Distribution Agreement

In presenting this thesis as a partial fulfillment of the requirements for a degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis in whole or in part in all forms of media, now or hereafter now, including display on the World Wide Web. I understand that I may select some access restrictions as part of the online submission of this thesis. I retain all ownership rights to the copyright of the thesis. I also retain the right to use in future works (such as articles or books) all or part of this thesis.

Zhuxiang Qin April 14th, 2014

What Happens To Marriage In China When Houses Become More Expensive

By

Zhuxiang (Emerson) Qin

Dr. Andrew Francis

Adviser

Economics Department, Mathematics and Computer Science Department

Dr. Andrew Francis

Adviser

Dr. David Borthwick

Committee Member

Dr. Lilia Coropceanu

Committee Member

2014

What Happens to Marriage In China When Houses Become More Expensive

By

Zhuxiang (Emerson) Qin

Dr. Andrew Francis

Adviser

An abstract of
a thesis submitted to the Faculty of Emory College of Arts and Sciences
of Emory University in partial fulfillment
of the requirements of the degree of
Bachelor of Arts with Honors

Economics Department, Mathematics and Computer Science Department

2014

Abstract

What Happens To Marriage In China When Houses Become More Expensive

By

Zhuxiang (Emerson) Qin

This paper examines the empirical relationship between housing prices and marriage measured by level and percentage numbers of people getting married in the given year in China. Using OLS, TSLS and FD models, this paper discovers that OLS yields significant yet inconsistent results, while the results from TSLS models support the hypothesis proposed in this paper that an increase in housing prices in general deters people from getting married. Specifically, a 1% increase in housing prices causes about 3,168.23 fewer people getting married, and approximately 0.011 decrease of the percentage number change in the portion of newly married people to total population. This paper concludes by explaining the difficulties in analyzing the relationship between housing prices and marriage in China, and recognizes several directions needed for future improvement.

What Happens to Marriage In China When Houses Become More Expensive

By

Zhuxiang (Emerson) Qin

Dr. Andrew Francis

Adviser

An abstract of
a thesis submitted to the Faculty of Emory College of Arts and Sciences
of Emory University in partial fulfillment
of the requirements of the degree of
Bachelor of Arts with Honors

Economics Department, Mathematics and Computer Science Department

2014

Acknowledgements

I would like to thank Dr. Francis, Dr. Borthwick, and Dr. Coropceanu for being on my committee. I would also like to give special thanks to Dr. Francis and my friend, William Zhiwei Xu, for their help and kind support along the way.

Table of Contents

I. Introduction

In China, the relation between one's, especially a male's, possession of residential assets and his desirability as marriage partner has long existed. On one hand, by social conventions, a male is considered ready to form a new family only when he has a permanent and secure foothold. On the other hand, since year 2003 when housing prices started to soar nationwide (see Figure 1), possession of private houses has become the most direct indicator of one's financial stability. Wei (2012) in his paper confirmed this opinion by stating that owning houses can be considered as a signal of relative wealthier status and hence will favor the males' competitiveness in marriage market. According to a national survey conducted in year 2013 by Sofun, the largest online real-estate platform in China, 51.67% of the interviewees believe that buying houses is the prerequisite of marriage while only 11.67% interviewees do not see houses as one mandatory condition. In addition, over 73.33% of interviewees stress their preference for a private house instead of living in a rented apartment or with parents. Intriguingly, even though it seems to over half of the people that housing appears to be the precondition to marriage, meanwhile over 58.33% indicate that they in general cannot afford the down payment for new houses, and thus are unable to purchase one without financial aids from their parents. Such a struggling relationship between housing and marriage alongside the still increasing housing prices raises an interesting question: will rising housing prices deter some portion of people from getting married?

Before digging into that question, it is necessary to investigate the housing market in China, which by nature is quite distinct from those in other countries such as the United States. Since year 1949 when The People's Republic of China was founded, in the following three decades

central government implemented planned economy and was the monopolistic supplier of many goods and resources including housing. This system started to change, called by the national economic reform in late 1970s. In 1987, city Shenzhen issued a new policy and allowed for the first time trading residential assets. However in early stage, lack of experience and theoretical instructions led to imbalanced supply and demand, eventually causing housing bubbles in several southern coastal cities in late 1980s and early 1990s.

Year 1998 marked a meaningful milestone to housing market in China, and signaled the official start of commercial housing in China. After 1998, province-owned enterprises, or "units", which were called as "Danwei" in Chinese, no longer took charge in allocating houses to their employees as they used to, and were required by law to integrate all housing benefits into employees' salaries. This important regulation confirmed the commodification of housing.

Around year 2003, housing prices started to soar nationwide. According to the report published by National Bureau of Statistics of China, in 2005 the national average housing prices increased by 19.1%. A few mega-cities, such as Beijing, experienced a 20% increase in housing prices, while the average housing prices growth rate in Beijing remained at around 0.78% from year 2000 to 2004. Figure 2 shows the growth rate of housing prices of 30 provinces of China from year 1998 to year 2011.

Taking into account the particular history of housing development in China, this paper collects annual, province-level data from year 1998 to year 2011, and runs three sets of regression models to seek for empirical evidence. Regressions using the first difference method are first excluded due to the lack of noteworthy results. Both OLS and TSLS regressions provided interesting outcomes. After comparisons, this paper decides to give more emphasis on the results generated by TSLS regressions, and states that on the province level, a 1% increase in the real housing price leads to a decrease of about 3,168.23 persons getting married in the given year, and a decrease of about 0.011 percentage number change in the portion of newly married persons to total population. In summary, high level of housing prices in general discourage part of people from getting married.

