A Study on The Chinese Real Estate Market and Inter-regional differences of the Influential Factors on the Price of Housing

WANG, Peng  
Research Assistant, Urban Planning and Real Estate Laboratory, University of Seoul  
(e-mail: wp@uos.ac.kr)

KANG, Myoung-Gu  
Professor, Department of Urban Planning and Design, University of Seoul  
(e-mail: mk@uos.ac.kr)

Abstract  
After the implementation of this system in 1998, the housing price kept soaring. From 2003 to 2005, the average housing price grew by 10% annually, and a growth of 14.9% was recorded in 2007. From 2000 to 2010, the average residential trading price greatly fluctuated in the Chinese real estate market. The State Council of The Central People's Government of China commissioned many policies from 2005-2012 to stabilize housing prices. However, they had little success, because real estate prices continued to rise and fall in a vicious pattern. This thesis asks: what are the factors that affect the price of housing in the Chinese Real Estate Market? And what is the different of east economic zone and west economic zone about the influential factors on the Chinese real estate market? Panel data was selected from 1999 to 2010 about 35 large and medium-sized Chinese cities. From this panel data, the random effects model was used to analyze the market factors of supply and demand, as well as the country's main monetary policy. The results of this paper identified four market factors and two monetary policy factors. The Market factors were the long-term residential population of the city, the per capita GDP, the over incomplete residential areas, and the cost of house price. The monetary policy factors were the money supply and the interest rates on loans.

Keywords: Chinese Real Estate Market, Chinese Housing price, Panel Data Analysis, Fixed effects model, Eastern economic region, Central and Western economic region.
I. Introduction

1. Backgrounds, Study Objectives

Since China established a national housing supply system in the 1950s, the government shoulders full responsibility for providing housing for citizens and housing construction was thus included into the country's construction plans. Local authorities as well as government-owned enterprises and institutions were financed from the national budget of housing to build public housing and distribute them to citizens, who enjoyed public housing by paying only a small amount of rent.\(^1\) The public housing system in which the country provides housing caused numerous problems including supply shortages, small living areas, poor quality and a lack of maintenance.\(^2\) Major reasons for these problems were rapid population growth, a lack of housing investment and supply, and disorderly use of land.\(^3\) Up to the end of the 1970s, the government was no longer able to provide sufficient housing for citizens, which led to a serious housing crisis. To tackle this problem, the Chinese government proposed a four-step housing system reform, which aimed at pushing forward the reform to make housing a private good, privatize public housing,\(^6\) and develop the real estate market. In July of 1998, the Central Government promulgated the 《Notice on Deepening Housing System Reform and Speeding up Housing Construction》\(^7\) to gradually implement the Own-As-You-Pay housing system.

After the implementation of this system housing prices kept soaring. From 2003 to 2005, the average housing price grew by 10% annually, and a growth of 14.9% was recorded in 2007. China's real estate market encountered a short-term gloom due to the international financial crisis in 2008 but soon picked up. From the second quarter of 2009, the real estate market grew by 23.6% in a short period of time. However, the price continued to drop from September 2011 to February 2012, with housing prices in 65 big and medium-sized cities decreasing by 15%. Faced with high yet unstable prices in the housing market, the central government of China on the one hand kept pushing forward the housing system reforms, while on the other hand promulgated a series of regulative documents to strengthen control on housing prices. These policies turned out to be ineffective. Although housing prices in some first-tier cities\(^8\) in eastern China dropped, most second-tier cities\(^9\) in the central and western parts of China kept rising. What are the factors that effect China's real estate market? Are the housing prices in eastern China affected by different factors than in the central and western parts of China? If so, what are the differences? With regard to these two questions, this study will look into 35 first and

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6 Privatization of public housing: China established a national public housing supply system from 1950 to 1978, which means that housing will be provided to citizens directly by the nation. Privatization of public housing means that the national supply model will be changed to a market-oriented one.
7 Promulgated by the State Council of China on July 3rd, 1998 with a document number of 23.
8 First-tier cities: Cities with a permanent residence more than 5 million and GDP volume more than RMB 160 billion.
9 Second-tier cities: Vice-provincial cities, which are also capital cities of their provinces with a permanent residence more than 3 million.
second-tiered cities within China and divide them into the eastern economic region or the central and western economic region according to the regional economic division method proposed in China's Seventh Five Year Plan\textsuperscript{10}. Using the statistics from 1999 to 2010 of these cities, this study will establish the fixed-effect model by using STATA12.0 to analyze the influencing factors on China's housing prices and the differences among the factors affecting housing prices in the eastern or central and western parts of China.

