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Analysis of shanghai housing price based on the hedonic price method

Dun Li[1], Xiangqian Zhang*[2]
Business Administration College HuaQiao University No. 269, Chenghua North Road, Quanzhou 362021, (P. R.CHINA)
E-mail: 446838775@qq.com, Xqzhang1998@163.com

ABSTRACT

The high housing prices of many major cities of China has becoming a hot social topic recently. This paper, taking Shanghai as an example, had specified the Hedonic Price Method as the research method through combining the theoretical research and empirical research method. According to the selected specific characteristic variables, this paper had collected 240 data in which 220 data were valid, and used related econometric software (Eviews7.0) to debug and analyze those data further to construct a model of the influences of specific factors on housing prices. Straight after, the paper summarized the result, confirmed the influence degree of various factors on housing prices and analyzed the housing price in Shanghai from the perspective of the hedonic price theory. Hereby the paper had come to a conclusion to help consumers buy house with relatively good position, high quality satisfaction and reasonable residential housing price. Besides, the paper had put forward practical Suggestions for Shanghai real estate management department to timely grasp the housing price distribution and control urban commercial house price macroscopically.

KEYWORDS

Housing price; Hedonic price method; Characteristic variables.

INTRODUCTION

As living space, residence is personal and family life necessities of urban residents. Urban real estate plays a decisive role in the life and economy of a society. Real estate industry is one of the pillar industries of Shanghai and the whole China currently. Being the big driving force of economic development has objectively made Shanghai housing prices high which also become a social problem in recent years. The rising house prices in Shanghai not only deepen the difficulty of the outsiders to take root in Shanghai, but also bring more pressure to city residents'life, which are not conducive to the long-term benign development of economy. Despite the double control of national macroeconomic regulation and local policy, Shanghai house prices still remain high. Overall fluctuation of prices is mainly affected by macro economy[1], while when being specific to each house, it is determined by the micro factors. These microscopic factors affecting specific differences of housing prices are the research objective variables this paper mainly devoted to. This article has selected several factors such as room size, the number of the bedroom, room, floors or balconies, if elevators exist, building time, property management fees, landscaping ratio, the distance to large shopping centers, subway stations or city center, and decomposed those factors using Hedonic Price Method to find the influences of various factors on housing prices. Besides, Political, economic, social, administrative natural and some other factors also fully reflected in the real estate market and real estate prices. Facing the problem of housing prices, Domestic scholars have made qualitative research on the supply and demand of housing market, the composition of housing price, housing policy and some other aspects, while the corresponding traditional analysis methods such as the cost of inputs method, income method and market comparison method had certain errors and limitations in analysis. Therefore, a new theory and method is needed to study China's urban housing prices[2]. The basis of Hedonic Price Method is called Hedonic Price Theory, which mainly focus on evaluating the various different but closely interrelated characteristic prices of the heterogeneity goods (housing, land, automobile, etc.) thus is of great significance for the study of residential prices. Learning from the results of Hedonic Price Model's theoretical and empirical research, this paper devoted to research the influencing factors and mechanism of city housing prices based on the Hedonic Price Model of cities' characteristics structuring the urban housing, thus to provide references for managing national urban housing price, completing property management system and formulating scientific regulatory policies. In the process of analyzing the influences of the various micro factors, this paper has discussed the influence degree of each of these factors on housing prices in Shanghai to give Suggestions for urban planners to make more adequate use of city space, to provide practical basis for policy makers, to provide focus for developers to build housing estates, to provide pricing basis for both buyers and sellers and to provide theoretical reference for house holders to optimize value.

LITERATURE REVIEW

Summary of Foreign Research

Hedonic Price Method and its model was first applied in the preparation of price index of a heterogeneous product or service. The earliest application was a statistics research on the correlation of vegetables quality difference and price fluctuation by Waugh (1928). He analyzed the effects of vegetable quality on the price and estimated the implicit price of each attribute according to the thought of the price differences is the result of the quality characteristics differences. Hedonic Price Model was first applied in the real estate field in 1960s. Ridker and Henning (1967) used Hedonic Price Theory to build model and made quantitative research on the influence of the improvement of the environmental quality (such as lower air pollution index) on real estate price. Ferri (1977), Palmquist (1980), Fleming M.C and Nelis J.G (2009) also studied the real estate residential price index which was established after describing the price changed over time in the Hedonic Price Model with characteristic variables including building structure, external characteristics, public services, accessibility, neighborhood characteristics, and trading months and years. Further, Nancye and Richard a. (1997), John m. (1998) has introduced and compared the difference of index compilation in regards of Hedonic Price Method, repetitive selling method and mixed method[3].

The Sketch of Hedonic Price Method

Hedonic Price Method considered that the consumers' requirements for the heterogeneous goods (cars, workers, housing and land are typical heterogeneous goods) was not based on the goods itself, but based on the characteristics that the goods contained[4]. Split the influence factors of housing prices, and the price underlying the various factors could be derived. The quality factors of housing price could be dismantled to reflect the pure price changes[5] in the control of the property characteristic (or quality) in a fixed number.

The Research Design

Summary of characteristic variables

Shanghai housing characteristic price model was established by summarizing the characteristic variables that impacted shanghai housing prices and coding and quantizing the quantitative and qualitative variables[6].