This paper contributes to literature by proposing an innovative topic to which no previous study was dedicated, and by offering numerical evidence to support a well-recognized but unproven hypothesis that fewer people are getting married because of their incapability to afford houses whose costs in general far exceed ordinary people's income levels.

The rest of this paper is organized as the following. Section II provides literature review regarding marriage and housing market. Two papers are included and explained particularly because of the relation and similarity between their subjects and this paper's. Section III describes data adopted in this paper. Section IV introduces three methods used in later regressions. Section V shows results using the methods mentioned previously and analysis. Section VI concludes this paper and offers suggestions for future research.

II. Literature Review

(1) Housing Market

There is certainly no lack of research studying the housing market in general. Green and Hendershott (1993) in their theoretical paper proved that evolving demographic forces, such as age, education level, and race of the household head, along with household income to a great extent affect people's demand for housing and thus housing prices. Applying empirical testing, Capozza, Hendershott, Mac, and Mayer (2002) explored the determinants of real house price dynamics, and found noteworthy effects of real income growth, population growth and construction costs on housing prices.

Compared to that in the United States, the housing market in China offers more perspectives and perhaps more variables to be analyzed. In China, government retains the ownership of urban lands. Individuals can purchase lands and reserve the right to use them for a fixed term: "70 years for residential uses, 50 years for industrial and/or mixed uses, and 40 years for commercial uses" (Wu, Gyourko, and Deng, 2012). Because of this system the costs of land can be separated from those of constructions, and are therefore considered as one of the main determinants on final transacted housing prices. Wu, Gyourko, and Deng in their study examined the housing markets of eight major cities including Beijing and Shanghai in China, and found that land prices have increased dramatically during the past decade – "real, constant quality land values have increased by nearly 800% since the first quarter of 2003, with half that rise occurring over the past two years." By further calculating the ratio of land prices to the weighted average price of

the matched housing projects, Wu observed increasing shares of land values in housing prices since year 2005 (See Fig.). Though not tested thoroughly, Wu's finding suggests a positive correlation between the land prices and housing prices. However, whether or not urbanization – the factor proved to be the fundamental reason leading to increases in land prices in recent years – as well imposes direct positive influence on housing prices was not discussed in Wu's paper and thereby was left as one promising direction for future research.

In addition, a substantial amount of literature attempts to explain the rising housing prices by examining and testing the claimed overly high demand of housing (Wang, 2012; Wei, 2012), by analyzing the monetary policy (Zhang, 2012;), and by looking at environmental, social-economic variables on macro level (Zheng, 2009; Zheng, 2011). Nonetheless few studies relate housing prices to marriage particularly.

(2) Marriage

Similar to housing, marriage is a popular topic of general research interests, and has been well studied across many disciplines. While early research was often dedicated to analyzing the impacts of familial and social determinants on marriage, recent literature shows an increasingly stronger emphasis on economic determinants such as women's education level and career attainment. The indeed significant influence of economic factors on marriage-related demographic features found by abundant previous studies suggests a possible correlation between specific economic feature and marriage. This potential correlation may be amplified in China by the important share of housing in China's overall economy and by the particular

relation between housing and marriage in Chinese family culture. This paper, therefore, is constructed based on this belief.

(3) Combine The Two

Although no former research has been identified that directly correlates housing prices to marriage, a few relevant studies are found and can offer helpful perspectives to be incorporated in this paper.

In his study "The Competitive Saving Motive: Evidence from Rising Sex Ratios and Savings Rates in China" (2011), Wei proposed that due to the rise of male-female ratio, Chinese parents raise their savings to improve their sons' competitiveness in the marriage market, leading to a nationwide high savings rate in China. Wei collected data from a survey conducted by Chinese Household Income Project in 2002, and found direct empirical evidence from OLS and median regressions that included saving rate as the dependent variables controlling local sex ratio and other household demographic features. Wei's tests provided noteworthy results: first, identical households with a son have a tendency to save more than those with a daughter; second, savings rate in areas with skewed sex ratio (male to female) tends to be higher; third, the effect of local sex ratio on savings rate stays significant and positive in TSLS regressions that was instrumented on financial penalties for violating family-planning policy. To interpret these findings, especially the pattern that households with a daughter might also increase their savings when sex ratio rises, Wei proposed that higher sex ratio might lead to higher housing values, causing all households, including those with a daughter in the region, to raise savings in order to afford the local houses.

Wei then collected new data of housing values and space area from rural districts and ran OLS regressions to discover whether or not his assumption was valid. Wei's regression returned positive and significant impacts of sex ratio on housing prices. In his later study "Status Competition and Housing Prices" (2012), Wei consolidated this finding by running Tobit regressions and again observed a significant, positive relationship between sex ratio and housing values.

In most previous studies regarding marriage, sex ratio was often used as one prevalent controlled variable and was proved to be influential. Two of Wei's studies indicate a strongly positive correlation between sex ratio and housing values, and thus seem to suggest potential existence of correlation between housing prices and marriage.

However, Zhang's (2012) paper "What Drives China's House Prices: Marriage or Money?" shows little consensus to Wei's theory. Zhang agreed that influenced by the birth control policy and the tradition of preference for the birth of boys, China has been experiencing imbalanced male-female ratios in the recent decades. In addition, by quoting the results and findings from studies of Angrist (2002) and Chiappori (2002) that sex ratio can affect marriage prospects and other socio-economic factors, Zhang further confirmed Wei's intention to explain the rising housing prices by taking sex ratio into consideration. To test Wei's theory, Zhang first collected sex ratios (male to female) in different age cohorts of China from year 1982 to 2009, and found that ratios of two cohorts of marriageable age (20-24 and 25-29) are less than one in most years, suggesting that women in these two age groups in fact faced stronger competition than men did.

