



The Effects of Housing Prices on Income Inequality in Urban China

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Abstract: *This paper explores the effects of housing prices on income inequality in urban China. The authors use China's interprovincial panel data for the period between 1999 and 2011 and find that there is a significant positive association between housing prices and the Gini coefficient of the income of urban residents, and that there are remarkable regional disparities.*



Introduction

Since China's State Council issued its 'Decisions on Deepening the Reform of Urban Housing' in 1994, housing prices have increased with the rapid urbanisation throughout China that has occurred in the past two decades. The average residential real estate price grew up from 1509 Yuan per square metre in 1995 to 4993 Yuan per square metre in 2011 by a growth rate of 30.88%. Meanwhile, the Gini coefficient for urban income inequality increased from 0.369 in 1995 to 0.477 in 2011. These changes indicate a huge income gap in China along with the continuous rise in housing prices. In addition, the difference in the housing price-to-income ratio in China's urban areas between the highest-income households and the lowest-income households has increased from a fivefold different in 2000 to a difference of 8.81 times in 2010 (Table 1). The three decades since the initiation of pro-market reforms in 1978 have seen rising income inequality in urban China (Ravallion and Chen, 2007; Gustafsson et al, 2008). As more than 50% of China's population is urban, rising urban inequality has become of increasing concern in China. The negative consequences of rising income inequality were ignored before the current world economic crisis because China seemed to be so successful in terms of high economic growth (Paul et al. 2012).

Table 1: Housing price-to-income ratio of different income levels of households in China's urban areas from 2000 to 2010

Year	2000	2005	2010
Average	6.28	6.77	7.76
Lowest	14.76	22.69	25.38
Low-income	10.81	14.74	16.34
Middle	8.50	10.68	11.86
Middle-income	6.67	7.75	8.66
Upper-middle	5.26	5.64	6.34
High-income	4.17	4.10	4.70
Highest	2.95	2.45	2.85

Source: 'China Statistical Yearbook' (2001-2011).

The issue of wealth disparity and income inequality caused by rising housing prices has caught the attention of some scholars. In an empirical analysis Hamnett (1991) revealed that there is a significant difference in housing wealth among residents. Because of the increase in homeownership and the value of the housing market, the biggest inequality has arisen in the past 40 to 50 years between the 70% of households who are homeowners and the 30% who are not. Therefore, inequality in housing wealth is also related to social class and income. Levin and Pryce (2008) identified significant housing wealth inequality across ethnic and socio-economic groups. Inequalities in housing wealth accumulation caused by rising housing prices are likely to have negative effects on access to education, racial segregation, and spatial concentrations of poverty. Williams (2010) highlighted the increases in housing prices across all regions as evidence for the widening gap in wealth between homeowners and tenants. He



also briefly mentioned the potential for developing financial products to allow the wealth of non-homeowners to keep up with that of homeowners.

Some research indicates that real estate is quite important because of its dual attributes; it is both an investment good and a consumption good held by households, and the differences in properties held by households can significantly affect the optimal allocation of household assets (Henderson and Ioannides, 1983). Some people who own multiple properties may choose to lease some of their properties that are surfeit to their needs and subsequently gain rental income. They may also sell such properties and obtain additional profits to purchase other properties. The status of household asset allocation for these households will be changed by the additional revenue generated from rising housing prices (Grossman and Laroque, 1990; Arrondel and Lefebvre, 2001). By contrast, some households who have no property or require a mortgage loan for the purchase of a property will observe an increase in their expenses when housing prices increase. They would then have to save money and spend less while future income would be held constant (Fratantoni, 2001; Aron et al., 2012).

Consequently, the property income being generated from rising housing prices is expected to widen the income gap between families, and the main purpose of this paper is to show how rising housing prices affects income inequality. Following this introduction there is a discussion of the data and the methodology, and then we analyse the results and close with our conclusions.

Methodology and Data

In the framework of the household asset structure, total household income in period t mainly consists of financial assets (including safe and risky assets, such as cash deposits and stocks), rental income, wage income, etc. (Arrondel and Lefebvre, 2001). Therefore, we choose income inequality as a dependent variable for households at different income levels and use the Gini coefficient of the income of urban residents to represent this. To calculate the Gini coefficient of unequal income groups, we can use the formula (Thomas et al., 2000):

$$GINI = \frac{1}{\mu} \sum_{i=2}^N \sum_{j=1}^{i-1} w_i |y_i - y_j| w_j \quad (1)$$

where μ denotes the income expectations of members, N is the number of groups, y_i and w_i represent the average income of i -th group and its percentage of the total population, respectively. We can obtain the Gini coefficient of the provincial income gap of China's urban residents based on the above formula. The household income data are the annual disposable income of members of urban households in China, which are drawn from the income quintile survey on urban households by the National Bureau of Statistics of China from 1999-2011. Income quintile includes low, lower-middle, middle, upper-middle, and high income households and each one of the ratios equal to twenty percent. The Gini coefficients are shown in Tables 2-4.