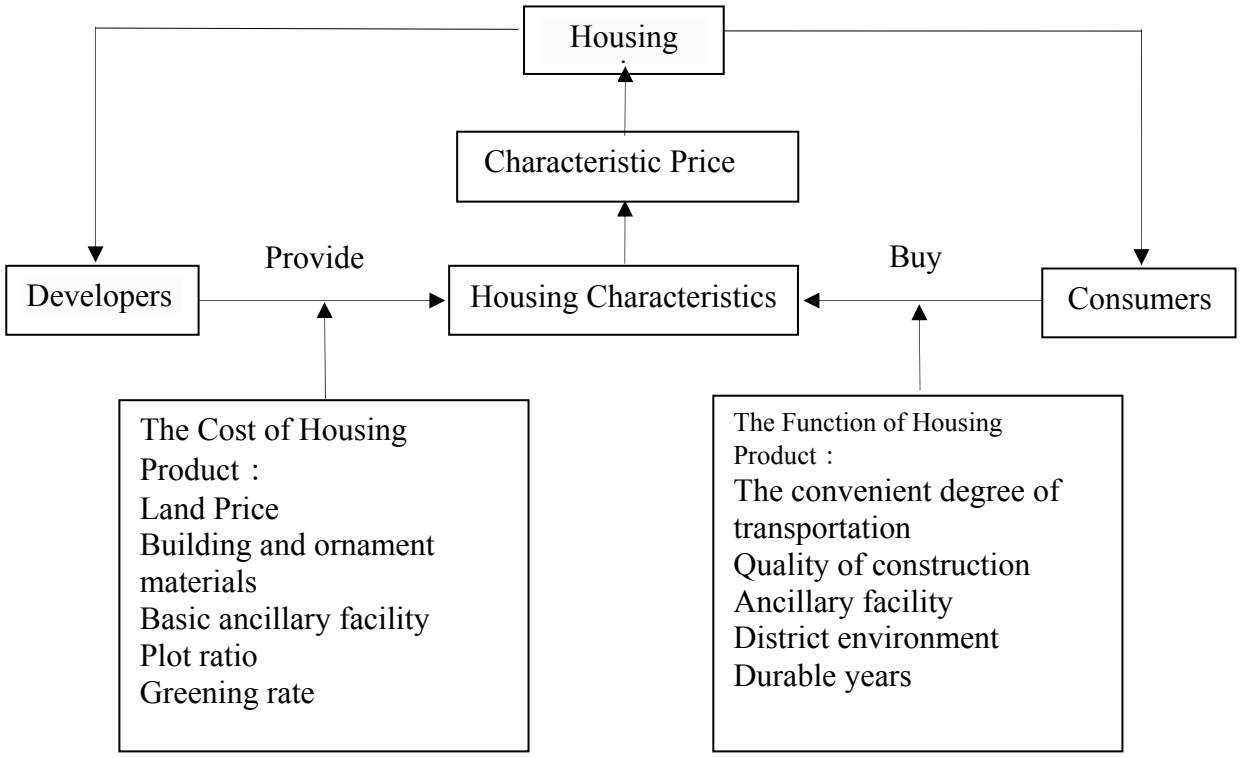

Figure 1 : The research design

Establishing the regression

Shanghai housing characteristic price model was derived by studying the influence of different housing characteristics on the housing prices through building regression to compute the price characteristics and price elasticity with the obtained data.

Analysis of results

Reference factors changing with the housing market price was analyzed through the comprehensive comparison of characteristic variables of the Hedonic Price Model.

MODEL SUMMARY

The determination of survey area

12 districts were selected which were Jiading, Putuo, Kunshan, Hongkou, Yangpu, Huangpu, Qingpu, Zhabei, Jing 'an, Xuhui, Baoshan and Changning, including most residential and commercial districts of Shanghai, therefore the data was relatively sufficient. As housing prices in Shanghai decreased from city center to the periphery, the distance to central referred to the distance to Shanghai people's square[7].

The selection of Characteristic Variables

It is critical to choose characteristic variables when use characteristic price method for pricing real estate. In this paper, the characteristics of the real estate can be divided into three types: geographical characteristics, construction characteristics and neighborhood characteristics[8].

Geographical characteristics

Residential location characteristics consider the overall convenience degree of residential location from the overall perspective of city[9]. Three categories of index is used to reflect the convenience degree of the residential location, that is, life convenience, traffic convenience, public facilities accessibility when study the effect of real estate prices. In this paper, the characteristics of the real estate's geographical location is reflected by measuring the shortest path to the three types of particular places or facilities from the house respectively.

Construction characteristics

Different construction characteristics, including the building area, room number and housing age, have different impacts on housing prices. Many scholars studied such construction characteristic variables as room number, bedroom number, bathroom number and building area and found that these features are positively related to housing prices[10]. While

considering the whole life cycle of building, the feature of residence age could be thought negatively related to the housing price.

Figure 2: The determination of survey area

Neighborhood Environment

Neighborhood environment characteristics refer to living environment factors which have impact on residence, including social variables, the external environment, the local government and municipal public services. Many research results showed that consumers were willing to pay a higher price to have residence with good landscape. A school would lead to a large impact on its surrounding residential property prices almost in every country. However, a hospital's impact was different among countries. In our country, many consumers hoped a high grade hospital existed near home. Through the above previous residential characteristics variables, the characteristics of these variables are summarized in table through the above general research[11].

TABLE 1: Explanatory variables commonly used in the hedonic price model

Types of variables	Common Explanatory Variables
Geographical Characteristics	The distance to large shopping Centre, subway station, city center, etc.
Construction Characteristics	Structure area, floors, building age, room number, bedroom number and balcony number
Neighborhood Environment	Elevators, property management fee, greening rate

The Choice of Dependent Variables

The most commonly used dependent variable by foreign scholars is the actual transaction price, followed by the listed price or assessment price. However, domestic residential transaction data is not comprehensive enough. Transaction prices (i.e., marketing price) are commercial secrets for developers and intermediaries, and there is no real estate transaction registration data issued by official organization or authority in Shanghai, besides, collecting the actual transaction prices are very difficult, therefore in the empirical study listed price was applied[12]. Housing intermediary listed price is provided by the seller under guidance of the intermediary institutions. Basically it could reflect the level of similar surrounding real estate transactions, but the phenomenon of overvaluation by sellers cannot be ruled out. The sellers'valuation of housing can be used for the market price as they know more of the housing characteristics than others. Comparing the average price of developers pricing and professional assessment pricing, it can be found that developers pricing is generally higher than professional assessment pricing. Besides, listed prices are often higher than the final transaction price. Those differences have nothing to do with the characteristics of the real estate, thus if the error is random, the estimated value obtained by regression analysis would be unbiased[13]. Therefore, this paper selected the listed unit price provided by Soufang website in Shanghai as the dependent variables (Appendix 1).

The Choice of Independent Variables

Geographical characteristics, construction characteristics and neighborhood characteristic are chose as characteristic variables. According to the actual situation, as well as the preliminary data analysis, some variables were rejected: the total

number of rooms, floors, building time, greening rate, and distance to the subway station. Combined with the literature analysis, the model variables are listed below,and two methods was chosen for the seven variables selected.