This finding, therefore, seems to contradict to the initial premise proposed by Wei (2012) that men face stronger and stronger competition in marriage market.

Zhang further performed a statistical exercise to numerically investigate the relationship between the growth rate of housing prices and sex ratio. Zhang created a simple linear regression model and found no significant relationship between the growth rate of housing prices and sex ratios for 15-19, 20-24, and 25-29 cohort groups. In addition, the extremely low value of R-square in Zhang's regression model suggests that sex ratios can account for around only 5 percent of the variation in housing prices growth rate. This result shows that sex ratios have no statistically significant impacts on the growth rate of housing price, although omitted variable bias is certainly an issue associated with Zhang's models.

Wei and Zhang's papers offer two different results. Such discrepancy most likely derives from the different level of data that Wei and Zhang examined – Wei used household surveys while Zhang's data was on the province level. Nevertheless, the two scholars' findings combined together suggest needs for more research on this subject, and can provide valuable perspectives and determinants to be included in this paper.

Because all data used in later regressions are on the province level, this paper by nature appears to be more similar to Zhang's study.

III. Data Description

This paper looks at 30 provinces of China from year 1998 to year 2011. Province "Xi Zang" (Tibet) is excluded due to data inaccuracy. All data in this paper are collected from the results of census conducted by The National Bureau of Statistics of China (NBSC), and can be found in the statistics yearbooks published by The NBSC. All data are on the province level.

The primary factors of interest in this paper are "newly-added number of people in first marriage" and "province-level housing prices", respectively considered as the dependent variable and the independent variable in later regressions. Variables that help take into consideration the socio-economic influence on the dependent variable include "province-level GDP", "total RMB amount of housing sales", "general Consumer Price Index (CPI)", and "cost of building completed". Province-level GDP helps provide insights regarding the overall economic conditions in the province. CPI is often used as an indicator of general price level and in some sense measures people's living standards. CPI is therefore included to account for its possible impact on marriage similar to the impact of GDP.

Demographical determinants are "newly-added number of divorced couples", "total population in province", "sex ratio (M/F)", "the number of people who have obtained a degree of college or higher institution in the given year", and "the number of people who have obtained a degree of high school". It is intuitively straightforward that the number of divorced couples, total population in the province, and sex ratio are influential to the number of people getting married

in a specific year. To avoid omitted variable bias, these variables mentioned earlier are included in all regressions.

In addition to "the number of newly married people in the given year", which measures the raw number, the percentage of these newly married people over total population is created as an alternative dependent variable and is included in later regressions. The reason for constructing this variable is that compared to raw numbers, percentage numbers can better capture the data trend given the fact that total population increases at a steady rate in most of the provinces of China during the past decades. Thus percentage numbers may appear to be more straightforward for readers to decide whether or not more people are getting married.

IV. Methodology

In order to better explain the possible numerical relationship between marriage and housing prices, this paper runs three sets of regression models to discover empirical evidence.

(1) OLS

The first set of regressions includes four models and is run using Ordinary Least Square (OLS) method. Model (1) and (2) use "Marriage (Level)", the number of newly married people in one given year, as the dependent variable, while Model (3) and (4) choose "Marriage (%)", the percentage number of "Marriage (Level)" over total population in the province in one given year

(scaled up by 100 times for easier interpretation), as the dependent variable (See more in Table 1).

OLS measures the linear relationship among the variables and thus is easier to interpret. Thus the results from OLS, if consistent, can show the direct impacts of housing prices on marriage. OLS models in this paper can be expressed by the formulas shown below.

$$Marriage_i = \alpha + \beta_1 HousingPrice_i + \beta_2 x_2 + \cdots + \epsilon_i$$

(2) Instrumental Variable (TSLS)

Instrumental Variable method, or Two-stage least-square regression (TSLS), is preferable when simultaneous causality bias exists and causes correlation between regressions and the error terms. This paper collects the cost of building completed in the given year as the instrument variable. To be relevant, the instrument must be correlated to the instrumented controlled variable. Regressing the instrument on the controlled variable using OLS method is called the first-stage regression and can be used to test the relevance. In this paper, the first-stage regression can be expressed by the formula shown below.

$$realPrice_i = \pi_0 + \pi_1 realCost + \pi_2 Divorce + \pi_3 Sales + \cdots + \epsilon_i$$

If the F-test is passed in first-stage regression, the instrument is said to be relevant. In later statistical tests, "realCost" is shown to be a relevant and strong instrument (see Table 3). First-stage regression computes the predicted term of "realPrice" using the instrument "realCost".

Second-stage regression then includes the predicted term that is not correlated to the error terms to avoid bias.

$$Marriage_i = \beta_0 + \beta_1 \widehat{realPrice} + \beta_2 Divorce + \cdots + \epsilon_i$$

(3) First Difference

The last set of regressions included the difference between "Marriage(Level)$_n$" and "Marriage(Level)$_{n-1}$" as the dependent variable. This manipulation helps to some extent avoid the concern of dependent variables being autoregressive.

