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AN EMPIRICAL STUDY OF THE IMPACT OF METRO STATION PROXIMITY ON PROPERTY VALUE IN THE CASE OF NANJING, CHINA

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ABSTRACT

This paper analyzes the impact of metro station proximity on property value from both theoretical and empirical perspectives. Data on second-hand apartments within six kilometers of metro line 1 and 2 stations in Nanjing are used. Our empirical results show that metro station proximity has a positive partial effect on property value. The degree of impact diminishes with the increase of the distance. The extent of impact reaches the largest when the distance is less than five hundred meters, and is still remarkable when the distance is within two kilometers. The effect becomes insignificant when the distance is larger than two kilometers. Our empirical results also show that with the distance increasing, the extent of price variation is widened first, reaching a peak when the property is within one kilometer, and then decreases. In addition, metro station proximity in suburban areas is shown to have a higher positive impact on property value compared with metro station proximity in urban areas.

Contribution/ Originality: This study contributes in the existing literature by analyzing the impact of metro station proximity on property value from both theoretical and empirical perspectives, in the case of the city Nanjing, China.

1. INTRODUCTION

Site selection is a hot topic in urban economics. The discussions are usually descriptive or normative in nature. Some studies address the issue of first-rank, location conditional on a given set of constraints (Fujita, 1989). Others focus more on showing the value of a property at a

particular location. At all events, the issue of recognizing the factors affecting property values is ordinary to both sets of methods. This paper focuses on properties around metro stations.

Relevant studies started early in Western countries. Theory holds that metro station proximity might have two impacts on residential property values. Most studies suggest that housing closer to public transportation enjoys a higher market value than housing farther from public transportation. U.S. public transit agencies declare that property development around metro stations is the most significant economic benefit of metro investments. Operation of metro lines does goods to housing price along the line. Investments in public transport infrastructures, such as a new metro station, are capitalized totally or partially into land and housing prices. Other studies, however, show that proximity to metro stations may decrease housing prices because of nuisance effects like noise. Domestic studies on this topic are relatively fewer. All the studies show that metro transportation has some effects on property value.

The impact of Metro Line 13 in Beijing on housing prices was studied and a conclusion that the scope of influence is different to each station was reached. The impact of metro station proximity on property value is larger in suburban areas than that in urban areas. Based on domestic and foreign studies, inference can be reached that metro transportation do have some effect on housing prices. This effect, however, vary with different distances and different areas. The definition of 'property' should be given at the beginning of discussion. Different definitions are given related to different disciplines. Property in this paper means a housing estate ranging from a vacant land to an area occupied by all kinds of buildings: industrial, residential, commercial, and so on. Many authors have conducted property value studies by listing the broad categories of factors influencing property value, e.g. physical, accessibility and environmental factors (Bowes David and Ihlanfeldt Keith, 2001).

While some others have included land use patterns and historical factors into their analysis (Brigham, 1965). Plenty of detailed lists can be recognized within each category. In the case of the factors to the analysis, the detailed list differs from place to place and thereby from one study to another. These factors possibly weigh up between each other. A number of relevant studies have been made in China. However, most of the studies are conducted on the perspective of Geoscience rather than Econometrics and most of the research objects are Beijing and Shanghai. To better explain the effect of metro station proximity on property value, I collect some information in Nanjing and conduct this research.

Taking Metro Line 1&2 in Nanjing as examples, this paper uses hedonic pricing model and econometric theory to study the impact of metro stations on property value. I focus mainly on the following issues: 1. The theory of how metro station proximity affect the housing prices. 2. The extent of the influence of metro station proximity on property value. Does the degree of the influence of different distances remain the same? 3. With the distance increases, how will the extent of price variation changes? 4. Whether the impacts of metro station proximity on property value are the same in urban areas and suburban areas?

In subsequent sections, I methodically discuss the theoretical basis of the studies, present and compare the empirical results of the studies conducted. In addition, I make a quantitative analysis

to explain the differences in the results of the studies. Therefore, this paper is made up of a qualitative review and a quantitative analysis.