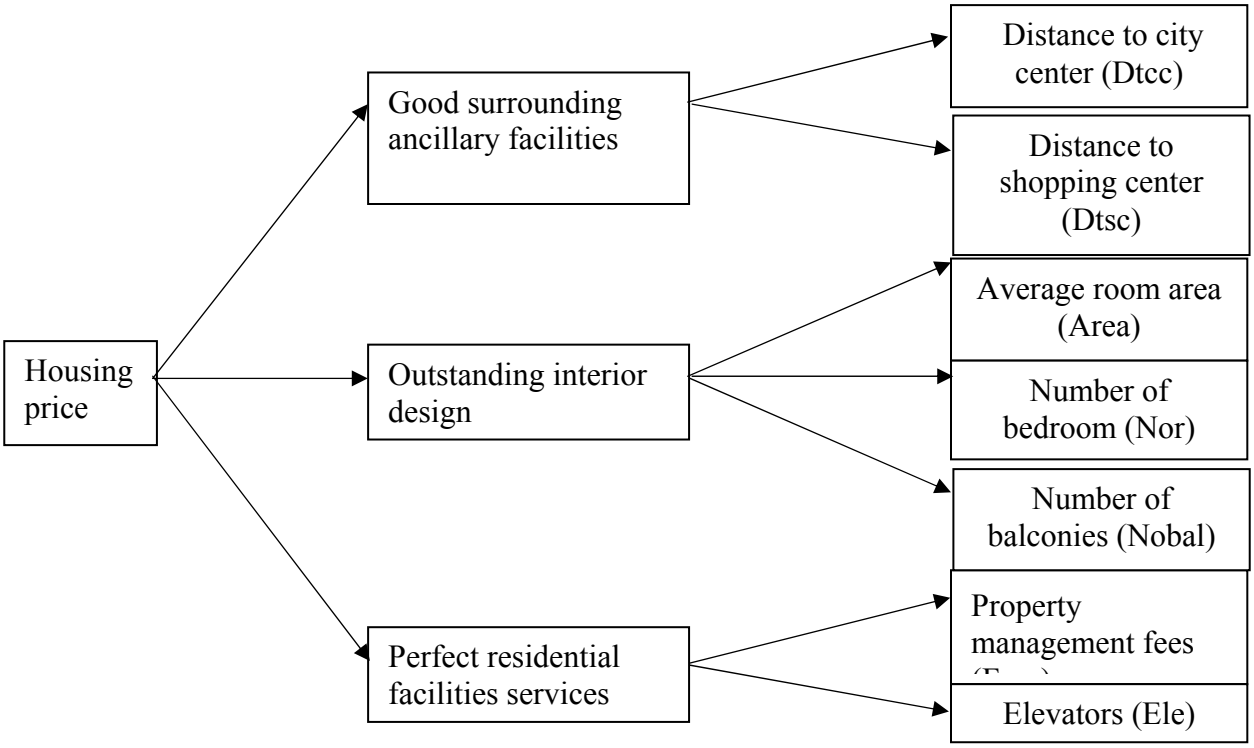

Figure 3 : The model variables

TABLE 2: Residential characteristics variables and their meanings

Class of Characteristic	Variables Names	Variables Meanings
Geographical characteristics	Distance to shopping center (Dtsc)	The distance to nearest the shopping center
	Distance to city center (Dtcc)	The distance to city center
Construction characteristics	Number of bedroom (Nor)	Number of bedrooms of every house
	Room area (Area)	Calculating the settlement area of housing price
	Number of balconies (Nobal)	Number of balconies of selected house
Neighborhood characteristic	Property management fees (FPM)	Property management fees per month per square meter
	Elevators (Ele)	Show 1 if elevators exists, otherwise show 0

Actual numerical value

The method is simple and intuitive for reflecting variables. Variables using the actual numerical value are showed below:

TABLE 3: Straight quantitative method

The Name of Variables	Quantitative variables
Distance to shopping center (LOGDtcc)	Take the log of the distance to nearest the shopping center
Distance to city center (Dtcc)	The distance to city center (meter)
Number of bedroom (NoR)	Number of bedrooms of every house
Room area (Area)	The Usable areas when calculating the total price (square meters)
Number of balconies (Nobal)	Number of balconies of every house
Property management fees (Fees)	Property management fees per month per square meter

Virtual quantitative method

There is one variable quantified using this method, that is, elevators.

The specific quantitative method are shown in table below.

TABLE 4: Virtual quantitative method

The Name of Variables	Quantitative variables
Elevators	Show 1 if elevators exists, otherwise show 0

EMPIRICAL ANALYSIS

Sample analysis

Dependent Variable:Y
Method:Least Squares
Date;12/02/13 Time:18:58
Sample:1 240
Included observations:240
Weighting series:AREA
Weight type:Standard deviation (average scaling)

TABLE 5: Regression results after correction

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5045017.	703059.0	7.175809	0.0000
LOGDTCC	-609309.7	84668.03	-7.196455	0.0000
DTSC	-138.3813	60.16886	-2.299882	0.0223
AREA	50139.70	4040.626	12.40889	0.0000
NOR	-292768.5	96576.34	-3.031473	0.0027
FPM	179977.9	83821.89	2.147146	0.0328
ELE	48771.57	167784.6	0.290680	0.7716
NOBAL	92795.06	118226.1	0.784895	0.4333

Weighted Statistics

R-squared	0.772876	Mean dependent var	2897590.
Adjusted R-squared	0.766024	S.D.dependent var	1212993.
S. E. of regression	982351.9	Akaike info criterion	30.46605
Sum squared resid	2.24E+14	Schwarz criterion	30.58207
Log likelihood	-3647.926	Hannan-Quinn criter.	30.51280
F-statistic	112.7815	Durbin-Watson stat	1.466814
Prob (F-statistic)	0.000000	Weighted mean dep.	2398755.

Unweighted Statistics

R-squared	0.725241	Mean dependent var	4283367.
Adjusted R-squared	0.716951	S.D. dependent var	3410623.
S.E.of regression	1814531.	Sum squared resid	7.64E+14
Durbin-Wats on stat	1.649012		

According to the conjecture of model form, the equation was built as follows:

$$Y\ (price)t=C+\beta 1LOGGDTCC+\beta 2DTSC+\beta 3AREA+\beta 4NOR+\beta 5FPM+\beta 6ELE+\beta 7NOBAL+ut\ (\beta)$$

β is the coefficient of dependent variables and independent variables.

It can be seen from the regression equation, the distance increase 1% to the city center, the housing price would reduce 610000 Yuan. As well as the distance increase 1 km to the nearest shopping center, the housing price would reduce 138000 Yuan. It can be derived that housing prices of Shanghai is 50000 Yuan per square per meter.

The test of model

Test for Heteroskedasticity

Heteroskedasticity is reflected relative to the Homoskedasticity which is an important assumption of classical linear regression model to ensure that the regression parameter estimation have good statistical properties, that is, the random error term of general regression function satisfy the property of homoscedasticity which means they all have the same variance[14]. If this assumption is not met, namely: the random error term has different variance which is heteroskedasticity according to a linear regression model. The existence of heteroskedasticity would bring serious consequences for correctly establishing the regression model and statistical inference, therefore it is necessary to test the model to make sure whether heteroscedasticity exists. This model used the white test to verify:

TABLE 6: The result of heteroskdeasticity test: White test

F-statistic	0.970808	Prob.F (34,205)	0.5199
Obs*R-squared	33.28381	Prob.Chi-Square (34)	0.5025
Scaled explained SS	57.43597	Prob.Chi-Square (34)	0.0072

Test Equation:
Dependent Variable:WGT_RESID^2
Method:Least Squares
Date:12/02/13 Time:18:59
Sample:1 240
Included observations:240
Collinear test regressors dropped from specification
It can be seen from the table that the P-value of Obs*R-squared is 0.5199, greater than the significance level of 0.05. Therefore, null hypothesis could not be rejected showing heteroskedasticity did not exist.