Table 2: Gini coefficient of income inequality in eastern China during 1999-2011

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Beijing	0.199	0.224	0.243	0.238	0.220	0.253	0.247	0.241	0.247	0.269	0.256	0.243	0.260
Fujian	0.202	0.222	0.220	0.238	0.251	0.280	0.269	0.273	0.278	0.286	0.285	0.284	0.298
Guangdong	0.241	0.254	0.257	0.383	0.366	0.359	0.347	0.344	0.334	0.342	0.333	0.324	0.320
Hainan	0.253	0.296	0.281	0.360	0.323	0.317	0.326	0.321	0.329	0.311	0.313	0.305	0.318
Jiangsu	0.247	0.259	0.277	0.355	0.340	0.352	0.332	0.330	0.331	0.311	0.314	0.312	0.297
Liaoning	0.237	0.251	0.250	0.312	0.283	0.277	0.289	0.283	0.282	0.308	0.291	0.289	0.291
Shandong	0.227	0.229	0.237	0.297	0.269	0.275	0.288	0.279	0.281	0.277	0.273	0.268	0.271
Shanghai	0.229	0.212	0.249	0.253	0.291	0.309	0.337	0.297	0.286	0.286	0.277	0.268	0.264
Tianjin	0.255	0.261	0.286	0.295	0.294	0.304	0.303	0.280	0.286	0.274	0.270	0.262	0.259
Zhejiang	0.222	0.245	0.257	0.272	0.294	0.308	0.294	0.296	0.298	0.305	0.303	0.297	0.289

Source: Author's calculation.

Table 3: Gini coefficient of income inequality in central China during 1999-2011

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Anhui	0.214	0.252	0.245	0.307	0.274	0.268	0.255	0.242	0.240	0.280	0.269	0.272	0.263
Heilongjiang	0.243	0.267	0.278	0.323	0.306	0.314	0.325	0.316	0.314	0.324	0.308	0.296	0.299
Henan	0.228	0.262	0.261	0.318	0.307	0.276	0.272	0.261	0.259	0.271	0.269	0.263	0.264
Hubei	0.226	0.243	0.250	0.312	0.299	0.255	0.255	0.268	0.265	0.287	0.293	0.297	0.270
Jiangxi	0.217	0.238	0.242	0.318	0.247	0.267	0.260	0.252	0.250	0.246	0.248	0.244	0.263
Jilin	0.218	0.223	0.234	0.312	0.307	0.270	0.268	0.269	0.271	0.288	0.286	0.269	0.300
Inner Mongolia	0.242	0.258	0.244	0.314	0.317	0.293	0.277	0.266	0.260	0.299	0.284	0.277	0.294
Shanxi	0.233	0.272	0.276	0.338	0.277	0.271	0.273	0.269	0.276	0.281	0.280	0.272	0.281

Source: Author's calculation.

Table 4: Gini coefficient of income inequality in western China during 1999-2011

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Hongqing	0.217	0.216	0.248	0.306	0.237	0.253	0.253	0.237	0.235	0.234	0.222	0.200	0.229
Guangxi	0.230	0.248	0.268	0.303	0.309	0.286	0.302	0.295	0.300	0.270	0.266	0.260	0.277
Guizhou	0.229	0.224	0.246	0.319	0.311	0.278	0.297	0.255	0.295	0.297	0.289	0.288	0.298
Qinghai	0.246	0.240	0.257	0.324	0.320	0.286	0.304	0.309	0.330	0.358	0.344	0.333	0.371
Shaanxi	0.235	0.267	0.273	0.281	0.281	0.282	0.277	0.274	0.271	0.280	0.273	0.271	0.260
Sichuan	0.234	0.267	0.274	0.333	0.313	0.310	0.300	0.300	0.297	0.290	0.294	0.270	0.270
Xinjiang	0.254	0.276	0.259	0.299	0.277	0.287	0.282	0.269	0.251	0.280	0.278	0.275	0.274
Tibet	0.247	0.206	0.244	0.254	0.274	0.264	0.241	0.324	0.331	0.316	0.301	0.304	0.334
Yunnan	0.233	0.223	0.221	0.277	0.256	0.269	0.296	0.292	0.300	0.306	0.286	0.281	0.274

Source: Author's calculation.