II. Literature Review

1. Relevance Theory of Housing Price-Four-Quadrant Model

According to neo-classical economic theory, housing prices are determined by supply and demand in the housing market. The macro-economy influences housing prices in a way such that its alteration changes people's expectations towards the future, thereby affecting housing supply and demand. Similar to normal goods, the price of real estate is the result of supply and demand equilibrium. However, as a special good, real estate follows the linkage mechanism in which interactions exist between the flow market and the stock market, between the capital market and the real estate market, and among rent, cost and price. According to the four-quadrant model by Dipasquale and Wheaton (1992)\textsuperscript{11}, in the sales market, housing demand should be equal to supply. Therefore, housing prices are determined by the number of households who wish to own a house and the number of housing which can be owned. The increase of both urban population and household income pushes up the demand for housing and affects the supply and demand mix as well as housing prices. The increased supply of housing mainly comes from the development of new projects and is determined by the capital price relevant replacement capital in the sales market. However, in the short-run, sales usually lag behind investment in housing construction. Therefore, prices tend to deviate from cost. In replacement capital, construction costs and land costs have an impact on housing supply, thereby affecting housing prices. In the rental market, demand derives from users of properties. The cost of using these properties is the amount of money paid to acquire the right to use. The amount of rent is determined by the use of space in the real estate market rather than the value of property right in the capital market. In the real estate market, while the use space supply is fixed, demand for property depends on exogenous factors such as rent, income level, and household consumption preference. Moreover, changes in loan interest rates affect rent and housing prices, which in turn affects housing demand in the real estate market. (Figure 1)

\textsuperscript{10} Seventh Five Year Plan of China: 1986-1990
2. Advanced Research

What are the reasons for housing price fluctuation? Many studies are conducted from the perspective of income per capita, land price and monetary policies. Peng and Wheaton\textsuperscript{12} conducted an empirical study on the factors affecting Hong Kong's housing prices from 1965 to 1990, whose results showed that changes in land supply affected housing prices to a relatively large extent. By constructing a housing price model which contains PDT, Abraham and Hendershott\textsuperscript{13} revealed a direct relation between housing prices and other factors including construction costs, employment rates and income and a negative correlation between the margin of price increases and interest rates. Harris\textsuperscript{14} studied the influences of actual interest rates and nominal interest rates on housing prices and discovered that changes in actual interest rates could explain market price levels while nominal interest rates only exerted an impact when an expectation of appreciation of housing was formed.

With regard to housing prices in China, a great many studies have been conducted by Chinese scholars. Dong Zhiyong, Guan Hao, Ming Yan\textsuperscript{15} used panel data from 1999 to 2006 of 31 provinces and cities within China and chose explanatory variables including population density

\textsuperscript{12} Peng, Rj.,W.C. Wheaton. Effects of restrictive land supply on housing in Hong Kong: Journal of Housing Research,1994(2)
\textsuperscript{14} Harris, J.c. The Effect of real rates of interest on housing prices[J].Journal of Real ESTATE Finance and Economics,1989
\textsuperscript{15} Dong zhiyong, Guan Hao, Ming Yan. Factor Analysis on China's Real Estate Price: An Empirical Research of Pannel Data: Journal of China University of Geosciences, 2010.
and GDP per capita as variables for the demand side, land price as the variable for the supply side, the local fiscal situation as the local government factor and loan interest rates and exchange rates as the macro monetary variables. They analyzed factors affecting China's housing prices and the results showed that the main factor was for the demand side, while factors for the supply side and monetary policies had relatively small influence on housing prices. The study also revealed that nominal interest rates did not significantly affect housing prices while actual interest rates had an appreciable impact on them. Zhou qingkui studied the relationship between housing prices and monetary policy within China's four municipalities directly under control of the central government and asserted that a loose monetary policy led to the housing price increase.