The test for autocorrelation

The scatter diagram

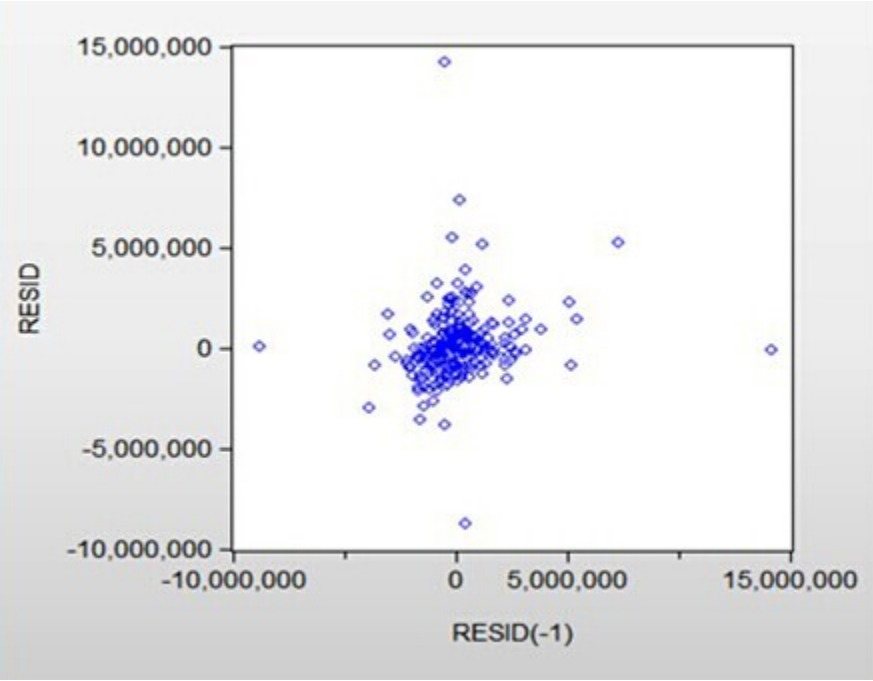

Figure 4 : The scatter diagram

It can be seen from the scatter diagram, data distributed around the original point, therefore no obvious positive correlation or negative correlation existed in the model.

The Test for Autocorrelation

Broad - Godfrey (BG) test, is an inspection more general to r order autocorrelation, which would allow the test of the relationship between the residual and some lag values.

Test Equation:
Dependent Variable: RESID
Method:Least Squares
Date:12/02/13 Time:19:04
Sample:1 240
Included observations:240
Presample missing value lagged residuals set to zero.
Weight series:AREA

TABLE 7: The result of BG test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2496866.	438722.4	-5.691221	0.0000
LOGDTCC	305886.2	54361.33	5.626908	0.0000
DTSC	-84.94182	43.32823	-1.960427	0.0511
AREA	-12432.09	2657.272	-4.678518	0.0000
NOR	254380.7	59282.43	4.290996	0.0000
FPM	-214939.6	62722.50	-3.426835	0.0007
ELE	200112.1	99249.38	2.016255	0.0449
NOBAL	-97451.32	71860.34	-1.356121	0.1764
RESID (-1)	0.031661	0.023851	1.327472	0.1857

It can be seen from the table that the P-value of RESID (-1) is 0.1857, greater than the significance level of 0.01. Therefore, null hypothesis could not be rejected showing first order autocorrelation did not exist.

The test for multicollinearity

In the process of regression analysis, if too many characteristic variables involves, certain correlation would exist between Characteristic Variables, leading to a converged impact of these variables on the dependent variable, making the collinearity exists between these variables. The emergence of collinearity, will affect the regression parameter estimation of the model, thus reducing the precision of the model. As econometric model, Characteristic prices will surely involve data collinearity, therefore eliminate the collinearity of data is the precondition of accurate model. The variance inflation factor inspection was used here. If the value of VIF is greater than 10, then severe collinearity problem might exist[15].

The VIF value of all variables have been derived and shown in the table below through Eviews software:
Variance Inflation Factors
Date:12/02/13 Time:19:00
Sample:1 240
Included observations:240

TABLE 8: The VIF value of multicollinear indices

Variable	Coefficient Variable	Uncentered VIF	Centered VIF
C	4.94E+11	122.9308	NA
LOGDTCC	7.17E+09	135.5020	1.200838
DTSC	3620.291	2.391987	1.162810
AREA	16326661	28.14714	6.464195
NOR	9.33E+09	48.47822	6.397049
FPM	7.03E+09	5.315926	1.561353
ELE	2.82E+10	4.693280	1.547188
NOBAL	1.40E+10	4.957982	1.851545

It can be seen from table, VIF value of all characteristic variables were far less than 10, therefore, no serious multicollinearity existed among the independent variables.

The test for stability

Chow Forecast Test was chosen to ensure that the model is stable using 220 data.

Equation:UNTITLED

Specification: Y C LOGDTCC DTSC AREA NOR FPM ELE NOBAL

Test predictions for observations from 220 to 240

TABLE 9: Chow Forecast test

	Value	df	Probability
F-statistic	1.099333	(21,211)	0.3505
Likelihoodratio	24.91929	21	0.2507

It can be seen from the table, P - value was 0.3505 which is not significant, showing that model is stable.

THE DISCUSSION OF RESULTS

The analysis of characteristic variables

The model has deleted three factors, that is, nearby schools, subway stations and greening rate which were important reference factors in practical choice of residence. However, they were hard to obtain and the information on the website were incomplete in the process of thinking and discovering. Besides, it was found in the actual search that the mixed categories of surrounding schools, including the elderly universities and colleges, made it difficult to quantify as it was difficult to define specific customer demand of school type. Surrounding schools'matriculating quality and teaching ability could not able to intuitively reflect from the website, thus the "good school" in parents'view could not be measured with specific parameters[16]. Due to the convenient Shanghai transportation, each house could be found adjacent to subway station in the data collection phase, making the factor of distances to the subway station was not significant. However compare to the distance to surrounding metro station, the distance to the city center could laterally reflect the degree of transportation convenience of residence location. In terms of greening rate, most residential areas showed 35% greening area on the website, while the rest of the communities'greening area value was of 0 which was relatively fuzzy, therefore this data was abandoned finally.