V. Result and Analysis

(1) OLS

In Table 2, all models yield consistent and significant results for the impacts of "divorce" and "sales": holding everything else constant, an increase in number of divorced couples increases the raw number as well as the percentage number of newly married people in a given year, while an increase in total housing sales decreases the two numbers mentioned earlier. The strong positive correlation between the divorced and the married seem reasonable, and can be attributed to many factors. For instance, during the past decade, Chinese government has made the procedures easier and cheaper to register for both marriage and divorce. Such improved convenience can be overall seen as a decrease in price needed to purchase the service, thus pushing up the quantity demanded and resulting increased numbers of married and of divorced

people. On the other hand, the negative, significant correlation between “sales” and the dependent variables seems to address that less people are getting married when housing sales are increasing. Because increases in housing sales can arise from increasing demand of houses, soaring housing prices, or consumers buying the second house, the negative correlation between “sales” and the dependent variable here may or may not support the housing price-marriage hypothesis proposed in this paper. However it is certain that booming housing markets on a macroeconomic level deter some portion of people from getting married.

GDP has a positive coefficient in first three models but is only strongly significant in model (1) and (2). Though not significant in any model, the negative coefficients of sex ratio indicate that a sex-imbalance towards more males over females decreases the level number and the percentage number as well. The interaction term “GDPandCoas” shows a strong negative impact, meaning that an increase in GDP in eastern provinces has a more negative effect than in non-eastern areas. How to interpret this result, however, is not clear. Eastern areas in China are in general more economically prosperous. Compared to other provinces, those with better economy often exhibit distinct difference in many sociological perspectives, which may affect people’s marital behavior and decisions. Though not statistically significant throughout all models, the other two interaction terms, “MediumPlevel” and “HighPlevel”, seem to suggest a consistent conclusion: one unit increase in real housing price in areas of higher GDP levels has stronger negative impacts.

The controlled variable of primary interests in this paper, housing price, yields positive coefficients in model (1), (3) and (4), and a negative coefficient in model (2). Understanding the negative influence of increasing housing prices seems intuitive. As the hypothesis states, soaring housing prices, especially in big cities/provinces such as Beijing and Shanghai, make it more difficult for people to pass the threshold in the marriage market, therefore causing a decrease in the number of people getting married each year. However, as mentioned previously in Section III, raw number may not be as well explanatory in measuring trends as is percentage number, since what level numbers seemingly demonstrate can be easily biased by the aggregate quantity. On the other hand, model (3) and (4) yield positive and significant coefficients for housing prices, and the coefficient of housing prices in model (1) is as well positive but not significant. A reasonable explanation for this result associates with the fact that people adjust their behavior according to changes in their expectations. Housing prices have been soaring dramatically since year 2003 in most of the provinces of China. Under such pressure those who currently do not own a private house would have a tendency to buy one as soon as possible, if affordable by all means. Parents, acknowledged to be the payers for their child's houses in general cases, would also be encouraged to purchase a house in advance, because, as mentioned previously, residential assets play an influential role in one's competiveness and desirability in the marriage market. Such increasing yet met demand for houses not only "qualifies" more young people to be considered as proper candidates for marriage, but also to a great extent facilitates young people's relationship progression, causing more people be willing and able to register for marriage

(2) Instrumental Variable

a. Testing The Instrument

From Table 3, "realCost" and its logarithm term appear to be two valid and strong instruments on housing prices. In addition, R-squared in both models indicate that the models can account for above 90% variations in the dependent variable. Therefore the second stage regressions, which will be posted later as Table 4, are supposed to provide trustworthy results.

b. Second Stage Regressions

First, all four I.V. regressions show significant results for variable "divorced" and "sales" that are consistent with the findings from OLS models. In addition, all models exhibit a negative coefficient of GDP, and the coefficient becomes significant in model (2) and (4). This finding coincides with the hypothesis that higher housing prices cause a decreasing number of people getting married each year.

Another noteworthy result shown by Table 4 is that in model (2) and (4), the first lag term of housing price appears to be positive and very significant. To interpret this finding does not take much effort: higher housing prices from last year encourage people to take precautionary actions by settling the marriage as soon as possible.

(3) First Difference

The two models in Table 5 show contradictory results, and none of the coefficients of housing price or its logarithm term is significant. In addition, the low values of R-squared in both models suggest a poor explanatory power of controlled variables over variation in the dependent variable. Several determinants that are significant in previous models, such as GDP and Tpop, become insignificant here.

(4) Further Discussion

Combining results from the three methods, it seems that no evident consistent relationship can be found between marriage and housing prices. To better understand the exact impacts of housing prices on marriage, the first question would be to decide which method should be given the most emphasis. First difference model can be easily excluded due to its poor performance and explanatory power mentioned previously. Although OLS provides several noteworthy insights, its regressions using difference specifications yielded contradictory results. How to interpret such inconsistency does not seem very clear, making it difficult for OLS to offer affirmative conclusions. Another issue associates with OLS is the possible existence of simultaneous causality, which will cause the independent variables and/or the controlled variables to be correlated to the error term, violating one of the required principles of OLS. As mentioned in Section II (3), Wei's studies have pointed out that the increasingly competitive marriage market resulted from sex-imbalance in China pushes up the demand for housing, keeping housing prices constantly at a higher level. This theory, if valid, serves to justify the influence of marriage on

housing prices. Under such circumstances, therefore, TSLS appears preferable among the three methods.

First of all, results from TSLS are relatively consistent: all four regressions show negative coefficients of housing prices, two of which are statistically significant. In addition, compared to being positive, the negative influence of housing prices on marriage seems more logically plausible.