2. THEORY AND EMPIRICAL FINDINGS

2.1. Theoretical Basis

Most land value theories have their root in the model of agricultural land advocated by Von Thuïnen (1830), who emphasized the predominance of transportation cost in determining land value and use. For a certain land of certain fertility, land value differentials originate from the transportation savings afforded by the site of the land. In subsequent studies, economists proposed bid-rent theory[1] (Alonso, 1964) to improve the model. The core concept of the bid-rent theory is that every agent is ready to pay a certain amount of money according to the location of the land. A higher accessibility of an estate results in a dense settlement. This leads proportionally to a rent gradient that goes down with distance from the Central Business District for locations that yield equal utility. From this point of view, the main factor accounting for the differences between land values is the accessibility that is measured by the proximity to the CBD and the corresponding transportation fee. The physical characteristics of the property are supposed to be given. Nevertheless, as the hedonic pricing model[2] becomes popular, the physical quality of the estate is considered as important parts in explaining the deviations in housing prices. Together with the accessibility factor, the physical qualities are also interpreted related to the proximity to CBD. The bid rent theory assumes that the size of properties increases as the distance to the CBD extend. However, the transportation cost perspective for urban properties seems narrow. The idea of accessibility thus contains all variables that lead to the possibility of a site for interaction (Hansen, 1959). Although a general definition of the idea of the accessibility is available, short of appropriate measuring technique and data implies that simple methods are used. Therefore, in the literature I focus on only some of the factors, specifically a CBD targeted interaction in relation to shopping and employment.

2.2. Fundamental Theory

Property value is influenced by the internal characteristics, external amenities and accessibility. The internal characteristics are the physical characteristics of the property. Hedonic price analyses for land values (especially residential areas), have listed a wide range of the characters (Grass, 1992; Kruk, 2001). The external amenities affecting property value originate from an area on property prone to vary. Immediate locations tend to have higher influences than further locations. High population movement leads to the development of retail activities while it may also attract criminality at the same time (Bowes David and Ihlanfeldt Keith, 2001).

[1] A geographical economic theory that refers to how the price and demand for real estate change as the distance from the central business district increases.

[2] A model identifying price factors according to the premise that price is determined both by internal characteristics of the good being sold and external factors affecting it.

The fundamental theory in how metro accessibility affects housing price can be brought forward as follows. As a site becomes more appealing, as a result of particular characteristics, demand increases and this results in price increase. Under most circumstances, CBDs are the centers of large amounts of activities. Therefore, closeness to CBD is viewed as an appealing quality that increases estate prices. Investments in transportation infrastructure reduce this friction at CBD to some extent. Properties near the investment area enjoy benefits from these investments as well. Being close to a transportation facility increases the accessibility of the estate and thus the value of the transportation facility is capitalized in the estate value.

2.3. Empirical Studies

2.3.1. Impacts of Accessibility on Housing Price

The problem of measuring accessibility also seems to be a primary challenge. In bid rent theories, accessibility variables are measured as the distance to the destination or the cost of transportation. This method is applied for most accessibility studies. It is crucial to notice that this method stems from the definition of accessibility: the ease by which CBD may be reached. Nevertheless, in the literature varying definitions of accessibility are observed, depending upon the purpose of the research. In some studies, extra parameters (in addition to cost, travel time/distance, fee etc.), including interaction patterns may be needed. Although the concept seems subjected to measurement problems and definition, its fundamental theoretical relationship to the estate value remains the same. Clearly, a higher accessibility index for estate in question means a higher estate value.

It may be predicted that a price curve will see a negative slope, and when we move away from the metro station, prices decrease. However, the effect will not enlarge continuously with the increase of the distance. The influence will be indifferent when the distance exceeds a certain range. The impact of metro station on property value can be divided into two types. One is positive externality, namely improving the location conditions of the property, reducing the transportation cost, and increasing the housing prices. The other is negative externality, including noises and mess environment caused by increased population movement, which implies decreasing of the housing prices. Metro stations affect housing prices through both externalities, and obviously the effect of positive externality exceeds the influence of negative externality. With the distance increases, the negative externality decreases and thus the effect of metro stations on property value keeps changing.

