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Elasticity of Demand for Urban Housing in Western China Based on Micro-data - A Case Study of Kunming

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Abstract

Purpose - Considering the importance of housing needs to real estate market, domestic studies on real estate prices from the perspective of demand are basically based on macro-data, but relatively few are associated with micro-data of urban real estate demand. We try to find a reliable relation of elasticity of demand and commercial housing market.

Research design, data, and methodology - In this paper, we have derived housing demand theoretic method and have utilized micro-data of residential family housing survey of downtown area in Kunming City in October, 2015 to estimate income elasticity and price elasticity of housing demand respectively and make a comparative analysis.

Results - The results indicate that income elasticity and price elasticity of families with owner-occupied housing are both larger than those of families with rental housing. Income elasticity of housing demand of urban residential families in Kunming is far below the foreign average and eastern coastal cities level, however, the corresponding price elasticity is far higher.

Conclusions - We suggest that housing affordability of urban families in western China are constrained by the level of economic development, and the current housing price level has exceeded the economic affordability and psychological expectation of ordinary residents. Furthermore, noticing the great rigidity of housing demand, the expansion space of housing market for improvement and for commodity is limited.

Keywords: Microcosmic Data, Housing Needs, Elasticity of Demand.

JEL Classifications: F014, F32.

1. Introduction

Since the implementation of reform and opening policy in China, the housing problems have been a hot topic in society and academic community. With the deepening of urbanization, urban housing demand is also growing. To some extent, housing needs can verify whether the development of housing market of an area is reasonable, while demand for housing reflects on housing consumption. From 2002 to 2012, per capita disposable income of the actual urban residents increased 142.9 percent and per capita living space increased from 24.5 square meters to 32.9 square meters with an average annual growth rate of 2.99%. But at the same time, high prices and low pay capability about urban housing social problems have become increasingly prominent and sustainable economic development has also been a challenge.

Demand for housing has become an important research area since it began to rise in the 1960s and it was proposed at first time by Muth(1960). Because of differences in data

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and estimation methods, the scholars have also come to different conclusions to housing demand elasticity estimate. From the beginning of the 1980s, some scholars began to survey the applicability of the theory of housing demand under neoclassical demand theory and stress the importance of the special problems of housing as a commodity. Arnott(1987) summarized the particularity of housing as necessities, durability, importance, indivisible, spatial fixity, the dispersion of the market, the importance of asymmetric information, the importance of transaction costs and so on. Henderson and Ioannides(1983) constructed a precise mathematical model based on maximization of utility, by which effects on housing selection pattern brought by differences in opportunity costs induced by externity, taxation and incompleteness of capital market can be analyzed. Since 1990s, research of housing demand has been deepened in selecting models mainly considering different factors which influence housing demand. Goodman (1995) took impact of residential mobility on selection of housing pattern into account and Toussaint-Comeau and Rhine(2004) added location factor to housing consumption and the composite rent or buy model, both of which persistently explored and deepened edges of housing demand theory. Patrick Bajari, etc.(2013) combined previous studies of housing demand conducted by other scholars, and built a dynamic model on housing demand using data from PSID(Panel Study of Income Dynamics) which embodied elements such as non-convex adjustment costs, credit constraints and uncertainty from income and housing price.

These studies suggested that the housing demand theory in international academic field after nearly fifty years of research has made a great breakthrough. In contrast, the research on housing demand in China is still at a relatively early stage, especially the lack of rigorous and empirical research. Due to the lack of a micro sampling data, the domestic research on estimates of housing demand elasticity mostly bases on macro statistics, which mainly comes from the time series data and cross-sectional data of city residents consumption expenditure structure in China Statistical Yearbook. CHEN Zhao(1997) used the cross-sectional data from 1992 to 1995 of national each income group to estimate the income elasticity of housing demand which appears as 1.2. ZANG Xuheng(2001) and other established ELES (extended linear expenditure system) model to estimate the income elasticity of all kinds of consumer goods by the time series data of city residents consumption expenditure structure, which the income elasticity of housing needs was 0.73. ZHENG Siqi and LIU Hongyu(2005) took 9781 section sample data of housing residents in Beijing City in 2000 to accurately estimate the income elasticity of housing demand of residents, which results showed that the income elasticity of home buyers in Beijing City was 0.86. these results is relatively high, and even data in some years is too high, so using the appropriate data to estimate housing demand elasticity accurately can reflect the real demand of housing. Accurate measurement of housing demand price elasticity and income elasticity will be beneficial to analysis the following questions. First, it is possible to quantitatively examine the relationship between household income and housing consumption levels such as to judge the development stage of urban housing consumption. Second, it can estimate and compare the different characteristics (such as different income and age) of housing demand price elasticity and income elasticity of households, which analyze the sensitivity of housing consumption to household income and price levels and the differences in different populations. Third, it can be used to predict housing consumption growth rate with the increasing of household income and price level.

