

# Assessing the Relative Amenity Value of Accessibility and Neighbourhood Quality in Nanjing, China

Hong Hu, Stan Geertman, Pieter Hooimeijer  
hu@geo.uu.nl, s.geertman@geo.uu.nl, p.hooimeijer@geo.uu.nl  
Faculty of Geosciences, Utrecht University

## INTRODUCTION

The relationship between housing price and amenities has been systematically analyzed in western countries using hedonic price models. However, there is no comprehensive study on the effect of various amenities and their relative weight in influencing housing prices in China. According to the literature (e.g. Haurin & Brasington, 1996; Hui et al., 2007), three broad categories have an impact on housing price: dwelling attribute, accessibility, and neighbourhood quality. This study focuses on the relative value of accessibility and neighbourhood quality on apartment prices in Nanjing, China.

## MODEL

By far, there have been no fixed hedonic price models. We choose relatively simple function forms since they normally reduce random errors and inaccuracies which are usually more apparent in complicated models; moreover, these simple function forms are relatively easy to apply and to interpret (Cassel & Mendelsohn, 1985; Jim & Chen, 2006).

According to the classical theory (Alonso, 1964), trade-off exists between distance and land price. People's valuation of distance between ones' residence and a destination differs within transport mode, purpose of trip, household characteristics and destination characteristics (e.g. attractiveness) (Geurs & Ritsema van Eck, 2001). Based on these differences, there are two types of distance decay: 1) The influential effect exerts a continuous long distance range, in which the distance gradient is steep at short distance and gradually becomes flatter at increasing distance; several functions have been used to capture this effect such as a negative power, a negative exponential, and a logistic function (Fotheringham, 1983; Bewley & Fiebig, 1988; Song, 1996); 2) the influential effect is discontinuous and limited to more or less a fixed proximity distance (Hagoort, 2006). In general, type 1 can be used to analyze accessibility amenities which have continuous effect at medium-to-long distance, while type 2 can be used for neighbourhood amenities which exert a more or less constant effect at relatively short distance, after which no effect will be exerted. Therefore, for assessing accessibility we use a double-log model since it describes continuous distance decay effect and fits empirical data better. For assessing the value of neighbourhood quality, we measured the presence of amenities using a semi-log model. Moreover, for assessing the value of dwelling attribute, we use a semi-log model.

The function form of our model is:  $LN(P) = \alpha + \beta H + \gamma LN(A) + \eta N + \epsilon$

where P represents housing price per square meter; H represents dwelling attribute variables; A represents accessibility variables; N represents neighbourhood quality variables;  $\alpha$ ,  $\beta$ ,  $\gamma$  and  $\eta$  are associated parameter vectors; and  $\epsilon$  is random error terms.

## DATA

The apartment sale data was collected from relevant websites of Nanjing housing market from June 28th, 2010 to July 10th, 2010. 9948 apartment sales were recorded, distributing over 511 neighbourhoods. For each of three broad categories we selected representative indicators.

For dwelling attribute, we selected the indicators of building year, size of apartment, number of bathrooms, number of bedrooms and floor level.

For measuring the accessibility, we adopted different GIS accessibility techniques: Euclidean distance, time cost by car, by public transport, and by bike. With the help of these techniques, we measured accessibility to the CBD as an indicator of both transport hub and job opportunities; metro stop as an indicator of intra-city rapid public transport hub; access points of city expressway as an indicator of city rapid car transport hub; railway station as an indicator of inter-city public transport hub; potential score of job accessibility (using a simple gravity model; combining Delauney network with road network) as an indicator of job opportunities; and accessibility to square, park, and water bodies (river and lake) as indicators of open space.

The measurement of all the neighbourhood variables is performed by indicating their presence in a neighbourhood. As such, we selected heavy industry as an indicator of environmental disamenity; school district as an indicator of education; historical heritage as a cultural indicator; and presence of square, park, and water bodies as indicators of open space.

## CONCLUSIONS

The empirical results show: 1) although in western counties, accessibility and neighbourhood quality have a relative equal effect on housing price, in Nanjing China accessibility exerts a far stronger impact on housing price than neighbourhood quality; 2) among different accessibility indicators, distance to metro stop is a by far the most important factor for residents when buying an apartment, even taking rapid car accessibility into account; 3) the major disamenity in the neighbourhood appears to be the “presence of heavy industry”, which can be found in 43% of the recorded neighbourhoods.

## **BIBLIOGRAPHY**

- Alonso, W. (1964). *Location and land use: Toward a general theory of land rent*. Mass: Cambridge: Harvard University Press.
- Bewley, R., & Fiebig, D. G. (1988). A flexible logistic growth model with applications in telecommunications. *International Journal of Forecasting*, 4(2), 177-192.
- Cassel, E., & Mendelsohn, R. (1985). The choice of functional forms for hedonic price equations: Comment. *Journal of Urban Economics*, 18, 135-142.
- Fotheringham, A. S. (1983). A new set of spatial-interaction models: The theory of competing destinations. *Environment & Planning A*, 15(1), 15-36.
- Geurs, K. T., & Ritsema van Eck, J. R. (2001). *Accessibility measures: Review and applications*. RIVM (National Institute of Public Health and Environment) Report 408505 006,
- Hagoort, M. J. (2006). *The neighbourhood rules: Landuse interactions, urban dynamics and cellular automata modeling*. PhD dissertation of Utrecht University
- Haurin, D. R., & Brasington, D. (1996). School quality and real house prices: Inter- and intrametropolitan effects. *Journal of Housing Economics*, 5(4), 351-368.
- Hui, E. C. M., Chau, C. K., Pun, L., & Law, M. Y. (2007). Measuring the neighboring and environmental effects on residential property value: Using spatial weighting matrix. *Building and Environment*, 42(6), 2333-2343.
- Jim, C. Y., & Chen, W. Y. (2006). Perception and attitude of residents toward urban green spaces in guangzhou (china). *Environmental Management*, 38, 338-349.
- Song, S. (1996). Some tests of alternative accessibility measures: A population density approach. *Land Economics*, 72(4), 474-482.