2.3.2. Different Extents of Impacts in Different Areas

Metro station proximity has different impacts on housing prices at different areas. Judging from the past studies, most rail transportation has a positive effect on housing prices. However, there are some studies showing different conclusions. Neglecting territorial factor is an important reason that leads to different conclusions. Metro station proximity in suburban areas has a higher positive impact on property value in comparison to metro station proximity in urban areas. Public transportation are complete and frequently used in urban areas, people have more choices.

Transportation infrastructure in suburban areas, however, needs to be improved. Thus the decreasing degree of marginal transportation cost brought by rail transportation is far-gone in suburban areas than in urban areas. This leads to a higher positive impact on housing prices in suburban areas than in urban places.

2.3.3. Impacts of Environmental Amenities on Housing Price

In the earlier property value research, environmental amenities were not taken into consideration. Nevertheless, the hedonic price model calls for their involvement. The concept of environmental amenities is subjected to more measurement problems than the concept of accessibility. Having succeeded in defining the concept of environmental amenities, the connection to the estate value is interpreted in the same way: the higher the pleasant amenity index corresponding to the estate, the higher its price. The predominant theoretical framework includes physical features, accessibility, and environmental amenity factors.

3. DATA AND DESCRIPTIVE STATISTICS

3.1. Overview of Nanjing Metro System

Nanjing is the 6th city that has metro system in China. It is currently operating 6 metro lines. Currently there are 4 urban metro lines traveling on 142.6 kilometers of route; additionally, there are 2 suburban metro lines in operation, resulting in a metro system with a grand total of 223.6 kilometers of route. The total length of the system ranks fourth in China, after Shanghai, Beijing and Guangzhou. Line 1 is the first operating metro line in the Nanjing Metro system, inaugurated on September 3, 2005. After the opening of the 25.08 km-long south extension line on May 28, 2010, the total length of Line 1 is now 46.8 km. This line mainly runs in a north-south direction. It starts at Maigaoqiao station in the north, and continues southwards towards China Pharmaceutical University station that is located at the southeastern side of Nanjing. Line 2 is a subway line that runs mainly in an east-west direction on the Nanjing Metro network. This line entered operation on May 28, 2010. It covers a length of 37.95 km with 26 stations. Line 3 is a line that opens on 1 April 2015. It currently has 29 stations spanning a total of 44.1 kilometers. One section of Line 10 is in operation, it opened on July 1, 2014, with 14 stations spanning a total of 21.6 km. Line S1 is a suburban metro rail line serving the southern suburbs of Nanjing. It connects Nanjing South Metro Station with Nanjing Lukou International Airport. Line S8 is an intercity metro line that connects Luhe District to Pukou District. The Line is 45.2 kilometers long, and features 17 stations. The line started construction on June 21, 2012 and was officially opened on August 1, 2014. Nanjing metro system has a relatively long history in China, and it has a remarkable impact on housing prices. Crossed by each other, Line 1 and 2 are the two main metro lines covering the core areas in Nanjing. Therefore, data of properties along Line 1 and 2 are representative as an object of study.

3.2. Data and Descriptive Statistics

The data used in the analysis of the paper covers sales transactions of Nanjing residential housing market. To resist the interference of time factors, all the data found are from March to April 2015. Considering the situation that new housing estates around metro stations are limited and maldistributed, this paper mainly collects the data of second hand housing estates around Line1 and Line 2 stations. All the data used in this paper are from four transaction websites: Anjuke[3], Lianjia[4], Fangtianxia[5], and 365house[6]. These four websites contain almost all the second hand housing transaction information in Nanjing and provide specific information about location, price, area of structure, etc. To ensure the facticity of the data, I randomly chose some housing estates and investigated the sample on the spots. The results were almost the same with the information from the websites. As to the degree of influence, the longest distance in the foreign studies is 3km while most domestic studies limit it to 1km.Considering the convenience of transferring the subway, this paper studies the influence of metro stations on property value within 6km. To prove that metro station proximity has different impacts on property value in different areas, Nanjing is divided into two parts. One is urban areas, including 8 districts(except for Xianlin District). The other is suburban areas, including Jiangning District and Xianlin District. 1200 data are randomly collected, 432 suburban samples and 768 urban samples are selected.