The relationship between housing and land prices also received widespread attention. Ping Xinqiao (2004) held that the increase of land prices pushed up housing prices. Yan Jinhai (2006) studied the relationship between China's housing and land prices, and the results demonstrated that they interacted in the long run, while in the short run housing prices determined land prices rather than the reverse. Kuang Weida (2005) proposed that housing prices had a linear negative correlation with land prices when supply was over demand, while housing prices were positively correlated with land prices when supply was less than demand.

2. Influencing Factors and Hypotheses of China's Housing Prices

Regarding the numerous influencing factors of housing prices, a review of literature shows that much attention is focused on how economic situations, land prices, monetary policies, construction costs and exchange rates influence housing prices. This study proceeds from the perspective of variables such as supply, demand and national monetary policy to analyze the influencing factors of China's housing prices and proposes some testable hypotheses according to theory analysis.

1) Market Supply and Demand Factor: Population and GDP

Theoretically speaking, urban population growth increases urban population density, which means housing resources become more scarce, which causes demand for housing. As an indicator of income level, GDP represents household purchasing power to a large extent. For households with different income levels, income increases will have an influence on their demand for housing.

Therefore this study establishes the following hypothesis:

Hypothesis 1: Population and GDP per capita have a significant positive correlation with housing prices.

2) Market supply factors: Land Prices and Housing Completion Areas

In the land market, no matter in the short or long run, land supply is inelastic due to its

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17 Ping Xinqiao, Chen Minyan. Financing, land price and housing price trend[J]. World Economy, 2004. (7)
scarcity and the difficulty to change its function. Therefore land prices are determined by land demand. Land acquisition costs will affect construction costs. Moreover, housing completion areas are limited by the demand in the housing market. The increase in housing completion areas also increases the housing supply, which affects housing prices to a certain extent. On the contrary, high housing prices will affect market demand, which in turn leads to a decrease of housing completion areas.

Therefore this study also establishes the following hypothesis:

Hypothesis 2: Land prices are positively correlated with housing prices, while housing completion areas have a negative correlation with housing prices.

3) National Monetary Policy: Actual Loan Interest Rates from Years One to Three

From a supply and demand perspective, the increase of loan interest rates will, on the one hand, apply pressure to real property developers based on capital. On the other hand, it will also increase the mortgage burden on house owners, which in turn indirectly affects housing prices.

And finally, this study establishes the following hypothesis:

Hypothesis 3: In the short run (from years 1 to 3), interest rates have certain negative impacts on housing prices.

III. Empirical Analysis of the Influencing Factors of China's Housing Prices

1. Data Construction

To analyze factors that have had an effect on China's housing prices, this study selected 35 big and medium-sized cities within China and their statistics from 1999 to 2010. Data including annual average housing prices, annual housing areas built, and construction costs per 1 square meter of these cities came from the Statistical Yearbook of China's Real Estate Market. Population and GRDP of the cities was obtained from statistical yearbooks of the cities. Data concerning loan interest rates (actual interest rates) came from the database of the People's Bank of China.