The Analysis of Model

Based on the speculation of model form to set up linear regression equation, then the equation was established by the success of data collection. In the BG-test, null hypothesis could not be rejected showing first order autocorrelation did not exist. In the test of multicollinearity, VIF value of all characteristic variables were far less than 10, therefore no serious multicollinearity existed among the independent variables. The P-Value of White test and Chow Forecast Test were all greater than 0.05. All test results showed that the model was built successfully.

The Effects of Sample Size to the Results

The impact of rejecting data overall was reduced by increasing the sample size. Conclusion was not significant after 100 data were collected at first data collection phase. To ensure the stability of model and significance of data, the amount of sample size are double collected after modification. The results always tended to synchronize along with the increasing sample size. Therefore, to obtain stable and significant results, larger sample size was needed.

SUGGESTIONS ABOUT POLICIES

For the government. Centralized extension of city should be enhanced to promote the suburban housing prices

Entertainment facilities, leisure parks and medical areas should be set up when planning land utilization, thus providing convenient life and transportation for surrounding residents by reducing the cost of living[17]. Finally the inner value of real estate located around would be increased. More centralized extension can control people's rigid demand for the downtown residence and curb speculation as well.

For the developers

Increasing housing space utilization by reducing the compartments

The design of more landscapes and balconies is suggested. High value of house always appear in those houses owning comfortable conditions with the spacious interior structure design[18].

Employing high quality property management before selling to improve owners'taste and their living convenience

It is necessary to insure the elevators and other amenities of life when make structural design. Owners'committee could be established who can choose the outstanding property management company according to their demands after sales. According to the data analysis, equipping new elevators can effectively enhance house values for those communities with old buildings, which has been proved to be a high rate of return of investing.

For the consumers

Blindly psychology should be avoided

When purchasing houses, consumers should consider locations and floors rationally. Blindly follow the fashion would not help to make the best choice. Such reasonable choices and consumptions could be considered: Leaving the bustling section properly, choosing house without elevators when the floors is relatively low, choosing house with higher utilization of space and less compartment[19], choosing house without parking space if not necessary.

Pay attention to those implicit factors that influence little on house price but great on the amenity for residence

Evidence shows higher greening rate, better social security, less traffic control and quiet environment are effective factors can be considered, which more attention should be paid to as it is helpful for consumers to choose a more comfortable house at a lower price.

APPENDIX 1

Data source : Search Room Net-ShangHai Station： http://esf.sh.fang.com/

DataNumber	Price	Area	NoB	NoR	Floor	Ele	NoBal	Year	FpM	RoG	DtSC	DtSub	DtCC
house001	32212	78	2	4	2	1	2	1995	2.50	0.30	700	800	1500
house002	43037	158	3	7	21	1	1	2006	3.50	0.40	720	500	1800
house003	38888	54	1	3	20	1	0	1997	0.50	0.20	500	700	750
house004	45000	140	4	8	5	1	2	2003	1.80	0.50	1100	1000	7800
house005	39927	138	3	7	16	1	4	2010	2.50	0.40	600	400	3000
house006	43709	151	3	7	5	1	2	2005	3.00	0.60	1300	500	6000
house007	26812	69	2	4	2	0	1	1996	0.50	0.30	3000	600	12000
house008	58064	93	2	6	6	1	2	2004	1.90	0.50	3000	1000	8000
house009	39927	138	3	7	16	1	3	2011	2.50	0.40	500	600	2800
house010	48233	166	3	7	20	1	1	2005	3.60	0.43	5000	1300	10000
house011	40000	117	3	6	12	1	1	2010	2.50	0.40	700	700	3000
house012	46014	87	2	4	26	1	1	1995	1.00	0.40	850	800	4000
house013	46237	71	2	4	9	1	1	2002	1.60	0.35	100	1000	5000
house014	49758	207	4	8	8	1	3	2005	3.60	0.43	3500	1300	9000
house015	30819	61	2	4	3	0	1	2006	1.30	0.25	1400	800	10000
house016	70945	148	2	6	20	1	2	2007	2.00	0.30	400	500	2000
house017	19355	93	4	9	6	0	1	2008	0.60	0.35	3000	700	17000
house018	29870	77	2	4	3	1	2	1997	1.20	0.38	800	1300	7000
house019	40000	125	2	5	1	1	2	2005	2.40	0.50	650	600	6500
house020	45000	111	2	5	15	1	3	1999	2.00	0.30	400	500	6000
house021	52000	198	3	7	5	1	1	2005	2.50	0.56	2700	1000	8000
house022	20000	54	2	4	2	0	0	1995	0.50	0.35	3100	800	13000
house023	20412	97	2	5	5	0	0	1995	0.60	0.35	2100	400	15000
house024	32258	248	4	10	16	1	3	2010	4.50	0.35	2000	1900	16000
house025	30000	75	2	4	5	1	1	1998	1.25	0.30	300	1000	6500
house026	17414	128	3	6	5	0	2	2008	1.20	0.40	800	800	15000
house027	38532	109	2	5	9	1	1	2003	1.60	0.40	1400	1200	13000
house028	18072	83	2	4	10	1	2	2010	1.60	0.35	1400	1300	17000
house029	13676	68	2	4	12	1	1	2004	1.45	0.45	2000	1500	14000
house030	16176	136	4	8	8	1	2	2009	1.60	0.40	600	13000	26000