Although TSLS appears to be able to offer an affirmative answer, the relationship between marriage and housing prices cannot be easily concluded. Empirical tests can merely offer part of information obtained from numerical computations. Marriage-housing price is by nature a complicated issue to analyze, and requires substantial information on well-rounded economics and sociology perspectives. Several well-recognized characteristics related to marriage and housing market may explain the difficulties in generating fully convincing and consistent results by simply adopting empirical tests. First, though being said to exhibit signs of bubbles, housing market in China is yet rudimentary judged by its age. Year 1998 marked the official start of commercial housing market. Till today, the market has a history of only 17 years, during when China has undergone dramatic economic development in many aspects, including the booming housing market. Such rapidly escalating prosperities in the entire nation in the past decades usually arose from combinations of policies, labor, resource development and allocation, and other complex determinants, making it difficult to attempt to explain certain economic event by solely looking at one or a few variables. Second, ultimately this paper treats marriage as a

consumption good affected by its affiliated cost – housing, which is measured by housing prices. However marriage market is most likely to be very inelastic. High level of costs may alter the behavior and decision of some people, but not of a lot. The interactions within the marriage-housing market devised by this paper, if logical, should be extremely dynamic, vulnerable to many factors that are difficult to measure such as acceptance for open relationship and celibacy. Therefore it is difficult to quantify the direction of influence of one variable on the other. Third, for years housing market has been the focus of government's vision. A substantial amount of new policies and regulations are issued each year that can influence the housing market. Such unstable market dynamics deem to diversify general public's decision about when and how to purchase housing, and will further pose influence people's marital behavior and decisions.

VI. Conclusion and Suggestions For Future Directions

This paper attempted but failed to collect micro-data, such as individual or household level survey data. Province-level data cannot avoid to takes into consideration excessive factors, which may bias the results. In addition, as well proved by abundant previous studies, micro-data has superior explanatory power in analyzing marriage or marriage-related variables because more detailed information can be obtained to more accurately evaluate the results. The deficiency of using province-level data also reflects on the concern that the relationship between housing prices and marriage is very likely to be significant in only mega-cities such as Beijing, Shanghai, Shenzhen and other cities of similar economic and social landscapes. With only annual, province-level data, there is simply not enough observation to be included in regressions if this paper were to examine only mega-cities. Since the Bureaus of Civil Affairs in China, regional

and national, release data regarding marriage annually, achieving monthly or seasonal data online does not seem viable. This technical issue leaves the option unavailable to specifically examine big cities where housing prices are of the utmost concerns. Recalling Wei's and Zhang's papers, the discrepancy in their results to a large extent arises from the different sorts of data they were analyzing. This paper, similar to Zhang's, does not find very consistent results despite the effort to cross-analyze different models using diverse specifications.

In summary, using annual province-level data, TSLS regressions compared to OLS and FD show a relatively more trustworthy result that increasing housing prices decrease both the level number and percentage number of people getting married each year. Total money value of housing sales in general negatively influence marriage. Increase in GDP, especially when interacted with the geographic categorization of the province, have significant impacts on marriage. The direction, however, does not appear to be clear and needs further research. Overall this paper contributes to literature by proposing a very interesting yet fallow topic. One promising direction to look at for future study is to improve regression models by including micro-data on a monthly or seasonal basis. Meanwhile, more variables should be also taken into consideration to better capture the variation in marriage. If data can be obtained regarding at what age people are getting married for their first time, more meaningful results will be await since it is most plausible that high level housing prices postpone but not cut off people's progression to get married.

As Wu (2011) explained in his paper, "the best one can do, especially with limited data, is examine as many independent data sources as possible to see if systemic patterns are evident

leading to the same answer". In this paper, multiple regressions within OLS and TSLS models show noteworthy results between marriage and housing prices, suggesting a promising direction and needs for future research. The significance of economics studies, or of any responsible academic paper, lies on their ability to call for attention and spark more general interests in extending the previous knowledge and improving the extant understandings of nature and society. If this paper to any extent has accomplished this goal, the rewards for all the effort that author has contributed to this work will be redeemed.

VII. Reference

Becker, Gary S. "A theory of marriage." In *Economics of the family: Marriage, children, and human capital*, pp. 299-351. UMI, 1974.

Capozza, Dennis R., Patric H. Hendershott, Charlotte Mack, and Christopher J. Mayer. *Determinants of real house price dynamics*. No. w9262. National Bureau of Economic Research, 2002.

Chiappori, Pierre- André, Bernard Fortin, and Guy Lacroix. "Marriage market, divorce legislation, and household labor supply." *Journal of political Economy*110, no. 1 (2002): 37-72.

Green, Richard K., and Patric H. Hendershott. *Demographic factors and real house prices*. No. w4332. National Bureau of Economic Research, 1993.

Jiang, Quanbao, Jesús J. Sánchez-Barricarte, Shuzhuo Li, and Marcus W. Feldman. "MARRIAGE SQUEEZE IN CHINA'S FUTURE." *Asian Population Studies* 7, no. 3 (2011): 177-193.

Lafortune, Jeanne. "Making yourself attractive: Pre-marital investments and the returns to education in the marriage market." *American Economic Journal: Applied Economics* 5, no. 2 (2013): 151-178.

Tian, Felicia Feng. "Transition to First Marriage in Reform-Era Urban China: The Persistent Effect of Education in a Period of Rapid Social Change."*Population Research and Policy Review* 32, no. 4 (2013): 529-552.

Wei, Shang-Jin, and Xiaobo Zhang. *The competitive saving motive: Evidence from rising sex ratios and savings rates in China*. No. w15093. National Bureau of Economic Research, 2009.