With sustained development of economic in China, urbanization continues to increase, resulting in rising prices. In addition, a special Chinese situation is that state control of land supply is very strict, which to some extent can affect the price. From the cultural point of view, due to the temptation of home ownership, people are more willing to purchase house rather than rent. Therefore, housing demand research from price elasticity and income elasticity has a strong practical and theoretical significance. As a typical tourist city, the housing development structure of Kunming city is characteristic. Since 13th Five-Year, Kunming municipal government has increased the protection of housing construction and supply of rental housing, so as to drive the development of owning housing and rental housing demand in Kunming City and reasonably guide housing demand to promote regional economic development. Under the current research situation, using the micro survey data in Kunming city housing residents in October 2015 we adopt the international popular models and methods and through derivation and calculation to further study housing demand elasticity in Kunming city. As a result, we try to provide the basis development policies for the development of the city housing by comparison and validating the previous scholars' research results.

2. Theoretical Method and Derivation

In this paper we will use the new classical micro economic demand theory which housing is different from the characteristics of general merchandise, but the housing can be simplified as homogeneous, separable housing services. The simplified study of the housing needs mainly focused on

housing demand income elasticity and price elasticity estimates based on empirical research in the 1960s.In this paper, we will analysis housing situation and development status through estimating on the income and price elasticity of Kunming City.

In simplified empirical research of housing needs, we have made important assumptions on the housing market, consumer behavior and housing characteristics, including that the housing market is perfectly competitive market and that consumers exit continuous and determine the preference curve for housing and non-housing goods and that consumer demand is not limited by other man-made, such as financing constraints and that housing is abstract service for the housing market at an equilibrium set by the new classical economics.

Based on these theories, we make the following specific assumptions: (A)The housing market is perfectly competitive market. (B)Housing and other consumer goods have a continuous phenomenon and determine the preference curve. (C)Consumers take utility maximization as the goal and suppliers take profits maximization as the goal. (D)The market is in a state of equilibrium. According to these assumptions we can list the housing demand equation.

$$\mathrm{Q} = \mathrm{q}(\mathrm{Y}, P_h, P_x, T) \quad (1)$$

In equation (1) Q is the amount of housing services, Y is family income, P_h is the price of housing services, P_x is the price of other goods and services, T is the family's preferences. According to this model and the data, we can estimate income elasticity and price elasticity of housing demand. Because equation (1) reflected in the family of t value is difficult to directly observed, many studies suggest that T is a function of household characteristics H.

$$T=t(H) \quad (2)$$

Here *H* include age, marital status, family composition and other factors. In this way, the housing demand equation has evolved into

$$\mathrm{Q} = \mathrm{q}(\mathrm{Y}, P_h, P_x, H) \quad (3)$$

According to the assumption of the housing demand equation, housing is abstracted as housing services[2] which comes into homogeneous, continuous Goods. At the same time, housing consumption demand is equal to housing consumption in the balanced condition, so here housing demand issues will be examined from the housing consumption perspective. At home and abroad housing service function is more common to use equation (4).

$$\mathrm{Q}' = e^{\beta_0} Y^{\beta_1} P_h^{\beta_2} P_x^{\beta_3} LC^{\beta_4} e^{\mu} \quad (4)$$

Under the equilibrium condition, the housing consumption reflects the housing demand, therefore, the housing demand function is equal to the housing service quantity multiplied by the housing service price.

$$E_h = P_h \cdot Q' \quad (5)$$

We joined formula Q′ into the formula (5), and simplify the process to obtain the results.