To acquire a comprehensive understanding on factors affecting housing prices of different parts of China, this study selected 35 big and medium-sized cities from China's 23 provinces, 5 autonomous regions and 4 municipalities directly under the central government. (Figure 2) The selection of these 35 cities was based on the division standard set in the article "China's Small and Medium-Sized Cities", which was co-published by the Organizing Committee of 2010 Scientific Development Forum of China's Small and Medium-Sized Cities and the Economic Development Committee of Small and Medium-Sized Cities. According to the division standard, 16 of the 35 cities were regarded as first-tiered cities, which have a permanent population of more than 5 million and a GDP volume more than RMB 160 billion. And the other 19 cities were regarded as second-tiered cities. (Table 1)
During China's Seventh Five Year Plan, the central government divided the country into three economic regions, namely the eastern, central and western parts, according to their geographical location as well as economic strength, to implement different economic policies. In order to explore whether factors affecting housing prices in different regions are different and what these differences might be, this study divided the 35 cities into two categories: eastern cities versus central and western cities. (Figure 3) Among the 35 cities, 17 of them are eastern cities including Beijing, Tianjin, Shijiazhuang, Shenyang, Dalian, Shanghai, Nanjing, Hangzhou, Ningbo, Fuzhou, Xiamen, Jinan, Qingdao, Guangzhou, Shenzhen, Nanning, Haikou. And the other 18 are central and western cities including Taiyuan, Hohhot, Changchun, Ha'erbin, Hefei, Nanchang, Zhengzhou, Wuhan, Changsha, Chongqing, Chengdu, Guiyang, Kunming, Xi'an, Lanzhou, Xining, Yinhuang, Urumchi. (Table 2)
2. Variable Setting

In China's real estate market, property developers' products can be categorized into commercial residential buildings, apartments, affordable housing, villas, premium apartments, business buildings and office buildings according to different functions. From the precondition of taking a market into full consideration and making sure that China's housing prices can be fully analyzed, the variable set in this study was the price of one square meter for average housing.

This study set population and GDP per capita as the variables in the market demand horizon. From a review of literature, it can be concluded that a growth of population indicates a trend of housing shortages, which theoretically would cause increasing demand of housing and thus push up the prices. Up to December, 2011, the urbanization rate of China exceeded 50 %, which shows a rapidly developing urbanization drive. The increasing urban population would have a deep influence on the urban housing prices. Moreover, with the economic development of cities, a large scale population flow is caused by the rural population pouring into cites. This rural population, who engages in production activities in cities, has a huge housing demand, which causes a potential influence on the housing prices. While explaining the population variable, this study set the population variable as the amount of population at the end of the year, considering urbanization as well as population flow elements. As an important indicator of income level, the

20 Commercial residential buildings: buildings that can be transacted freely in the market according to relevant laws and regulations without government intervention.
increase of GDP per capita will increase people's purchasing power and their demand for housing. For the low-income population who do not own any housing, income growth will translate their aspiration to own a house into a realistic demand. And for those in the middle and high-income populations who already own housing, income growth, on the one hand, drives them to improved housing standards, while on the other hand, it spurs investment demand as the nature of real property is an investment good. This study set housing completion areas and construction costs as variables from the supply perspective. Completion areas of housing is an important element of housing supply, which determines the change of the housing supply curve and has an indirect influence on prices. The long production cycle of real properties determines that housing supply usually lags. And elements including direct supply, potential supply and reserved supply exist in the process of housing supply. This study defined housing completion areas as the total area of housings which were completed and ready for sale. Construction costs, whose increase would shift the supply curve upward and push up housing prices, are the main part of the housing development costs. Land costs were the average sale prices of one square meter of land.

This study set loan interest rates from years one to three (including the third year) as a variable from the monetary perspective. Considering the cost for property developers to utilize capital, interest rates are also a regulative measure often adopted by the Chinese government for macro control on the real estate market. "The interest rates within years one to three can reflect influence on housing prices for a relatively long period from a supply and demand perspective, and illustrate whether the monetary policies to control housing prices are effective. From the supply perspective, the increase of interest rates will cause capital pressure to property developers, who will sell their stock to relieve that pressure but also cut the stock's price. However, the increase of interest rates will increase the loan costs for developers, which in turn will push up housing prices. From a demand perspective, it increases the costs for buyers who depend on loans so that demand is discouraged and prices go down." (Table3)

2. Model Setting

Under statistics model, the study uses statistics of 35 Chinese cities from 1999 to 2010 to analyze factors that have effect on housing price. Due to big differences of housing price, population and personal income in different Chinese cities, Wu Dayuan, Jiang Suyan(2010) Tsounta(2009) adopted time-series data of different areas to analyze data under panel data model, which turned out more reasonable and effective. Panel data can show a two-dimensional image including time series and sections. Through panel data analysis, neglected and unobserved variables can be identified to reach a credible result. The linear regression equation of panel data model is as the following:
\[ y_{it} = \alpha + \beta x_{it} + \epsilon_{it} \quad (\epsilon_{it} = \mu_i + \lambda_t + \epsilon_{it}) \quad (1) \]