DataNumber	Price	Area	NoB	NoR	Floor	Ele	NoBal	Year	FpM	RoG	DtSC	DtSub	DtCC
house031	21739	92	3	6	4	1	1	2011	1.80	0.50	2500	983	18000
house032	29473	95	2	5	5	1	1	2004	1.20	0.40	800	700	17000
house033	40853	82	2	5	6	0	2	2003	1.40	0.50	2300	1100	8000
house034	57257	210	4	9	9	1	3	2006	2.80	0.50	650	700	2000
house035	36111	108	3	7	1	0	2	2005	1.50	0.35	1400	600	11000
house036	35915	71	2	5	1	0	0	1999	1.00	0.47	800	1200	5000
house037	37974	158	3	7	18	1	1	2004	3.50	0.30	650	600	4000
house038	22727	88	3	7	3	0	2	1998	0.80	0.40	400	600	17000
house039	33333	48	2	4	6	0	0	1993	0.50	0.10	200	360	700
house040	25210	119	3	7	3	1	2	2004	1.50	0.45	550	600	15000
house041	43853	109	2	6	7	1	1	2005	2.10	0.40	1200	800	7200
house042	38125	80	2	4	16	1	1	2009	1.70	0.35	900	1200	8500
house043	40816	98	2	5	5	1	1	2008	1.40	0.43	500	1800	8000
house044	35733	72	2	5	1	0	1	2000	0.75	0.32	800	300	7400
house045	29594	148	3	7	15	1	2	2001	1.50	0.30	1100	500	6600
house046	35391	106	2	5	16	1	1	2010	6.00	0.35	800	800	3800
house047	55128	156	3	7	5	1	2	1996	1.10	0.42	2000	300	2900
house048	34737	95	2	4	17	1	1	2005	1.50	0.36	1600	300	9800
house049	36714	126	2	5	5	1	1	2006	1.96	0.40	1500	400	9000
house050	41608	143	3	6	22	1	2	2001	1.20	0.20	1500	1400	4800
house051	41726	139	3	7	21	1	2	2004	1.85	0.40	1200	900	6000
house052	38919	185	4	8	8	1	2	2001	1.80	0.42	900	1000	8000
house053	35955	89	2	5	20	1	1	2006	1.43	0.36	700	1600	10500
house054	33333	81	2	4	8	1	1	1997	1.40	0.30	800	800	9000
house055	38235	102	2	5	8	1	1	2005	1.30	0.43	700	700	12000
house056	42143	140	4	8	8	1	2	2002	1.30	0.51	1800	1800	11000
house057	41221	131	3	7	3	1	2	2005	1.63	0.35	600	600	14000
house058	31818	88	2	5	4	0	1	2000	1.20	0.30	1000	800	9800
house059	45000	120	2	6	8	1	1	2011	5.00	0.45	2100	500	10000
house060	36363	99	2	5	8	1	1	2006	1.43	0.30	700	1500	9000
house061	41786	108	2	5	12	1	1	2005	1.40	0.40	800	1500	8000
house062	31405	121	3	6	8	1	1	2002	1.90	0.42	800	800	14000
house063	33834	133	3	7	9	1	1	2004	1.20	0.30	1200	1200	8000
house064	40000	100	2	5	9	1	1	2002	1.50	0.40	700	900	7800
house065	42352	85	2	4	7	1	1	2005	1.57	0.35	1200	800	8000
house066	61594	138	2	5	22	1	2	2010	2.80	0.34	2000	900	4400
house067	44025	159	3	6	21	1	2	2004	2.50	0.31	1000	1000	2000
house068	51020	49	1	3	2	0	1	2000	0.50	0.20	500	600	2800
house069	35518	135	3	7	5	1	2	2005	2.50	0.30	2500	800	6000
house070	35398	113	2	5	15	1	1	2004	2.30	0.45	1800	1800	2600
house071	49804	84	1	4	32	1	1	2006	3.50	0.40	1800	400	2800
house072	37500	48	1	3	21	0	1	1990	0.50	0.35	700	700	1700
house073	45348	43	2	3	1	0	1	2002	0.50	0.30	800	600	1200
house074	44767	86	2	4	24	1	1	2003	1.50	0.20	1500	700	2800
house075	48458	114	2	5	4	1	1	2005	3.00	0.31	600	600	1000
house076	56704	169	3	7	6	1	2	2011	3.50	0.35	2400	1200	3200
house077	37209	43	1	3	5	0	1	1993	0.50	0.15	600	700	900
house078	41496	147	3	7	17	1	2	2004	2.00	0.40	800	300	1500

DataNumber	Price	Area	NoB	NoR	Floor	Ele	NoBal	Year	FpM	RoG	DtSC	DtSub	DtCC
house079	47826	94	2	5	6	1	1	2002	1.75	0.32	800	1000	1300
house080	42201	109	2	6	6	1	1	2002	1.55	0.35	3600	800	5200
house081	27410	166	5	9	14	1	2	2010	1.26	0.46	270	870	12000
house082	28584	85	2	4	5	1	0	2003	1.50	0.34	1300	2300	10000
house083	40233	44	1	3	6	0	1	1991	0.30	0.20	700	850	8000
house084	51413	78	2	4	5	0	1	1997	0.80	0.30	400	800	6000
house085	35000	161	3	7	1	1	2	2012	1.35	0.35	500	600	19000
house086	60897	156	3	7	8	1	2	2004	2.50	0.40	80	1200	5000
house087	51740	62	2	4	4	0	0	2000	0.80	0.35	200	790	6000
house088	37000	100	2	5	17	1	1	1998	2.80	0.40	600	800	5000
house089	27777	36	1	2	6	1	0	2005	1.95	0.30	700	1200	6000
house090	27647	85	2	4	9	1	0	1996	0.50	0.17	800	700	6000
house091	43010	93	2	5	26	1	1	2008	3.50	0.40	200	400	5000
house092	32544	169	4	8	7	1	2	1998	1.40	0.45	500	900	4000
house093	29727	129	3	7	4	1	1	1997	1.70	0.35	700	600	4000
house094	32198	32	1	2	4	1	1	1999	0.60	0.34	900	1100	7000
house095	36222	151	3	7	4	1	1	1999	1.15	0.60	500	800	6000
house096	25000	128	3	7	7	1	1	2005	1.20	0.35	1600	1375	7000
house097	46947	213	4	8	17	1	2	2005	4.00	0.69	1800	850	7000
house098	32330	133	3	6	6	1	2	2000	0.60	0.43	700	1200	11000
house099	49482	286	4	11	5	1	2	2007	3.80	0.40	200	900	6000
house100	51750	126	2	6	3	1	2	2008	2.80	0.30	20	1000	4000
house101	74418	172	4	8	13	1	2	2005	5.50	0.53	600	900	2500
house102	59239	92	2	5	5	1	1	1999	2.30	0.40	500	800	8000
house103	29889	130	3	7	4	1	1	1997	1.70	0.35	700	600	4000
house104	51740	62	2	4	4	0	0	2000	0.80	0.35	200	790	6000
house105	23910	82	2	4	17	1	1	1996	0.75	0.26	1500	1300	6000
house106	60897	156	3	7	8	1	2	2004	2.50	0.40	80	1200	5000
house107	35889	151	3	7	7	1	1	1999	1.15	0.60	500	800	6000
house108	51413	78	2	4	5	0	1	1997	0.80	0.30	400	800	6000
house109	40233	44	1	3	6	0	0	1991	0.30	0.20	700	850	8000
house110	32679	33	1	2	4	1	1	1999	0.60	0.34	900	1100	7000
house111	50102	287	4	10	11	1	2	2007	3.80	0.40	200	900	6000
house112	32198	32	1	2	4	1	1	1999	0.60	0.34	900	1100	7000
house113	52230	127	3	6	3	1	2	2008	2.80	0.30	50	1000	4000
house114	33658	41	1	2	1	0	0	1992	0.50	0.35	400	300	4500
house115	59239	92	2	5	5	1	1	1999	2.30	0.40	500	800	8000
house116	25600	125	3	7	6	0	1	2004	0.55	0.42	850	1500	8000
house117	30000	100	2	5	7	1	1	2010	1.26	0.46	2100	800	8000
house118	24409	127	3	7	7	0	2	2005	1.20	0.35	1600	1375	7000
house119	43010	93	2	5	26	1	1	2008	3.50	0.40	200	400	5000
house120	27777	36	1	2	6	1	0	2005	1.95	0.30	700	1200	6000
house121	7727	88	2	5	3	1	2	2005	1.30	40.00	3600	500	19000
house122	9913	116	3	7	3	1	2	2011	2.00	40.00	7000	1500	20000
house123	8593	64	2	5	7	1	1	2012	1.90	41.31	8000	1000	22000
house124	10600	300	4	10	1	0	4	2012	4.00	35.00	1400	2000	24000
house125	8235	85	3	7	17	1	2	2012	1.90	41.31	8000	900	21000
house126	8888	45	2	5	9	1	2	2012	2.00	1.20	1400	2000	15000