$$E_h = e^{\beta_0} \left(\frac{Y}{P_x}\right)^{\beta_1} \left(\frac{P_h}{P_x}\right)^{(\beta_2+1)} P_x^{(\beta_1+\beta_2+\beta_3+1)} LC^{\beta_4} e^{\mu} \quad (6)$$

According to conditions of homogeneity of variance $(\beta_1+\beta_2+\beta_3 = 0)$, we obtained the following results.

$$In\left(\frac{E_h}{P_x}\right) = (\beta_0+\beta_1 In\left(\frac{Y}{P_x}\right) + (1+\beta_2) In\left(\frac{P_h}{P_x}\right) + \beta_4 InLC + \mu \quad (7)$$

E_h shows housing consumption expenditure per unit time. Q′, Y, P_h, P_x are the same with the above. LC represents the demographics of the life cycle of family and μ is the error term. To estimate the coefficients in equation (7), what mainly need to do is to estimate family income Y, price of housing services P_h, the demographics of the other goods and services P_x and on behalf of the family preference LC.

2.1. Household Income Estimates

The importance of family income on housing demand is beyond doubt. Some international scholars carried out a lot of discussion after the birth of the housing demand equation. For excessive discrete problem of income elasticity of housing demand, Leeuw and Ellwood have conducted in-depth analysis which they argue that the impact of housing demand income should be the permanent income, rather than the current income.

First, permanent income of households should be estimated before the establishment of the housing demand equation. Due to the general cross-sectional data in the sample, here we will adapt family characteristics regression method to estimate permanent income. This method starts

[2] Housing services is a definition of the early economists in order to measure the simplified housing demand. A unit of housing services is defined as a standard output of a unit of time in the housing service.

from the age of householder, human capital and non-human capital which impacts permanent income of household and takes temporarily income as the random error terms which is not related to lasting income, to establish income equation which is as follows.

$$\mathrm{INC}_i = PERINC_i + \mathrm{TI}_i = f(AGE_i, HW_i, A_i) + TI_i \quad (8)$$

In equation (8), INC represents current income, PERINC stands for permanent income, TI shows temporary income, AGE represents the age of householder or years of employment, HW is human capital including education, professional experience and employment status. A_i represents non-human capital which mainly includes other assets in addition to housing. According to the family features regression method, we will get the estimate result of permanent income PERINC of micro sample.

2.2. Housing Price Estimates

In equation of housing demand housing, prices should be the price of housing services, rather than the price or rent per unit area. Besides, the price of housing services did not change due to the location or the quality of housing. Estimates of the housing services price can be achieved through the Hedonic model which can also get the value of housing consumption. Due to model (7) for estimating housing demand equation, we need not to measure housing consumption in this paper.

By Hedonic model method to calculate the housing stock prices and housing service prices, we need to set some housing characteristics impacting housing consumption expenditure $\mathrm{X} = (X_1, X_2, \cdots, X_n)$, including housing structural features, neighborhood environment and geographical situation. Then we will take housing consumption expenditure (rent) or the housing price (Marketp) as dependent variable, the housing characteristic x as the independent variables to establish the Hedonic model. In this part, owner occupied housing and rental housing will be estimated.

2.2.1. Housing stock prices of owner occupied housing

In the Hedonic model of owner occupied housing, we will take current housing market value as the dependent variable and housing construction area and housing years as the independent variable and built double logarithmic model to estimate Hedonic model according to the available data in the questionnaire.

$$\log(VALUE) = \beta_0 + \beta_1 \log(HSIZE) + \beta_2 \log(HAGE) + \varepsilon \quad (9)$$

2.2.2. Housing service price of rental housing

In Hedonic model of rental housing, we also take current housing market rent as dependent variables, housing construction area and housing years as independent variables and construct the double logarithmic model to estimate Hedonic model.

$$\log(RENT) = \beta_0 + \beta_1 \log(HSIZE) + \beta_2 \log(HAGE) + \varepsilon \quad (10)$$

Stock price of owner occupied housing and service price of rental housing can be estimated through the above Hedonic model.