\( n \): the numbers of panel data.
\( T_i \): i's contains spatial
\( \mu_i \): The indivial characteristic effect that is observed.
\( \lambda_t \): The time feature effect that is observed.
\( e_{it} \): Probabilistic error term.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Symbol display</th>
<th>Explanation</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable</td>
<td>Housing_Price</td>
<td>Average housing price per square meter, with inflationary elements reduced.</td>
<td>yuan/㎡</td>
</tr>
<tr>
<td>Explanatory Variable</td>
<td>Pop_Res</td>
<td>city's permanent residents at the end of the year</td>
<td>person</td>
</tr>
<tr>
<td></td>
<td>GRDP</td>
<td>City's GDP per capita</td>
<td>yuan</td>
</tr>
<tr>
<td></td>
<td>H_Com_Area</td>
<td>total area of housing completed and ready for sale</td>
<td>㎡</td>
</tr>
<tr>
<td></td>
<td>H_Cost</td>
<td>Average land sales per one square meter</td>
<td>yuan/㎡</td>
</tr>
<tr>
<td></td>
<td>Lending_Rate</td>
<td>Loan interest rates from years one to three</td>
<td>%</td>
</tr>
</tbody>
</table>

The characteristics of the 35 cities are different, therefore each panel individual's characteristics and error term \( \mu \) should be taken into consideration during model setting. In the first stage, ADF unit root test is conducted on the panel data to ensure all the data used is homogeneous panel. In the second stage, F test is conducted, which produces the fact that fixed-effect model is more suitable than OLS model in the study, for the purpose of considering entity fixed effect of the error term \( \mu \) in panel linear regression model. In the third stage, Hausman test is conducted to ensure whether fixed effect or random effect of error term \( \mu \) should be considered in panel linear regression model. The result turns out that fixed effect model is more applicable in the study. In the fourth stage, autocorrelation test is conducted on error term \( \mu \) in the fixed-effect model. The result detects the existence of first-order autocorrelation coefficient. According to (min yinshi, cuipisen.2009), the existence of first-order autocorrelation coefficient in error term has no effect on the use of fixed-effect model, which is thus adopted in the study. Equation (2) (3) and the deduction of the model are shown as in Figure 4.
Equation (3) is deduced by inserting explanatory variable and explained variable into Equation (2)

\[ E_{i+1} = (\alpha + \mu_i) + \beta x_{it} + e_{it} \]  \tag{2}

\[ House_{Price_{it}} = \alpha + Pop_{Res_{it}} + GRDP_{it} + H_{Cost_{it}} + Lending_{Rate_{it}} + \mu_i + e_{it} \]  \tag{3}

As mentioned above, the study aims to look into the difference of factors affecting housing price in eastern economic region and central and western economic region of China, and what elements produce the differences. In the export process of the analysis model of eastern economic region and central and western economic region of China, unit root test, F test and Hausman test are conducted on the panel data of 17 cities in eastern economic region and 18 cities in central and western economic region, which proves that fixed-effect model is applicable to the study of these two economic regions.