Wei, Shang-Jin, Xiaobo Zhang, and Yin Liu. *Status competition and housing prices*. No. w18000. National Bureau of Economic Research, 2012.

Wong, Odalia MH. "The socioeconomic determinants of the age at first marriage among women in Hong Kong." *Journal of family and economic issues*26, no. 4 (2005): 529-550.

Wu, Jing, Joseph Gyourko, and Yongheng Deng. "Evaluating conditions in major Chinese housing markets." *Regional Science and Urban Economics* 42, no. 3 (2012): 531-543.

Zhang, Chengsi, Guojun An, and Xin Yu. "What Drives China's House Prices: Marriage or Money?." *China & World Economy* 20, no. 4 (2012): 19-36.

Zheng, Siqi, Jing Cao, and Matthew E. Kahn. *China's Rising Demand for" Green Cities": Evidence from Cross-City Real Estate Price Hedonics*. No. w16992. National Bureau of Economic Research, 2011.

Zheng, Siqi, Matthew E. Kahn, and Hongyu Liu. "Towards a system of open cities in China: Home prices, FDI flows and air quality in 35 major cities."*Regional Science and Urban Economics* 40, no. 1 (2010): 1-10.

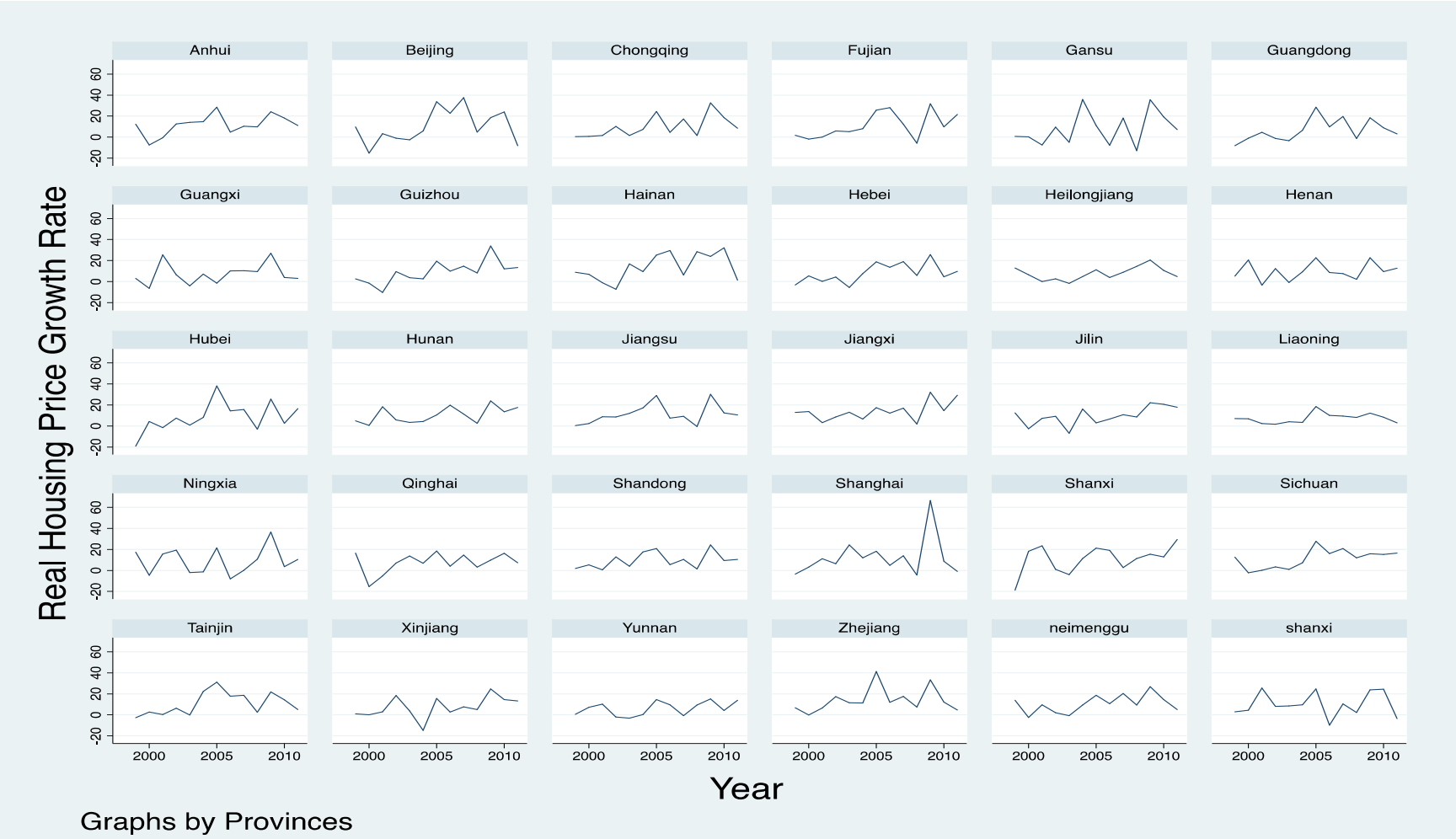

Figure 1

Data Source: Statistical Year Book of China, *National Bureau of Statistics of China*, calculated by author.

Figure 2

Data Source: Statistical Year Book of China, *National Bureau of Statistics of China*, calculated by author.