2.3. Other Commodity Prices

By Kunming price index in the 2015 October announced by China Bureau of Statistics, the consumer price index and total household equipment and maintenance services consumer price index, we can calculate the result. The calculation equation is as follows.

$$P_x = (a - b^* \cdot W_H)/(1 - W_H) \quad (11)$$

Among them, **a** represents the consumer price index of urban residents, **b** stands for household equipment and maintenance services consumer price index, W_H shows the percentage of disposable income accounted for household equipment and maintenance services spending.

2.4. Family Population Preference Estimate

Family preference is mainly influenced by age, marital status and family composition. Because the population of family can directly affect the family housing area size, then we mainly considerate family housing area (FSIZE), age of householder, and establish corresponding function: $\mathrm{LC} = \mathrm{f}(\mathrm{FSIZE}, \mathrm{AGE})$ and then estimate on the household demographic characteristics factors.

2.5. The Estimate of the Housing Demand Elasticity

After estimating household income, housing prices and other commodity prices and family preferences, according to the processing and estimation of each variable in the housing demand equation in front, now we can establish housing demand equation which is as follows.

$$In\left(\frac{E_h}{P_x}\right) = (\beta_0 + \beta_1 In\left(\frac{PERINC}{P_x}\right) + (1 + \beta_2) In\left(\frac{P_h}{P_x}\right) + \beta_3 InFSIZE + \beta_4 InAGE + \mu \quad (12)$$

Because the income elasticity is the changed percentage in income caused by the percentage of changing in demand and the price elasticity refers to the changed percentage in price caused by the percentage of changing in demand. In equation (12), β_1 stands for the income elasticity and β_2 represents price elasticity. As is all known, housing income elasticity and price elasticity has a reasonable range, and is the mirror of housing market development. And that the elasticity is too large or too small can reflect the change of housing demand. As Allen C. Goodman (1988) studied the affection of the housing price, permanent income, rent or buy and housing demand, he took all housing demand elasticity into the interaction effect between the four stages in the model which shows that prices and income have very important influence on the tenure choice model and social demographic variables (such as age) of the housing demand equation also has a very important and complicated Influence. By the above micro index based on the equation of housing demand for housing income elasticity and price elasticity, in the understanding of Kunming City housing consumption the government can reasonably guide housing development direction and take certain measures to digest the current urban housing stock, so as to guide the sound development of real estate.

3. Empirical Test and Analysis

According to the above theoretical method to estimate the housing needs of Kunming City, this paper uses the household micro data of central city in Kunming to estimate results in October 2015, which includes 2075 valid samples.

3.1. Data Description

The data in this paper is obtained by the method of sample survey which sample survey means investigate and analysis the part of the sample from all units of the study and use the features of sample to infer the features of overall. We put the central city of Kunming as the overall surveys which were divided into 156 areas. As a result, we investigate randomly real estate and residential district of the inside area. The results show that we mainly investigate mid-range residential area, involving nearly more than 50,000 families which the effective sample number is 2075. In the end, we've put together the appropriate survey data, and get the corresponding indicator data.

<Table 1> Analysis of the survey population

Family types	Owner-occupied housing	Rental housing	—	—	Total samples
	1750	325	—	—	2075
Community category	Ordinary residence	High-end residence	others	—	
	1678	324	15	—	2075
Distribution of house hold registration	Municipality nonfarm account	City agriculture accounts	Non-city non-agricultural accounts	Non-city agriculture accounts	
	1399	155	324	196	2075
Age distribution	18-35 level	35-45 level	45-55 level	55-65 level	
	766	492	346	471	2075
Education level	Junior high school or below	High school	Undergraduate	Master or above	
	404	948	607	116	2075

From the survey sample we can see there are mainly ordinary residential in survey samples, accounting for about 80%. There are mainly urban household families in survey population and age distribution is mainly concentrated in the 45 years. In education level people are basically high school education or above, accounting for about 80%.

3.2. The Accurate Definition and Calculation Method of the Main Variables in the Housing Demand Equation

The estimates of income elasticity and price elasticity are easy to implement according to the formula (7), but what is the difficulty is how to accurately define and calculate housing consumption, household income, housing prices

and other commodity prices the several variables. This is the problems of the housing demand equation which was focused by international academic circles since the housing demand equation was born.