**IV. Analysis Results**

1. **Basic Statistical Analysis**

   In order to gain a comprehensive understanding on the overall information of the analysis object, basic statistic terms of the used variables including mean, between and within is analyzed. (Table4) The average price during the 12 years period of the explained variable Housing Price is twice compared to between deviation, which shows geographical differences of housing price. The within deviation of explanatory variables including population (Pop_Res), average land price per square meter (H_Cost) is relatively larger than between deviation, which shows that the difference of population and average land price per square meter in different cities is becoming wider as time goes by. While for explanatory variables including GDP per capita (GRDP) and annual housing completion area (H_Com_Area), the within deviation is smaller than between deviation, which demonstrates that within the same period of time, GDP per capita and annual housing completion area have great difference in different cities.
### Table 4: Basic Statistical Analysis of the Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>House_Price</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>3067.385</td>
<td>2169.47</td>
<td>1080</td>
<td>15537.16</td>
</tr>
<tr>
<td>between</td>
<td>1570.315</td>
<td>1652.04</td>
<td>7432.557</td>
<td></td>
</tr>
<tr>
<td>within</td>
<td>1518.371</td>
<td>-2693.111</td>
<td>11246.07</td>
<td></td>
</tr>
<tr>
<td><strong>Pop_Res</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>7089674</td>
<td>5579641</td>
<td>231300</td>
<td>3.30e+07</td>
</tr>
<tr>
<td>between</td>
<td>5617468</td>
<td>458517.2</td>
<td>3.17e+07</td>
<td></td>
</tr>
<tr>
<td>within</td>
<td>636304.5</td>
<td>4021341</td>
<td>1.23e+07</td>
<td></td>
</tr>
<tr>
<td><strong>GRDP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>25971.54</td>
<td>16756.59</td>
<td>4826</td>
<td>84255.7</td>
</tr>
<tr>
<td>between</td>
<td>13138.01</td>
<td>8296.025</td>
<td>55922.17</td>
<td></td>
</tr>
<tr>
<td>within</td>
<td>10616.39</td>
<td>1116.949</td>
<td>60453.66</td>
<td></td>
</tr>
<tr>
<td><strong>H_Com_Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>5119055</td>
<td>5103702</td>
<td>198939</td>
<td>3.08e+07</td>
</tr>
<tr>
<td>between</td>
<td>3960420</td>
<td>1082656</td>
<td>1.76e+07</td>
<td></td>
</tr>
<tr>
<td>within</td>
<td>3282472</td>
<td>-7178183</td>
<td>2.63e+07</td>
<td></td>
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<tr>
<td><strong>H_Cost</strong></td>
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<td></td>
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<tr>
<td>overall</td>
<td>.0858077</td>
<td>.0056746</td>
<td>9.64</td>
<td>0.000</td>
</tr>
<tr>
<td>between</td>
<td>.0264033</td>
<td>.0463506</td>
<td>-3.94</td>
<td>0.000</td>
</tr>
<tr>
<td>within</td>
<td>.0627558</td>
<td>-.0449749</td>
<td>5.16</td>
<td>0.000</td>
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<tr>
<td><strong>Lending_Rate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>5.99575</td>
<td>5.478</td>
<td>7.047</td>
<td></td>
</tr>
<tr>
<td>between</td>
<td>0</td>
<td>5.99575</td>
<td>5.99575</td>
<td></td>
</tr>
<tr>
<td>within</td>
<td>.4302764</td>
<td>5.478</td>
<td>7.047</td>
<td></td>
</tr>
</tbody>
</table>

2. **Fixed-effect Model: analysis results of factors affecting housing price in 35 cities**

By adopting fixed-effect model Within Presumption Method to analyze factors affecting housing price of 35 cities, results are produced as shown in Table 5.

| House_Price       | Coef.  | Std. Err. | t     | P>|t| | [95% Conf. Interval] |
|-------------------|--------|-----------|-------|------|---------------------|
| Pop_Res           | 0.0008557 | 0.0000887 | 9.64 | 0.000 | .0006812 - .0010301 |
| GRDP              | .0805297  | .0056746  | 14.19| 0.000 | .0693722 - .0916872 |
| H_Com_Area        | -.0000586 | .0000149  | -3.94| 0.000 | -.0000878 - -.0000294 |
| H_Cost            | 3145.407  | 746.6371  | 4.21 | 0.000 | 1677.349 - 4613.464 |
| Leading_Rate      | 54.31165  | 105.4258  | 0.52 | 0.607 | -152.9794 - 261.6027 |
| _cons             | -5385.77  | 816.3787  | -6.6 | 0.000 | -6990.955 - -3780.584 |

Variables for demand side: Population (Pop_Res), GDP per capita (GRDP) and housing price are positively correlated. If the population increases by 1%, housing price will increase by 0.000086%. If GRDP grows by 1%, housing price will increase by 0.80%. The result significantly justifies Hypothesis 1.