DataNumber	Price	Area	NoB	NoR	Floor	Ele	NoBal	Year	FpM	RoG	DtSC	DtSub	DtCC
house127	14000	120	3	7	10	1	2	2012	1.50	35.00	3000	1000	20000
house128	16479	71	1	4	12	1	1	2011	2.40	50.00	7000	800	15000
house129	17058	85	2	5	3	1	1	2010	1.70	35.00	1000	1000	17000
house130	13494	91	3	6	7	1	1	2012	2.40	35.00	800	2000	23000
house131	10480	104	3	6	2	1	2	2003	0.80	40.00	7000	1100	20000
house132	10087	103	3	7	4	0	0	2007	0.70	35.00	1400	2000	15000
house133	15600	50	1	4	5	1	0	2012	4.30	31.25	1400	700	9000
house134	7941	102	4	7	15	1	1	2012	2.00	35.00	1400	1400	15000
house135	16000	35	1	3	5	0	0	1987	1.30	15.00	2100	200	3000
house136	20847	182	3	7	17	1	1	2000	1.50	35.00	1500	100	2100
house137	21248	212	5	11	5	1	1	2001	1.20	45.00	700	700	5000
house138	46785	230	5	11	35	1	2	2009	3.23	46.00	1400	300	3000
house139	36135	136	3	7	14	1	2	2003	1.80	41.00	1400	300	4000
house140	34593	121	3	6	8	1	1	2003	1.80	41.00	1500	350	4050
house141	15714	56	1	3	7	1	1	2009	1.60	40.00	1500	1800	10000
house142	8300	87	2	5	10	1	1	2011	2.00	40.00	3500	1500	23000
house143	8494	101	2	5	8	1	1	2011	2.00	40.00	1200	1500	20000
house144	15340	88	3	6	11	1	1	2012	3.00	42.30	1500	1400	15000
house145	7765	94	2	5	3	0	1	2006	1.10	38.00	700	4000	25000
house146	7142	140	3	7	11	1	2	2007	2.00	1.20	1000	2000	15000
house147	17073	82	2	5	4	0	1	2005	1.00	35.00	700	600	10000
house148	10185	108	2	6	6	0	1	2007	0.70	35.00	700	3000	14000
house149	20428	103	3	6	18	1	2	2008	1.60	35.00	800	1100	7000
house150	7916	120	2	5	8	1	2	2011	2.00	40.00	1400	1400	24000
house151	16000	20	1	3	3	1	0	2010	1.75	35.00	1000	500	11000
house152	19105	123	3	7	4	0	2	2000	0.45	40.00	1400	1500	7000
house153	14307	65	2	4	6	0	0	1998	0.30	40.00	1000	1500	6500
house154	7144	106	3	6	1	1	1	2007	1.65	5.00	100	4000	24000
house155	9354	67	2	4	2	0	1	2006	1.10	38.00	700	4000	24000
house156	11730	52	2	4	2	0	0	1995	1.00	40.00	1000	1000	19000
house157	19090	110	3	6	1	1	1	2004	1.25	35.00	800	1300	6000
house158	10555	90	2	4	2	1	2	2012	3.00	35.00	800	3000	24000
house159	19318	88	2	5	5	1	1	2010	1.90	35.00	1000	800	11000
house160	15072	138	3	7	3	1	2	2004	1.96	40.00	800	200	10000
house161	18013	58	1	3	4	0	0	1998	0.50	0.35	300	900	10000
house162	22500	100	2	6	3	1	1	2009	1.76	0.4	700	1200	15000
house163	45000	140	4	8	5	1	2	2005	1.80	0.5	1400	1200	6000
house164	43709	151	3	7	5	1	2	2005	3.00	0.6	900	600	4000
house165	28369	141	3	7	1	1	2	2002	1.35	0.4	900	500	7000
house166	30556	108	3	6	4	0	1	2002	0.85	0.21	1000	1300	7500
house167	27820	133	3	7	4	1	2	2001	1.15	0.4	800	500	7000
house168	44667	146	3	7	16	1	2	2004	1.80	0.51	1100	600	6000
house169	41322	121	2	6	8	1	2	2005	3.00	0.6	1400	300	4500
house170	60838	394	5	12	27	1	3	2005	3.60	0.43	2100	1300	6500
house171	59259	270	5	10	14	1	2	2009	3.60	0.43	3000	1300	6000
house172	29629	135	3	7	12	1	2	2000	0.85	0.35	600	1200	4900
house173	40677	118	2	5	13	1	2	2004	2.55	0.65	300	850	5000
house174	48672	226	4	9	8	1	3	2005	2.80	0.6	1000	800	5100