In this paper we use micro survey sample to estimate permanent income by the family characteristics regression, where the dependent variable takes the total family income (*INC*), independent variables include the virtual variable $YEAR_i$ to reflect housing age corresponding to the age range of 18-35 years, 35-45 years, 45-55 years, 55-65 years old, the virtual variable EDU_i to reflect the education level of household; the virtual variable $DANW_i$ to reflect employment field of household(shown in the *appendix 1*), and the virtual variable $FSIZE_i$ to reflect the family population. Model estimation results are shown in <Table 2> (using the weighted least squares method, after correction of heteroskedasticity).

<Table 2> Results of permanent income estimates (sample size 2075)

Coefficient estimation	Independent variable	T statistic	P value
0.8918	*YEAR1*	30.9561	0.0000
0.5502	*YEAR2*	20.0663	0.0000
0.2338	*YEAR3*	6.25742	0.0000
-2.3612	*EDU2*	-61.7397	0.0000
-0.9317	*EDU3*	-21.3406	0.0000
1.0987	*EDU4*	28.7304	0.0000
2.3632	*EDU5*	56.0391	0.0000
3.5979	*DANW1*	80.8658	0.0000
3.0470	*DANW2*	58.5118	0.0000
0.6891	*DANW3*	9.6001	0.0000
2.2709	*DANW4*	49.9596	0.0000
-1.5730	*DANW5*	-6.0470	0.0000
2.5489	*DANW6*	11.2827	0.0000
0.5239	*DANW7*	9.1588	0.0000
-3.2911	*DANW8*	-50.2007	0.0000
0.3363	*FSIZE*	41.8903	0.0000
5.9178	*C*	103.1681	0.0000
0.9919		Adjusted R^2	
15844.8800		F statistic	

From the table, we can see the P value for each dummy variables are small and the adjusted R^2 is also close to 1, which indicates that the overall estimates result of the model is good. According to the estimation results in <Table 2>, we can argue that the overall estimate result of permanent income is significant and the model fitting degree is high.

The virtual variable $YEAR_i$ to reflect the age of householder consecutively decrease, which indicates that persistent income EDU_i is lower with the increase of householder age. The virtual variable to reflect the education level of household consecutively increase, indicating that the higher the level of education is, the higher the lasting income is. The virtual variable $EANW_i$ to reflect employment field of household have largely gap, which shows the occupation for family income influence is very obvious. That the coefficient of *FSIZE* is positive shows the population of household is proportional to lasting income. Using the model (8) and the results in <Table 1>, it is used to estimate the lasting income of each family.

According to the model (9) with valid data of owned housing (1700 samples in total), standard features of owned housing are characterized by the mean value as the standard. As a result, the construction area in standard housing is 109.845 square meters and the age of house is 7.789 years, and the stock price in standard housing is 8355.27 yuan per Square meter.

According to valid data of rental housing in model (10)(324 samples in total), the estimation results of Hedonic model of housing services price shows that the cost of housing services in each family housing is clear. According to the family housing standard, housing characteristics, housing area and real age were taken mean value which the area of housing is 80.467 square meters and the age of house is 7.514 years, then we can compute that the price of standard housing services is 15.82 *yuan* per month `per square meters in rental housing market. In addition, according to the model (11), estimators are derived for other goods and services prices Px is 103.58.

3.3. The Estimation of the Housing Demand Elasticity in Kunming

In 2015 households survey micro data of Kunming City include 1700 owner occupied households, so the sample size which include 1700 is estimated. Housing demand equation results are shown in <Table 3> (white test results show: the OLS estimation results are heteroscedastic. So here we use weighted least squares estimation).

According to the results in <Table 3>, it shows that the housing demand model overall is good, the income elasticity is 0.175 and the price elasticity is -3.183. That the value of income elasticity is less than 1 indicates that housing demand lack of flexibility to income changes, namely in Kunming City housing demand to income sensitivity is relatively small in owned housing family. This shows that housing demand of Kunming residents in the rigid demand occupy a larger proportion and investment demand is small.

The price elasticity is -3.183 and its absolute value is greater than 1, which showed that changing in housing demand is elastic to change in the housing price. In other word, which in Kunming city housing demand are very sensitive to housing prices in owner-occupied housing family and slight decline in housing prices (rise) can lead to demand for housing residents greater increase (decrease). The coefficient of *FSIZE* is positive which shows that the larger family size is, the greater the demand for housing is and the coefficient of *AGE* is negative which indicates that the older the age of householder is, the smaller housing demand is.