Average land price per square meter is positively correlated with housing price. Housing completion area has a negative correlation with housing price. Every 1% increase in housing completion area leads to 0.00059% drop in housing price. Construction cost per square meter
has the biggest impact on housing price, namely, every 1% increase in land price pushes the housing price up by 3145.4 yuan, which proves that Hypothesis 2 stands.

Monetary policy variables: Loan interest rate of 1 to 3 years does not have effective statistical significance within 0.001 confidence level and its coefficient is positive and has a rather big P-value, which is not in line with Hypothesis 3. Therefore, loan interest rate of 1 to 3 years has little impact on housing price.

2. Analysis results of eastern economic region and central and western economic region

After analyzing eastern economic region and central and western economic region using fixed-effect model Within Presumption method, results are shown as in Table 5 and Table 6.

| House_Price | Coef. | Std. Err. | t     | P>|t| | [95% Conf. Interval] |
|-------------|-------|-----------|-------|------|---------------------|
| Pop_Res     | .0007942 | .0001245  | 6.38  | 0.000 | .0005486 - .0010398 |
| GRDP        | .0782841 | .0099655  | 7.86  | 0.000 | .0586214 - .0979468 |
| H_Com_Area  | -.0000173 | .0000212 | -0.82 | 0.416 | -.000059 - .0000245 |
| H_Cost      | 2135.183 | 534.425   | 4.00  | 0.000 | 1080.717 - 3189.648 |
| Leading_Rate| 137.6905 | 183.7389  | 0.75  | 0.455 | -224.8419 - 500.2229 |
| _cons       | -6077.226 | 1330.527 | -4.57 | 0.000 | -8702.467 - -3451.984 |

With regard to the analysis results in eastern economic region, except for housing completion area (H Com Area) and loan interest rate, the other variables have effective statistical significance within 0.001 confidence level.

V. Conclusion

The study uses panel data from 1999 to 2010 of 35 Chinese cities and establishes a fixed-effect model to conduct empirical analysis on influencing factors of housing price of 35 Chinese cities. It also analyzes the differences of influencing factors of housing price in eastern, and central and western economic regions. Through comparison of empirical analysis and the hypotheses, conclusions are drawn as the following:

1) Urbanization and Rigid Demand

Among the influencing factors of housing price, demand factor plays a determining role. Up to December 2011, the urbanization rate of China exceeded 50%, featuring a sharp increase in urban population. During urbanization, the average income of the citizens jumps by a large
amount, which leads to increasing demand of housing. On the other hand, with the rapid economic progress, a large rural population pours into cities to meet the cities' demand for labor force causing a large scale population migration. This population who lives and works in cities has a huge and rigid demand for housing. Chinese citizens still keep a traditional awareness of housing consumption, regarding it as an important part of family property. Therefore, demand for housing is rather rigid.

2) Land Transaction and GDP Growth

Under a nationalized and public land ownership environment, land transfer revenue is the main source of local government revenue as well as driving force for GDP growth. Real property developers purchase land from the government through bid inviting and auctioning so as to develop housing projects. During the land purchase, the competition between developers raises the land purchase price. Since land price is an essential part of construction cost, the increase of land price indirectly pushes up the construction cost, which in turn raises the sales price of housing.

3) National Monetary Policy

The central government's action to stabilize housing policy by leveraging loan interest rate can but only in a short run, produces effective results. With real estate becoming the pillar industry for China's economic growth, it's feeble to carry out housing price control only with monetary policy.

4) Eastern Economic Region and Central and Western Economic Region

Influencing factors of housing price in eastern economic region and central and western economic region are different in the following ways. With a relatively high economic development level and mature real estate market, speculation is rampant due to high investment return. Therefore investment demand and accommodation demand are main factors affecting housing price.

While in central and western economic region, a large population and labor force flow into eastern economic region on an annual basis. With new cities development and a large amount of housing construction investment, the income per capita is rising. Therefore, housing construction is the main factor of the rising housing price.

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