The data contain information related to characteristics of the dwellings, accessibility of the dwellings and some environmental features. In table 1, some descriptive statistics on the 3 categories of factors influencing property values are given. A large amount of relevant items are used for physical features of the houses. Examples are building age of the house, plot ratio, surface area of the house, floor of the house; all these variables are continuous. The descriptive statistics are based upon houses sold in the certain time period. The accessibility features of the houses considered contain the distance to Xinjiekou[7], and the distance to Hexi CBD[8]. To analyze the range of the influence, 4 dummy variables regarding distance to the nearest metro station are included in the study. The features in the environmental category include sightseeing view within 1000m, greening rate, and number of commercial facilities within 1000m.

3.3. Methodology

To single out the effect of proximity to a metro station, the influence of other characteristics of the land under consideration are always incorporated in the models. The hedonic pricing model is effective in singling out the impact of one characteristic from a large amount of characteristics

[3] http://nanjing.anjuke.com

4 http://nj.lianjia.com

5 http://nanjing.fang.com

6 http://nj.house365.com

7 The central business district of Nanjing, a famous commercial center in China.

8 The central business district and financial center of Hexi New Town, Nanjing.

constituting a property. This paper uses this methodology to conclude the impact of three types of property features in general and metro station accessibility before all. Large amounts of independent variables are included to explain the housing prices. The physical characteristics of the dwellings, environmental features and the accessibility variables are included in the study. To account for spatial effect, dummy variables are included in the analysis.

Table-1. Descriptive statistics for all data

	Observation	Mean	Sta. Dev.	Min	Max
Loca	1200	0.638796	0.4802001	0	1
Price (RMB/m^2)	1200	22883.29	8180.746	8461	50899
Dist (m)	1200	894.91	870.6791	37	5500
DistA (m)	1200	0.35	0.4771685	0	1
DistB (m)	1200	0.7466667	0.4351015	0	1
DistC (m)	1200	0.8633333	0.3436383	0	1
DistD (m)	1196	0.9264214	0.2611931	0	1
Area (m^2)	1200	97.1741	39.27825	41.4	395
Floor	1200	7.733333	7.041084	1	38
Age (year)	1200	10.60333	6.026297	0	33
Plot	1176	2.263639	1.111005	0.8	8.3
Green	1176	0.3533333	0.0997552	0.05	0.65
Fee (RMB/ m^2/year)	1176	1.093435	0.792175	0	5
View	1200	0.57	0.4952822	0	1
DistX (m)	1200	8104.367	5074.041	370	21800
DistH (m)	1200	9790.4	5336.542	560	23400
Business	804	405.7264	428.902	17	2079

Note: All Data comes from Anjuke, Lianjia, Fangtianxia, and 365house.

Table-2. Variable Interpretation

Variable name	Variable code	Variable interpretation
Dependent variable		
Price of the houses (RMB/ m^2)	P	Price of the house per square meter
Dummy variable		
Distance to the station (m)	Dist	Distance to the nearest subway station
	DistA	Noted as 1 if within 500m, 0 if out of 500m
	DistB	Noted as 1 if within 1000m, 0 if out of 1000m
	DistC	Noted as 1 if within 1500m, 0 if out of 1500m
	DistD	Noted as 1 if within 2000m, 0 if out of 2000m
Independent variable		
Location	Loca	Noted as 1 if located at urban area, 0 if located at suburban area
Building age (year)	Age	Building age
Plot ratio	Plot	Ratio of total building area and land area in the housing estate
Area of structure (m^2)	Area	Area of structure
Floor of structure	Floor	Floor of structure
View within 1000m	View	Noted as 1 if there is sightseeing view within 1000m, 0 if not
Distance to Xinjiekou (m)	DistX	Distance to Xinjiekou
Distance to Hexi (m)	DistH	Distance to Hexi
Greening rate	Green	Ratio of greening area and land area
Number of commercial facilities	Business	Number of commercial facilities within 1000m
Property management fee (RMB/m^2/year)	Fee	Property management fee

Note: All Data comes from Anjuke, Lianjia, Fangtianxia, and 365house.