In addition, in 2015 the micro survey data of households in Kunming include 324 rental households, so the sample size here is 324. The estimation results of housing demand equation shown in <Table 3> (*White* test show that the OLS estimation results exist heteroskedasticity phenomenon, therefore we use least squares estimate in table 2) shows that family housing demand significantly is fine in overall rental model which the value of income elasticity is 0.075, the price elasticity value is less than 0.1 and the income elasticity of housing demand is -2.472. The results show that income demand is lack of flexibility in the housing rental households. In other word, in Kunming City the sensitivity of housing needs to the family income is very small in the housing rental households. Revenue growth in such families don't encourage the expansion of its rental consumption, but turn to purchase house. The price elasticity is -2.472 and its absolute value is greater than 1 which shows that the change of housing demand is easily affected by the change of housing price. Namely, In Kunming city slight decline in housing prices (rise) can lead to greater increase (decrease) in demand for housing residents.

<Table 3> the estimation results of owned households and rental households

independent variable	owned household		rental households	
	Coefficient estimation	P value	Coefficient estimation	P value
C	3.5805*** (1097.16)	0．0000	2.5812** (26.16)	0.0000
$\ln(\frac{PERINC}{P_x})$	0.1757** (246.93)	0．0000	0.0752* (4.06)	0.0000
$\ln(\frac{P_h}{P_x})$	2.1830* (-756.54)	0．0000	-1.4719* (-47.37)	0.0000
InFSIZE	0.0948** (146.38)	0．0000	0.0625** (6.78)	0.0000
InAGE	-0.0105* (-18.53)	0．0000	-0.0999* (-6.99)	0.0000
Adjusted R^2	0.9998		0.9509	
F statistic	4018590		1565.5920	

*** 0.01 Significant level，** 0.05 Significant level，* 0.1Significant level

The P values of each variable co-efficients are significant from the estimate result and the statistical test value of the model obviously are significant, indicating that the estimates result of coefficient is good. From equation (a) and (b) estimation results indicate in Kunming City income elasticity of owned family is 0.175, price elasticity is -3.183 and income elasticity of rental family is 0.075 and price elasticity is -2.472. According to correlation theory of elastic economics, we can draw the following conclusions.

3.3.1. Private housing in terms of housing demand is more flexible than the rental family

Income elasticity in owned housing and rental housing are both less than 1, which belongs to the inelastic range. The two absolute values of the price elasticity are greater than 1 which belong to the scope of the elastic and absolute values of income elasticity and price elasticity in owned housing family are all higher than rental housing family, which from

the point of empirical analysis we verify that the owner occupied housing meet the theory of household consumption and investment demand. Rental family is just to meet the consumer demand.

3.3.2. The elasticity of cross section data is estimated to be long term elasticity

According to Li Zainai's research, that it uses time series data to estimate the elasticity value is short-term elasticity and that it uses cross-sectional data to estimate the elasticity value belongs to the long-run elasticity. Demand theory of western economics shows the long-run elasticity tends to be larger than the short-term elasticity for the general consumer goods and the long-run elasticity will less than the short-term elasticity for housing as durable consumer goods.

4. International and Domestic Comparison

Although in some foreign countries the urbanization rate has been very high and the problem of housing demand is no longer a hot topic, contrast to developed countries, we can see the problems and gaps in the Chinese housing demand and better guide the domestic housing healthy and sustainable development. American scholars estimated income elasticity of owned households between 1.1 to 1.5 through (a city or the city) multiple samples and the price elasticity is roughly between -0.72 and -0.67 (Zheng, 2007). De Leeuw (1971) summary that the estimate of income elasticity values of scholars is between 0.6 and 2.1. Lee, Tong-Hun and Kong, Chang-Min (1977) use representative family panel data of the United States from 1968 to 1972 to come a conclusion that it shows the income elasticity of owned housing is 0.87 and the price elasticity is -0.57, the income elasticity of rental housing is 0.695 and the price elasticity is -0.555. Ermisch. Findlay and Gibb (1996) based on Hedonic Price Model, by the data of six major urban agglomerations in British from 1982 to 1989, use two-stage least squares to estimate price elasticity and income elasticity of housing demand that shows the income elasticity is 0.517 and price elasticity is -0.426.According to data of the World Bank, in Korea (1976) income flexibility of owned housing is 0.62 and price elasticity is -0.05, income flexibility of rental housing is 0.42 and the price elasticity is between 0.78 and 0.06.In Bogota, Colombia (1978), income elasticity in own family is 0.78, price elasticity is -0.44,in rental housing income elasticity is 0.72,and price elasticity is -0.28. In Salvador, Brazil (1980), in own family income elasticity is 1.05 and in family rental is 0.42.

