-local services and facilities (Talen & Anselin, 1998).

Along with urban amenities, accessibility is an important determinant of residents' preference for a neighbourhood. Evaluation of the community resources accessibility responds to calls for the inclusion of measures of the physical environment, access to services and the social environment in area-level indices (Kearns & Paddison, 2000). For households with limited mobility and personal resources, the availability and quality of local services, facilities and amenities is likely to be of heightened importance (Kearns & Paddison, 2000). In the 1980s, location-allocation models were developed to determine the optimal location of services, such as health services (Askew, 1983; Ayeni & Rushton, 1987; McLafferty & Broe, 1990) and libraries (Cole & Gatrell, 1986). Advances in GIS have prompted a number of investigations into the contributions such systems can make to community and resources planning and analysis of accessibility to local amenities (Bullen, Moon, & Jones, 1996; Gatrell, Bailey, Diggle, & Rowlingson, 1996). For instance, accessibility to health care services (Lovett, Haynes, Sü Nnenberg, & Gale, 2000; Parker & Campbell, 1998; Pearce, Witten, &

Bartie, 2006), green space (Cetin, 2015; Comber, Brunsdon, & Green, 2008), public parks (Nicholls, 2001), public transport (Orford, 2017; O'Sullivan, Morrison, & Shearer, 2000). The advantage of the GIS analysis and the location based measures used in the accessibility studies are related to the operationalisation, interpretability and communicability criteria. They are undemanding of data and are easy to interpret for researchers and policy maker to visually asses the homogeneity distribution of the amenity throughout the city, measure the space per capita, etc. However, they clearly do not satisfy the theoretical criteria related to individual utility based accessibility measures (Geurs & Van Wee, 2004). The measure do not take individuals' perceptions and preferences into account, in other words, the measure implies that all opportunities are equally desirable, regardless of the type of the amenity (Geurs & Van Wee, 2004).

Valuing changes in access to and the quality of services has long been the domain of resource economists (see [Bockstael, McConnell, & Strand, 1991; Braden & Kolstad, 1991; Freeman, 1993]). The notion of accessibility and the efficient allocation of services that has merged from economic theory is a powerful idea. Economist have devised and refined methods for measuring the value of having access to services (Freeman III, Herriges, & Kling, 2014). Measurement is an essential part of the approach because it allows the idea of efficiency and equity to be applied to an array of services; and it serves as the basis for decisions that can improve service allocation and increases in neighbourhood environmental quality (Haab & McConnell, 2002).

Much of the empirical literature on valuing urban amenities have used two distinct methodologies. One group of studies have attempted to measure the value of amenities by its proximity on either land values or housing values using the hedonic pricing theory (Albouy, 2016; Cheshire & Sheppard, 1995; Diamond & Tolley, 2013; Irwin et al., 2014; Polinsky & Shavell, 1976). While a second and more recent group concentrated on individual preferences and derived a willingness to pay (WTP) estimate for amenities using the utility maximisation theory.

Two main approaches which had a great contribute towards the theoretical work on hedonic prices are Lancaster's (1966) consumer theory and Rosen's (1974) model. They posit that a good possesses a number of attributes that combine to form bundles of utility-affecting attributes that the consumer values (Garrod & Willis, 1992). Both of these approaches aimed to assign prices of attributes based on the relationship between the number of attributes and the observed prices of differentiated products. Typically, studies using the hedonic pricing method, estimates the amount an individual is willing to pay for a given property as a function of the various characteristics of the house (Willis, Powe, Garrod, & Brunsdon, 1997) and its spatial accessibility to a particular type of services such as parks and green spaces (Chiesura, 2004; Jim & Chen, 2009), schools (Burgess, Wilson, & Lupton, 2005; Gibbons & Machin, 2008), public transportation (Dubé, Legros, Thériault, & Des Rosiers, 2014; Phanikumar & Maitra, 2006) healthcare (Drummond & McGuire, 2001; Johannesson, 1996; Sloan, 1996) post office (Richard, Hutton, & Smith, 2008) local shopping centre (Dunse & Jones, 1998; Rosiers, Lagana, Thériault, & Beaudoin, 1996; Tse & Love, 2000; Willis, Powe, & Garrod, 1995) and police station (Moller, 2001).

Despite the fact that the main strength of the hedonic methods is that it is based on observed behaviour (revealed preference data), however, the methods suffer from several weaknesses (Earnhart, 2001). First, these models depend critically on the control of all important factors behind location choices (Freeman III et al., 2014). To manage with this dependency, hedonic studies include numerous explanatory variables, yet may still omit important variables. Second, hedonic analysis does not capture effectively preferences for uncommon attributes (Earnhart, 2001; Freeman III et al., 2014). Third, hedonic analysis suffers from collinearity between explanatory variables, especially when many are included (Freeman III et al., 2014); this aspect precludes the isolation of factors, including environmental factors, and generates coefficients with wrong signs or implausible magnitudes (Greene, 2003). Fourth, given limited information on households'