Assessing the impact of rising housing prices involves estimating the following equation within the framework of the household asset structure:

$$G_{i,t} = \alpha_0 + \beta_i X_{i,t} + \gamma V_{i,t} + \mu_i + v_t + \xi_{i,t} \quad (2)$$

where $G_{i,t}$ is the calculated Gini coefficient. The subscripts i and t refer to the i -th year and t -th province of China, respectively, and β_i represents the regression coefficients, and $\xi_{i,t}$ is the residual. In addition, μ_i represents the unobserved individual effects (interprovincial effect), which are usually caused by unobserved factors in the provinces, and v_t denotes unobservable time effects, accounting for any time-specific effect that is not included in the regression.

The independent variables ($X_{i,t}$) include housing assets (HP), wage income (WE), cash deposits (DR), and stock returns (SR). We use the average selling price of residential real estate in the provinces (HP) to indicate rising housing prices. HP reflects the effect of rising housing prices on income inequality. In addition, we select the ratio of household wage income to the total household income (WE) to represent the status of household wage income. We also use the benchmark one-year deposit rate (DR) and the average rate of return on stocks (SR) to indicate the safe and risky assets held by households that would allow us to analyse their impact on the household total income gap. $V_{i,t}$ is a set of control variables. To enhance the robustness of the empirical results, this study introduces provincial tax income (TAX), marketisation, level of education, rate of urbanisation, and the unemployment rate in urban areas as control variables to control for important factors related to income inequality among urban residents that are beyond the scope of the analytical framework of this study. Specifically, we use the average years of schooling of urban residents aged 6 and above in

each province to reflect the level of education (EDU); the formula is $EDU = \sum_{i=1}^n w_i g_i$, where w_i is the proportion of people within this level of education, and g_i is the years of schooling under different education levels, namely, college and above (16 years), high school (12 years), middle school (9 years), elementary school (6 years), and illiteracy is indicated as 0 years. The rate of urbanisation ($Urbanisation$) refers to the proportion of the non-agricultural population to the total population in a given province. And we use the Marketisation Index for China's Province (MI) to reflect the institutional changes and economic performance in different Chinese provinces and urban registered unemployment rate (UR) to reflect the situation of unemployment in urban China.

The data used in this study cover the period between 1999 and 2011 and most of them come from the National Bureau of Statistics of China. To prevent heteroscedasticity, we use the natural logarithm of HP , which is denoted as $\ln HP$.

Empirical Results

For the panel data estimation, we can choose three alternative models: pooled ordinary least squares (OLS), fixed effects (FE), or random effects (RE). As housing prices differ significantly between provinces, this province-specific effects means that the pooled OLS method is not suitable for estimating our empirical model. We only employ the FE and RE



models and perform Hausman tests to justify them. The p-value for the Hausman test is 0.0561, thus indicating that the null hypothesis cannot be rejected at the 5% level and that RE is more appropriate than FE. The estimation results are presented in Table 5.

Table 5: The results of the panel data estimation with fixed effects

VARIABLES	(1) gini	(2) Gini	(3) gini	(4) gini	(5) gini	(6) gini	(7) gini	(8) gini	(9) gini
<i>lnHP</i>	0.0257*** (0.00464)	0.0165*** (0.0130)	0.00772*** (0.00609)	0.0319*** (0.00533)	0.0259*** (0.00455)	0.0251*** (0.00465)	0.0304*** (0.00595)	0.0316*** (0.00818)	0.0211 (0.0138)
<i>WE</i>	0.0160 (0.0654)	0.0304 (0.0531)	0.0384 (0.0518)	0.0126 (0.0699)	0.0165 (0.0665)	0.0145 (0.0636)	0.127** (0.0571)	0.149 (0.105)	-0.122*** (0.0466)
<i>SR</i>	0.00341** (0.00147)	0.00656*** (0.00183)	-0.00253* (0.00130)	0.00390*** (0.00146)	0.00343** (0.00147)	0.00336** (0.00148)	0.00911*** (0.00191)	0.00300** (0.00122)	-0.000453 (0.00241)
<i>DR</i>	0.0120*** (0.00269)	-0.0140*** (0.00283)	-0.0117*** (0.00280)	-0.0115*** (0.00280)	0.0120*** (0.00249)	0.0119*** (0.00273)	-0.0176*** (0.00190)	0.0144*** (0.00361)	-0.00453 (0.00501)
<i>MI</i>		0.00683** (0.00301)							
<i>EDU</i>			0.0164*** (0.00462)						
<i>TAX</i>				-0.00272* (0.00162)					
<i>Urbanization</i>					-0.000611 (0.0382)				
<i>UR</i>						0.000573 (0.00212)			
Constant	0.100* (0.0578)	0.127 (0.0796)	0.0928* (0.0535)	0.0714 (0.0613)	0.0987* (0.0537)	0.103* (0.0586)	0.00942 (0.0657)	-0.0359 (0.0976)	0.218** (0.102)
Observations	351	295	351	351	351	351	104	130	117
Number of province	27	27	27	27	27	27	8	10	9

Notes: (1) The values in parentheses refer to the values of std. err; (2) *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively; (3) The estimation results of time dummies and individual dummy variables are not listed owing to spatial constraints.