DataNumber	Price	Area	NoB	NoR	Floor	Ele	NoBal	Year	FpM	RoG	DtSC	DtSub	DtCC
house175	27314	108	3	6	4	0	1	2001	1.05	0.48	1400	700	8000
house176	30097	103	2	5	15	1	1	1996	1.15	0.25	100	900	4000
house177	41891	148	3	7	9	1	2	2004	2.55	0.5	400	900	5000
house178	10917	109	3	7	3	0	1	2001	1.20	0.3	200	700	20000
house179	20548	146	4	8	5	1	3	2009	1.45	0.44	400	700	19000
house180	15555	108	2	6	6	0	1	2006	1.50	0.4	500	860	16000
house181	14230	130	3	7	5	1	1	2010	1.40	0.35	600	1000	19500
house182	43103	116	2	6	5	1	2	2004	1.80	0.51	1100	560	7000
house183	25043	115	3	6	14	1	2	2006	0.70	0.37	600	700	11000
house184	32061	131	3	7	7	1	2	2007	2.20	0.62	800	1100	9000
house185	25362	138	3	7	17	1	2	1996	1.15	0.25	100	230	4000
house186	37962	108	2	5	5	1	1	2004	1.60	0.45	600	700	5000
house187	34488	113	3	7	3	0	1	2001	1.80	0.43	850	350	7000
house188	40845	142	3	7	8	1	2	2004	1.50	0.4	1400	140	5000
house189	39090	110	3	6	2	0	3	1999	0.50	0.25	700	600	6000
house190	42487	104	2	4	6	1	1	2002	0.30	0.4	1400	500	5800
house191	47619	137	3	7	10	1	2	2004	2.55	0.65	350	870	5000
house192	28095	105	2	5	10	1	2	2003	4.50	0.42	1000	1500	8000
house193	37383	107	2	6	7	1	2	2001	6.35	0.7	800	1200	7500
house194	55555	108	2	5	11	1	3	2005	1.50	0.4	2000	140	4000
house195	44496	128	3	7	7	1	2	2004	1.80	0.4	1000	500	6000
house196	43975	102	2	5	18	1	2	2006	2.00	0.358	900	540	7000
house197	36290	124	3	7	3	1	2	2004	1.85	0.52	700	1300	6500
house198	60784	102	2	6	2	1	2	2004	5.00	0.6	750	800	3000
house199	40000	105	2	6	8	1	2	2012	5.60	0.35	800	630	10000
house200	29203	113	3	6	3	0	1	2005	1.50	0.35	400	850	11000
house201	32710	107	2	5	19	1	2	2000	1.4	0.36	1500	800	3900
house202	26140	35	1	3	5	0	1	1991	0.86	0.38	700	1083	2800
house203	29155	140	3	7	16	1	2	2004	1.85	0.45	1400	918	2500
house204	32989	97	2	5	12	1	2	2008	1.85	0.35	1200	800	4000
house205	42307	78	1	4	6	1	1	2008	2.4	0.35	1400	621	3000
house206	32456	77	2	4	11	1	1	2005	1.9	0.4	1400	615	2200
house207	32432	111	3	5	3	0	1	1997	0.5	0.4	1500	800	4800
house208	42411	99	2	6	15	1	2	2007	2.5	0.38	1400	620	2200
house209	29448	150	3	7	11	1	1	2004	1.72	0.4	1500	558	2100
house210	30369	54	2	4	4	0	1	2005	1.65	0.4	1500	500	2000
house211	48543	103	3	6	6	1	2	2005	1	0.4	1000	700	1500
house212	49574	98	2	5	15	1	2	2005	2.8	0.5	1000	648	500
house213	99601	251	5	10	1	0	2	2005	1	0.4	1200	700	800
house214	46341	82	2	5	22	1	1	2001	1.75	0.2	900	716	800
house215	45000	160	3	7	22	1	2	2003	1.75	0.04	1200	1000	1400
house216	47553	153	3	7	31	1	2	2002	4	0.06	800	953	1800
house217	51399	87	2	5	31	1	1	2001	1.9	0.33	700	750	2800
house218	36627	86	2	5	23	1	1	1998	1.5	0.25	1000	1100	3000
house219	64000	309	5	10	22	1	2	2003	3.8	0.48	800	800	800
house220	49655	145	3	7	12	1	2	2006	1.9	0.4	1000	900	3000
house221	41588	115	2	5	15	1	1	2005	1.8	0.4	1100	900	2800
house222	34566	147	3	7	11	1	2	2004	1.4	0.35	1200	700	2900

DataNumber	Price	Area	NoB	NoR	Floor	Ele	NoBal	Year	FpM	RoG	DtSC	DtSub	DtCC
house223	35988	92	2	5	18	1	1	2006	1.4	0.36	900	1000	3000
house224	56488	156	3	7	7	1	2	2005	1.6	0.4	800	900	2600
house225	58055	137	3	7	12	1	2	2003	1.7	0.4	700	700	2100
house226	28070	114	2	5	4	0	1	2000	1.6	0.3	1000	680	2400
house227	26068	117	2	5	15	1	1	2000	1.35	0.4	1200	960	3600
house228	26667	138	2	6	2	1	2	2008	2	0.33	1200	600	2800
house229	30172	58	1	3	12	1	1	2005	1.9	0.4	1200	700	2800
house230	33455	112	3	5	5	0	1	1996	0.6	0.4	1500	900	4800
house231	42411	99	2	6	15	1	2	2007	2.5	0.38	1400	620	2200
house232	29448	150	3	7	11	1	1	2004	1.72	0.4	1500	558	2100
house233	30369	58	2	4	8	1	1	2005	1.65	0.4	1500	600	2200
house234	48543	103	3	6	6	1	2	2005	1.2	0.4	1000	700	1500
house235	45278	155	3	7	31	1	2	2003	2	0.3	1100	900	1600
house236	33655	145	3	7	10	1	1	1996	3.8	0.3	1300	1000	2800
house237	36752	147	3	7	5	1	2	2005	1.8	0.36	1200	1000	2900
house238	52000	135	3	7	18	1	2	2006	1.8	0.33	900	800	2100
house239	41756	108	2	5	13	1	1	2005	1.4	0.3	800	900	2600
house240	29300	116	2	5	7	1	1	2004	1.3	0.4	1100	1000	3700

RESEARCH SUMMARY

The purpose of this paper is to build residential hedonic price model to analyze factors that influence Shanghai housing prices. The article did a literature review on hedonic price model and its theories. Combined with the development of Shanghai real estate market, this paper put housing Hedonic price model forward. Based on this model, factors were classified into three categories including location characteristics, structure characteristics and neighborhood environment characteristics. Seven characteristics quantified in two kinds of methods were selected as the independent variables in the model[20]. From the residence characteristic point of view, housing hedonic price model was constructed by using regression to analyze factors that affect housing prices. This empirical research in Shanghai housing market had gotten some valuable conclusions. Systematically selecting the characteristic variables affecting housing prices in Shanghai, and encoding and quantifying the quantitative and qualitative characteristics variables, thus constructing housing hedonic price model. Next, coefficients of the various factors were obtained by housing hedonic price analysis that comprehensively reflected the infrastructure sophistication, environmental comfort level and transportation convenience of residential area, thus providing more targeted policies to government. Real estate developers could also make comprehensive pricing instead of the traditional market comparison approach based on these factors and their influences to make the price conform to market demand as well as consumers'psychological expectation better. In addition, housing hedonic price model showed the level of importance of each factor for most consumers and provided references for new consumers. Overall, this study provided a basis and data support for government's decision-making, Real estate developing and consumers purchasing. Since the data was collected originally, authentically and recently, this paper could exhibit high practical significance and reference value.

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