4. REGRESSION ANALYSIS DESIGN AND RESULTS

4.1. Model Specification

A cross sectional pattern is applied to organize the data[9]. The hedonic specification is used because it gives robust evaluation and enables convenient coefficient explanation. There are undoubtedly other factors affecting the housing price that we cannot hope to observe and include in the regression equation. This paper assumes that the impact of all the other factors is random and independent, thus neglecting the impact of other factors will not affect the unbiasedness of the estimation. The model can follow a form where the physical characteristics of the property,

[9] Cross-sectional data, a type data collected by observing many subjects at the same point of time, or without regard to differences in time.

including building age, plot ratio, area of structure and floor of structure while the distance from the house to the metro station is the accessibility related variable. A vector of distance variables can be used to represent the location of the house (which contains the distance to Xinjiekou and the distance to Hexi) and whether the house is in urban or suburban area. Also, environmental variables can be used to represent environmental features, such as the greening rate, view within 1000m and property management fee. According to our theoretical analysis, the regression model can be designed into one in which DistN stands for dummy variables of different distance to the metro station and all the other factors (Age, Far, Area, Floor, View, Green, Trans, Fee) that affect the housing price are included.

4.2. Estimation Results and Analysis

Table-3. Estimation results of different range models

	Model 1	**Model 2**	**Model 3**	**Model 4**
	DistA	**DistB**	**DistC**	**DistD**
DistA (m)	12427.97* (43.86)			
DistB (m)		8906.777* (22.17)		
DistC (m)			9537.164* (21.47)	
DistD (m)				3994.285* (5.75)
Area (m^2)	3.546994 (1.16)	4.018789 (0.90)	15.328* (3.44)	19.05333* (3.47)
Floor	-113.2613* (-5.20)	49.68418 (1.54)	-122.6749* (-3.82)	-113.2344* (-2.85)
Age (year)	-236.8212* (-6.80)	-285.4439* (-5.59)	-371.4959* (-7.30)	-468.0817* (-7.32)
Plot	1470.006* (8.48)	4605.572* (19.97)	5790.952* (24.08)	4529.753* (15.75)
Green	-16106.02* (-11.79)	5169.212 (2.27)	-6331.313* (-3.02)	-18168.87* (-7.31)
Fee (RMB/ m^2/year)	-326.8102 (-1.12)	1236.45* (2.94)	1077.619 (2.53)	1372.701* (2.61)
View	1352.159* (5.00)	1146.401* (2.92)	-2634.708* (-6.06)	297.2133 (0.58)
DistX (m)	-0.3262512* (-6.79)	-0.3269535* (-4.41)	-0.5506082* (-7.78)	-0.9876752* (-11.69)
DistH (m)	-0.179166* (-4.89)	-0.2509347* (-4.68)	-0.3313839* (-6.20)	-0.4890824* (-7.42)
Business	0.4986578 (1.02)	-1.825248 (-2.45)	-0.300475 (-0.41)	3.308578* (3.77)

Note; Linear regression model coefficients with t-value of the estimates in parentheses
* stands for a significance level of less than 1%
All data comes from Anjuke, Lianjia, Fangtianxia, and 365house.