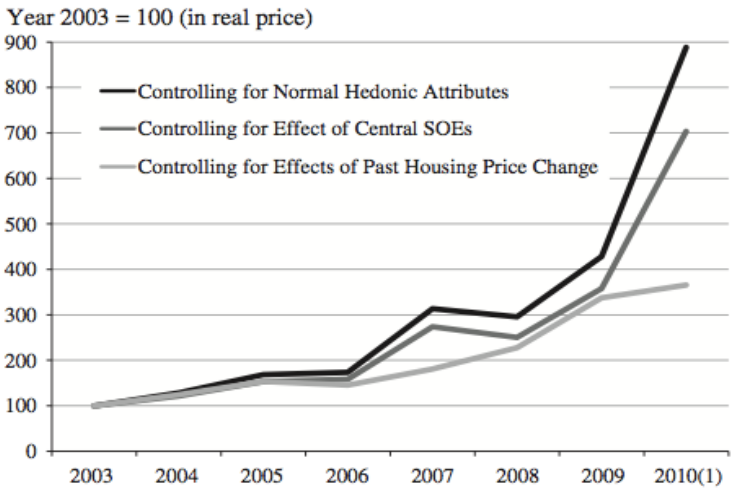

Figure 3

Source: Wu, Jing, Joseph Gyourko, and Yongheng Deng. "Evaluating conditions in major Chinese housing markets." *Regional Science and Urban Economics* 42.3 (2012): 531-543.

Table 1: Summary Statistics

VARIABLES	UNIT	DESCRIPTION	MEAN	SDEV	Observation
Marriage (Level)	Persons	Number of newly married people in the given year	583770.5	399636.1	420
Marriage (%)	100%	Fraction of FirstMarriage over total population in the state times 100	133.8938	36.812	420
Mgrowth	%	100 * (Marriage (Level)n - Marriage (Level)n-1) / Marriage (Level)n-1)	4.082756	19.22678	390
realPrice	Yuan / meter2	Province-level average price of commercial housing in the given year; converted to real price instead of nominal price	2852.889	2234.541	420
logrealPrice	Yuan / meter2	Logarithem term of realPrice	7.769853	0.562851	420
realCost	Yuan / meter2	Province-level average cost of buildings completed in the given year; converted to real costs instead of nominal costs	1386.391	603.4473	420
Divorce	Pairs	Number of pairs of newly-divorced couple in the given year	59171.78	40856.78	420
Sales	10,000Yuan	Total RMB value of sales of housing in the province in the given year	1751.755	1794.215	420
GDP	100,000,000 Yuan	Province-level GDP in the given year	7482.989	8142.597	420
Tpop	10,000 persons	Total population in the province in the given year	4254.723	2571.415	420
Sex Ratio	%	Male over female	104.1121	3.318436	420
College	%	Percentage number of people who obtained a college or higher degree in the given year to Tpop	62.55801	46.49889	420
HighSchool	%	Percentage number of people who obtained a high school degree in the given year to Tpop	122.4605	44.67711	420
CPI		Province-level general Consumer Price Index in the given year.	101.8948	2.585417	420
Coastal		1 if in eastern areas; 0 otherwise			420
GDPandCoas		Internaction: GDP * Coastal	4192.183	8692.291	420
LowLevel		1 if the province's GDP level is within 0 – 33.3 percentile range			420
MediumLevel		1 if the province's GDP level is within 33.3 - 66.6 percentile range			420
HighLevel		1 if the province's GDP level is within 66.6 - 100 percentile range			420
LowPlevel		Interaction: real Price * LowLevel	641.6874	1139.542	420
MediumPlevel		Interaction: real Price * MediumLevel	770.4703	1273.163	420
HighPlevel		Interaction: real Price * HighLevel	1447.392	2675.998	420

Table 2: OLS Regressions With Province Fixed Effects and Time Trends

VARIABLES	(1) Marriage (Level)	(2) Marriage (Level)	(3) Marriage (%)	(4) Marriage (%)
realPrice	12.699		0.015***	
	(15.486)		(0.004)	
logrealPrice		-114,064.128**		29.943*
		(57,102.439)		(16.330)
Divorce	4.290***	4.299***	0.001***	0.001***
	(0.473)	(0.470)	(0.000)	(0.000)
Sales	-30.759***	-28.753***	-0.005*	-0.006*
	(11.035)	(11.017)	(0.003)	(0.003)
GDP	21.302***	21.050***	0.000	-0.000
	(4.555)	(4.509)	(0.001)	(0.001)
Tpop	-9.711	-15.413	-0.022**	-0.020**
	(33.754)	(33.682)	(0.009)	(0.010)
SexRatioMF	-1,352.140	-1,933.956	-0.241	-0.347
	(2,533.063)	(2,517.390)	(0.711)	(0.720)
College	660.288	773.767	0.226	0.297*
	(608.241)	(599.095)	(0.171)	(0.171)
HighSchool	217.221	381.045	-0.126	-0.182
	(603.377)	(606.227)	(0.169)	(0.173)
CPI	-6,812.144	-9,014.843	-1.471	-1.081
	(5,852.474)	(5,910.113)	(1.644)	(1.690)
Plag1	7.274	22.252	-0.000	0.005
	(16.000)	(14.554)	(0.004)	(0.004)
Plag2	-19.377	-16.470	-0.006	-0.003
	(16.185)	(15.769)	(0.005)	(0.005)
GDPandCoas	-11.221***	-11.292***	-0.001	-0.000
	(3.125)	(3.083)	(0.001)	(0.001)
mediumPlevel	-4.502	-3.068	-0.005**	-0.003
	(7.229)	(6.845)	(0.002)	(0.002)
highPlevel	-15.270*	-11.933	-0.010***	-0.006***
	(8.321)	(7.324)	(0.002)	(0.002)
Constant	1075832.280	2291990.210**	383.529*	125.711
	(703,983.957)	(912,167.981)	(197.719)	(260.854)
Observations	360	360	360	360
R-squared	0.689	0.693	0.492	0.479
Number of States	30	30	30	30