Source: Author's calculation.

As Table 5 shows, the regression results of the model indicate a significantly positive relationship between rising housing prices (*lnHP*) and the Gini coefficient (*Gini*). These findings suggest that rising housing prices could significantly increase income inequality among urban residents. This fully confirms our hypothesis that rising housing prices will increase income inequality among urban residents under this framework of household asset structure. The regression coefficient of rising housing prices is 0.0257. At the same time, the benchmark one-year deposit rate (*SR*) and the average rate of return on stocks (*DR*) are significantly negatively related with the Gini coefficient, thereby indicating that these other factors can ease the income gaps among urban residents. But the effect of the ratio of household wage income to total household income (*WE*) is not significant.



To verify the robustness of the above results, we control for other variables that could affect income inequality (e.g. provincial income tax, the level of marketisation, education, urbanisation, and the unemployment rate). The regression results of models (2), (3), (4), (5) and (6) show that the regression coefficients of rising housing prices do not change significantly.

The results of models (7), (8) and (9) show that there are remarkable regional disparities between eastern, central and western areas in China. The elasticity of rising housing prices to income inequality is apparent in the eastern and central areas, but is not significant in the western areas. These results reflect regional differences in economic development and the expanding effect of the structure of the economy.

Conclusions

In this paper, we systematically tested the relationship between rising housing prices and income inequality by using China's interprovincial panel data of 27 provinces covering the period between 1999 and 2011. The results show that housing prices are associated with the Gini coefficient of the income of urban residents, which confirms the hypothesis that rising housing prices may affect income inequality. Based on the above findings, we suggest that the Chinese government should focus on controlling the increases in housing prices that cause income inequality and other social problems and should introduce housing price control policies to curb speculative demand.

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References

- Aron, J., J. V. Duca, J. Muellbauer, K. Murata, A. Murphy 2012. Credit, housing collateral, and consumption: evidence from Japan, the U.K., and the U.S. *Review of Income and Wealth*, 58 (3): 397-423. DOI: 10.1111/j.1475-4991.2011.00466.x.
- Arrondel, L., B. Lefebvre 2001. Consumption and investment motives in housing wealth accumulation: a French study. *Journal of Urban Economics* 50 (1): 112-137. DOI: doi:10.1006/juec.2000.2209.
- Fratantoni, M., 2001. Homeownership, committed expenditure risk, and the stockholding puzzle. *Oxford Economic Papers* 53 (2): 241-259. DOI: 10.1093/oep/53.2.241.
- Grossman, J. S., G. Laroque 1990. Asset pricing and optimal portfolio choice in the pricing of illiquid durable consumption goods. *Econometrica* 58 (1): 25-51. DOI: 10.2307/2938333.
- Gustafsson, B., S. Li, T. Sicular (eds.) 2008. *Inequality and public policy in China*. New York: Cambridge University Press.
- Hamnett, C. 1991. A nation of Inheritors? Housing Inheritance, Wealth and Inequality in Britain. *Journal of Social Policy* 20 (4): 509-536. DOI: <http://dx.doi.org/10.1017/S0047279400019784>.
- Henderson, V. J., M. Y. Ioannides 1983. A Model of Housing Tenure Choice. *American Economic Review* 73 (1): 98-113.
- Levin, E., G. Pryce 2010. *Measuring Changes in Housing Wealth Inequality*. Series: Economics Papers 6 (2). London: Department for Communities and Local Government.
- Paul S., Z. Chen, M. Lu 2012. *Household income structure and rising inequality in urban China*. Working Paper August 2012. https://www.google.cz/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwis94K7h-3JAhXLXROKHT5gCQIQFggnMAA&url=https%3A%2F%2Feditorialexpress.com%2Fcgi-bin%2Fconference%2Fdownload.cgi%3Fdb_name%3DFEMES12%26paper_id%3D455&usq=AFQjCNGqluuiHskqGuJBu9yD2RxQV79Sxw&bvm=bv.110151844,d.d24
- Ravallion, M., S. Chen 2007. China's (uneven) progress against poverty. *Journal of Development Economics* 82 (1): 1-42. DOI: 10.1016/j.jdeveco.2005.07.003.
- Thomas, V., Yan Wang, Xibo Fan 2001. Measuring Education Inequality: Gini Coefficients of Education. *Policy Research Working Paper* 2525. Washington D.C.: The World Bank Institute.
- Williams, P. 2010. "Housing wealth inequality: a personal view". Pp. 20-27 in Department for Communities and Local Government. *Housing Wealth Inequality*. *Economics Paper* 6 (1). London: Communities and Local Government.