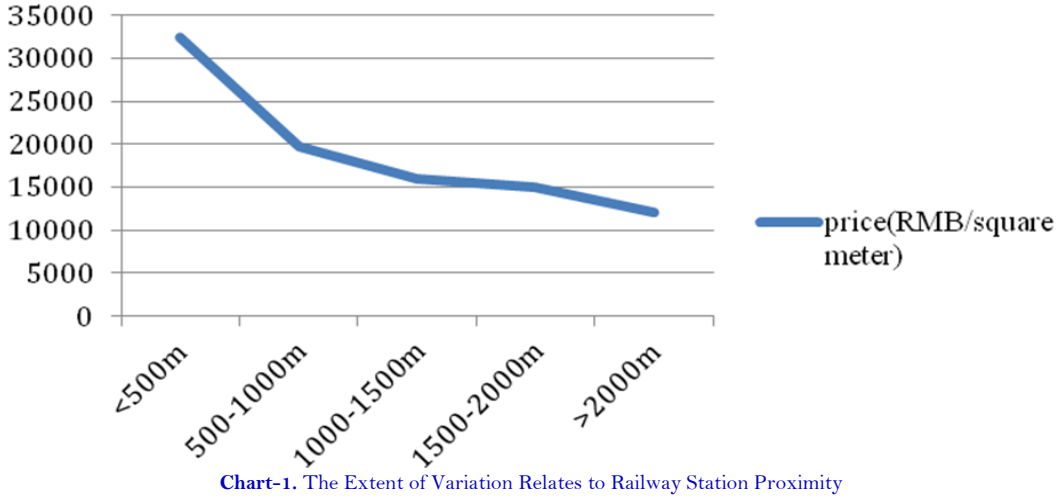

Chart-1. The Extent of Variation Relates to Railway Station Proximity

4.2.1. Different Extents of Impacts of Different Metro Station Proximity

Table 3 gives estimation results based on the regression model. The coefficients of the factors and t-value are reported. Based on the model, four dummy variables of different distance to metro station are used to analyze the impact of different distance on property value. Each coefficient shows the effect on housing price of each independent variable to the subway station. Judging from the t-value, we can see whether the factors have a significance level of impact on housing price or not. All factors in the distance category have significant positive effect on housing price, which validates that subway station proximity has a positive effect on property value. The degree of impact, however, decreases obviously with the increasing of the distance. The extent of impact reaches the largest when the distance is less than 500m, and is still remarkable when the distance is within 2000m. The effect becomes insignificant when the distance is larger than 2000m. From the line chart, we can obviously see that the extent of price variation reaches the largest when the property is within 1000m, and then decreases with the increasing of the distance.

Building age, plot ratio, view within 1000m, distance to Xinjiekou, distance to Hexi are extremely significant. Area of structure, floor of structure, green rate and property management fee are significant. Only number of commercial facilities within 1000m is not significant in 4 models. Take Model 1 as an example, building age has significant negative effect on housing price. With building age increasing 1 year, housing price decrease 236.8212 yuan per square meter. A unit's increase of plot ratio results in an increase of 1470.006 yuan per square meter of housing price. Houses with view within 1000m have prices of 1352.159 yuan per square meter higher than those does not have a view within 1000m. One more meter further to Xinjiekou, housing prices decrease 0.3262512 yuan per square meter. Housing prices will enjoy an increase of 0.179166 yuan per square meter if houses are one more meter closer to Hexi. These data show that people often take these significant factors into prudent consideration when buying a house. Area of structure, floor of structure, green rate and property management fee are factors that have relatively stable influence on housing price.

4.2.2. Different Extents of Impacts in Urban Areas and Suburban Areas

To prove that metro station proximity has different impact on housing price in different areas, population, urban and suburban area samples are selected. The regression result is shown in Table 4. As is shown in the table, the impact of metro station proximity has significant impact on property value in both urban areas and suburban areas. It is obvious that the coefficient of distance to metro station in suburban areas is almost 10 times the coefficient in urban areas, which means that accessibility to metro station matters much more in housing prices in suburban areas than in urban areas. The estimated variable of both distance to Xinjiekou and distance to Hexi are very significant, and both of them have negative effect on housing price. Being 1 meter further away from Xinjiekou, housing prices decrease 1.00052 yuan per square meter in urban areas and 0.9206812 yuan per square meter in suburban areas. Being 1 meter further away from Hexi, housing prices decrease 2.055526 yuan per square meter in urban areas and 0.4401933 yuan per square meter in suburban areas. This result validates that the closer the house locates to central business district, the higher the housing price is.