In contrast, in our country city income elasticity of owned household is obviously low, which it doesn't far below the level of developed countries, but it also is lower than some developing countries. From the domestic similar research, Zheng Siqi (2007), using micro data of Liaoning, Guangdong, Sichuan provinces investigation team , estimates own family housing demand income elasticity is 0.655.The price elasticity is -0.490,the income elasticity of rental households is 0.499 and the price elasticity is -0.309.Chen Yong, John M. Clapp, and Dogan Tirtiroglu (2011) use 10252 sales records micro data from 2004 to 2006 in Shenzhen Futian, Longgang two residential, to calculate the family housing demand price elasticity of -0.81 to -1.589.

Compared with eastern and central city, self-owned housing and rental housing income elasticity of demand of Kunming urban residents is low, and price elasticity is larger. As less developed western city in the economy, income of family housing demand constraints larger and rigid demand for housing far outweigh the general level, even greater than China's eastern coastal city. For housing price sensitivity is also much higher than the level of foreign countries and the eastern city which is our housing policy formulation that we must give full attention to the problem.

5. Conclusions and Acknowledgements

5.1. Conclusions

According to the above empirical analysis, the housing needs of urban families in Kunming have the following characteristics.

(1) owned households in terms of housing demand is more resilient than rental households. From the estimate result, regardless of the income elasticity and price elasticity, owned households are more sensitive than rental households. This may be due to their own housing. Specifically, housing needs is not only to meet their consumption needs, but also need to meet their investment needs which appear greater flexibility in space than rental households which only satisfies consumer demand.

(2) compared with the existing domestic and international research results, in Kunming family income elasticity of housing demand significantly is less than foreign general level and the eastern coastal city. price elasticity was significantly higher than that of foreign general level and the eastern coastal city. It illustrates family is limited by the level of economic development and the current price level has exceeded the ordinary residents economic bear ability and psychological expectations in China's western city.

(3) According to the formula (7), we use the macro data

from 2000 to 2012 in the statistics department to calculate that income elasticity of housing demand is 0.75 in Kunming and the estimation results of the price elasticity is -0.36.Compared with micro data and macro data, we found that the estimate of income elasticity in long-term(micro cross section data) is less than estimation result in the short-run (macroeconomic time series data), and in long-term price elasticity is greater than in the short-term elasticity. For a family, the purchase of housing is a long-term decision and income also is measured by the permanent income standard rather than temporary income so that in the long-term income elasticity is less than in the short-term elasticity is reasonable. On the other hand, that the price elasticity is greater than in the short-term elasticity shows that the change of house prices in the short term can hardly change city families to purchase house in Kunming. So, to stabilize property prices and then to stabilize purchase anticipation will be important way to expand the housing market demand for Kunming as a western city.

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Appendix

A. Variable name and basic statistics in the field of employment

variable	variable meaning	value method
DANW1	field of employment	virtual variable, government offices, party organizations, enterprise, institutions principal is 1, other is 0
DANW2	field of employment	virtual variable, professional skill worker is 1, other is 0
DANW3	field of employment	virtual variable, staff and associated personnel is 1, other is 0
DANW4	field of employment	virtual variable, commercial and service personnel is 1, other is 0
DANW5	field of employment	virtual variable, agriculture, forestry, animal husbandry, fisheries and water conservancy production personnel is 1, other is 0
DANW6	field of employment	virtual variable, production, transport equipment operators and related workers is 1, other is 0
DANW7	field of employment	virtual variable, retirees is 1, other is 0
DANW8	field of employment	virtual variable, Migrant Workers is 1, other is 0