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: First Stage Regressions With Province Fixed Effects and Time Trends

VARIABLES	(1) realPrice	(2) logrealPrice
realCost	0.255**	
	-0.11	
logrealCost		0.306***
		(0.046)
Divorce	-0.002	0.000
	(0.002)	(0.000)
Sales	-0.009	0.000
	(0.041)	(0.000)
GDP	-0.028*	0.000
	(0.017)	(0.000)
Tpop	-0.004	-0.000
	(0.124)	(0.000)
SexRatioMF	-18.688**	-0.005**
	(9.439)	(0.002)
College	5.339**	0.000
	(2.213)	(0.001)
HighSchool	-1.312	0.001
	(2.230)	(0.001)
CPI	-4.879	-0.012**
	(21.614)	(0.006)
Plag1	0.478***	0.000***
	(0.052)	(0.000)
Plag2	0.211***	0.000
	(0.058)	(0.000)
GDPandCoas	0.030***	-0.000
	(0.011)	(0.000)
mediumPlevel	0.144***	-0.000
	(0.025)	(0.000)
highPlevel	0.255***	0.000
	(0.027)	(0.000)
Constant	2,877.787	7.568***
	(2,588.101)	(0.775)
Observations	360	360
R-squared	0.961	0.958
Number of States	30	30
Standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		
F -test that all coefficients equal zero: F(29, 304)	2.49	4.81
Prob > F	0.0001	0.0000

Tables 4: I.V. Regressions with Province Fixed Effects and Time Trends

VARIABLES	(1) Marriage (Level)	(2) Marriage (Level)	(3) Marriage (%)	(4) Marriage (%)
realPrice	-106.381		-0.037	
	(128.144)		(0.040)	
logrealPrice		-316,823.504*		-113.766**
		(165,095.668)		(51.822)
Divorce	4.042***	4.361***	0.001***	0.001***
	(0.581)	(0.482)	(0.000)	(0.000)
Sales	-30.024**	-25.328**	-0.005	-0.003
	(12.086)	(11.542)	(0.004)	(0.004)
GDP	17.831***	21.260***	-0.001	-0.000
	(6.204)	(4.604)	(0.002)	(0.001)
Tpop	-11.819	-25.149	-0.022*	-0.027**
	(36.959)	(35.165)	(0.011)	(0.011)
SexRatioMF	-3,076.251	-2,641.349	-0.988	-0.849
	(3,323.660)	(2,624.979)	(1.033)	(0.824)
College	1,329.850	848.557	0.516*	0.350*
	(975.714)	(614.042)	(0.303)	(0.193)
HighSchool	132.275	688.360	-0.163	0.036
	(665.648)	(661.489)	(0.207)	(0.208)
CPI	-8,063.240	-12,693.173*	-2.014	-3.688*
	(6,534.117)	(6,650.628)	(2.031)	(2.088)
	(37,655.815)	(35,374.382)	(11.705)	(11.104)
Plag1	67.130	37.530**	0.026	0.016***
	(66.199)	(18.870)	(0.021)	(0.006)
Plag2	5.648	-16.047	0.004	-0.003
	(32.023)	(16.096)	(0.010)	(0.005)
GDPandCoas	-7.730	-12.079***	0.001	-0.001
	(5.054)	(3.203)	(0.002)	(0.001)
mediumPlevel	12.570	-3.756	0.003	-0.003
	(19.851)	(7.005)	(0.006)	(0.002)
highPlevel	14.543	-11.652	0.003	-0.006**
	(33.077)	(7.477)	(0.010)	(0.002)
Constant	1484408.375*	4376368.351**	560.591**	1,603.042***
	(884,269.931)	(1840691.052)	(274.861)	(577.777)
Observations	360	360	360	360
Number of States	30	30	30	30

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: First Difference on Dependent Variable with Province Fixed Effects

VARIABLES	(1) D. Marriage (Level)	(2) D. Marriage (Level)
realPrice	8.437	
	(17.875)	
logrealPrice		-37,970.699
		(66,258.939)
Divorce	3.508***	3.502***
	(0.546)	(0.545)
Sales	-18.790	-18.097
	(12.737)	(12.784)
GDP	2.319	2.112
	(5.258)	(5.232)
Tpop	8.851	6.878
	(38.962)	(39.083)
SexRatioMF	-3,647.258	-3,901.882
	(2,923.879)	(2,921.059)
College	37.838	99.281
	(702.084)	(695.162)
HighSchool	-804.119	-752.586
	(696.469)	(703.437)
CPI	-252.987	-1,030.465
	(6,755.429)	(6,857.812)
Plag1	2.406	9.507
	(18.468)	(16.887)
Plag2	-2.921	-1.069
	(18.682)	(18.298)
GDPandCoas	-3.035	-2.935
	(3.607)	(3.578)
mediumPlevel	0.580	1.661
	(8.344)	(7.943)
highPlevel	-7.955	-5.790
	(9.605)	(8.498)
Constant	216,275.144	635,563.194
	(812,598.808)	(1058436.099)
Observations	360	360
R-squared	0.257	0.257
Number of States	30	30

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1