Table-4. Estimation results of different Area models

	Model 1	**Model 2**	**Model 3**
	All	**Urban Area**	**Suburban Area**
Dist(m)	-4.178849* (-20.81)	-0.5226848* (-3.58)	-5.141809* (-18.53)
Area(m^2)	10.85629 (2.40)	-0.4205401 (-0.44)	18.20782 (1.92)
Floor	-45.18556 (-1.39)	-0.762402 (-0.09)	12.46856 (0.25)
Age(year)	364.1617* (7.06)	-80.11146* (-2.93)	336.3084* (4.37)
Plot	4567.974* (19.35)	623.2471* (5.01)	4807.31* (13.85)
Green	-7169.508* (-3.39)	-23090.2* (-31.15)	-9159.003 (-2.45)
Fee(RMB/m^2/year)	1478.024* (3.43)	-5017.122* (-20.79)	-1095.181 (-1.92)
View	-1108.461* (-2.66)	20322.79* (87.02)	-5545.083* (-11.54)
DistX(m)	-0 .5282966* (-7.31)	-1.00052* (-12.46)	-0.9206812* (-4.92)
DistH(m)	-0.2065955* (-3.71)	-2.055526* (-89.64)	-0.4401933* (-2.70)
Business	-0.3774909 (-0.51)	19.42564* (44.27)	-31.07596* (-12.39)

Linear regression model coefficients with t-value of the estimates in parentheses
* stands for a significance level of less than 1%
All data comes from Anjuke, Lianjia, Fangtianxia, and 365house.

5. CONCLUSION

The effect of metro station proximity on housing prices has attracted considerable attention in both economic and urban planning literature. A number of empirical studies have been conducted to quantify the effect with differing results. Taking Nanjing Metro Line 1&2 as

examples, this paper finds a systematic explanation for the impact of metro station proximity on property value through both theoretical and statistical studies. Here are the conclusions:

1. There is indication that metro station proximity has obvious positive impact on property value. The extent of impact reaches the largest when the distance is less than 500m, and is still remarkable when the distance is within 2000m, leaving the station as a primary accessibility point. The effect becomes indifferent for properties out of 2000m of the metro station, which indicates that the approximated range of influence of metro station on property value is 2000m.

2. The extent of price variation, however, decreases remarkably with the distance increases. With the distance increases, the extent of price variation enlarges first, reaching a peak when the property is within 1000m, and then decreases.

3. The influence of proximity of metro station on property value is different according to different area. As to suburban areas where transportation infrastructures are not well constructed, the influence of metro station proximity on housing price is larger and more obvious. As to urban areas where public transportation is convenient and can be easily reached, the impact of metro station proximity on property value is not as remarkable as that in suburban areas.

REFERENCES

Alonso, W., 1964. Location and land use: Toward a general theory of land rent. Cambridge, MA: Harvard University Press.

Bowes David, R. and R. Ihlanfeldt Keith, 2001. Identifying the impacts of rail transit stations on residential property values. Journal of Urban Economics, 50(1): 1-25.

Brigham, E., 1965. The determinants of residential land values. Land Economics, 41(4): 325-334.

Fujita, M., 1989. Urban economic theory. Cambridge: Cambridge University Press.

Grass, R.G., 1992. The estimation of residential property values around transit station sites in Washington, D.C. Journal of Economics and Finance, 16(3): 139-146.

Hansen, W.G., 1959. How accessibility shapes land use. Journal of American Institute of Planners, 25(2): 73-76.

Kruk, R.V.D., 2001. Economic impact of wetland amenities: A special econometric analysis of the Dutch housing market. Unpublished Manuscript.

Von Thuïnen, J., 1830. Der isolierte staat in Beziehung auf landwirschaft und nationalokonomie. Munich: Pflaum.