

House or Spouse? An Analysis of Home-Purchase Restriction Policy in China

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Affidavit

We affirm that this course paper was written by ourselves without any unauthorised third-party support. All used references and resources are clearly indicated. All quotes and citations are properly referenced. This seminar paper was never presented in the past in the same or similar form to any examination board.

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Abstract

In order to circumvent the home-purchase restriction policies, some families decided to strategically divorce to obtain additional home-purchase eligibility. This paper applies the difference-in-differences approach with the propensity score matching technique on panel data from 2005 to 2019 to estimate the impact of the home-purchase restriction policies on the marriage market. We find that the number of divorce cases, especially in metropolises or the provincial capitals, substantially increases after the restricted-policy implementation. Using the Time-Varying DID method, we further find that the restriction policy's deregulation is associated a decrease in the divorce cases.

Keywords

Home-purchase restriction policies, Fake divorce, DID.

1 Introduction

To restrain the soaring housing prices, China has introduced a series of home-purchase restriction policies implemented in 46 cities between 2010 and 2011. The most typical restriction is that a household that already owned two or more houses was not allowed to purchase any more. However, people can always find the countermeasures against a released policy. One representative example is that a couple can strategically divorce so as to get the eligibility to purchasing the house by separating into two individual "family".

Though most of existing papers study the impact of the property-purchase restriction policy on the housing prices, few investigate the social influence or other externalities that it brought. As [Becker \(1973\)](#) stated, the marital matching quality and exogenous income shock are crucial drivers of divorce, our paper regards the natural experiment of home-purchase restriction as the exogenous income shock on residents' marital relationship, and seeks to investigate the impact of the restriction policy on divorce cases by utilizing a difference-in-differences model.

The rest of the paper is structured as follows: Section II reviews the established literature and provides general information on Chinese home-purchase restriction policy. Section III discusses how we collect data and construct variables, and it introduces our empirical strategy and the various specifications that we will consider. Section IV presents the main results and carries out several robustness checks. Section V focuses on the Chinese home-purchase restriction Policy Deregulation after 2015, and finally in Section VI we draw the conclusion.

2 Literature Review and Policy Background

2.1 Literature Review

Review of Literature on the Economics of Marriage

The economics of marriage pioneered by [Becker \(1973\)](#) argues that the reason for people choosing to marry is that the utility of being married is higher for both partners than when they are single, the poor quality of marriage and the exogenous income shock lower the husband's or the wife's utility, thereby causing the breakdown of the marriage. [Charles and Melvin Stephens \(2004\)](#) investigates the impact of two external income shocks, disability and layoff, on family marital relationships. Their finding indicates that disability has no effect on marital relationships, while layoffs make couples more likely to divorce. [Eliason \(2012\)](#) examines the effects of worker layoffs caused by Swedish corporate bankruptcies on family marital relationships, showing that the layoff for the husbands leads to an 13 percent increase on the divorce rate. Apart from this, [Juho Härkönen \(2006\)](#) finds that the more educated a man and a woman are, the more survival skills they will acquire, and thus the greater the utility gained by the family, and the lower the probability of divorce for the couple.

Review of Literature on the Housing market and Marriage Market

Helmut Rainer (2010) studies the relationship on housing market and marriage market, using UK data to examine the impact of unanticipated housing price changes on divorce and find that negative house price shocks increase the likelihood of divorce. Schmidt and Sevak (2011) further distinguishes the impact on homeowners and renters, finding that a decline in house prices reduces the divorce rate for homeowners, but has no significant effect on renters. Fan (2016) sheds light on investigating the effect of home-restriction policy on residents' divorce, and finds the effect mainly concentrated in urban areas. Chen and Fan (2016) also finds that the purchase restriction policy has significantly increased the divorce rate and remarriage rate in the cities where the restriction policy implemented.

2.2 Policy Background

Since 2000, China's housing prices have been rising at an average annual rate of 8.6%(Liu and Fan (2013)), the Chinese government realized the possible side effects, such as crowding out effects on consumption and creating the investment bubbles that the skyrocketing housing price brought about(Wang and Bao (2011)) and thenceforth have introduced a series of regulatory policies.

First Phase: initial regulation (2010 and 2011)

On September 30, 2010, the Ministry of Housing and Construction, the Ministry of Land and Resources and the Ministry of Supervision in China jointly issued a document explicitly requesting cities with excessively high housing prices to introduce corresponding purchase restriction policies. And as of December 31, 2010, 17 cities had introduced purchase restrictions, limiting each household to purchase one more new house, but without considering the number of houses that the family already owned. Therefore, the restriction did not effectively curb the excessive housing demand. To better curb the soaring housing prices, China's State Council enacted a more stringent purchase restriction policy in 2011, stipulating that families who already own two or more homes are not eligible to purchase further homes (including the second-hand homes). 46 cities in total (including the previous treated cities) implemented this home-purchase restriction by the end of 2011¹.

Second Phase: deregulation (2014)

Since 2014, the restriction policies have started to loosen due to the financial crisis, the European debt crisis as well as the need for domestic economic transformation. In June 2014, the home-purchase restriction policy was firstly announced to be ended in Huhehaote, and thenceforth has been phased out in most cities by the end of 2014.

Third Phase: re-regulation (2016 till now)

From 2016, some cities restarted or upgraded the home-purchase restrictions on their housing market. During this period, the series of regulations, including home-purchase re-

¹The appendix provides the information of the treated cities distribution and the list of the treated group and the control group

strictions, loan restrictions, home-selling restrictions, etc., have varied in different cities in China. Therefore, we will not analyze the impact of restriction policies in this phase.

Motivation of Fake Divorce for Housing

Since the policy implementation is based on a family reference, for those families who own two or more homes, they can split one family into two through faking divorce, and thus have eligibility to purchasing additional homes. Moreover, the fake divorce can also effectively ease liquidity constraints and reduce the housing cost since the interest rate and down-payment requirements for the purchase of a second home are different from those for the first one².

3 Data and Methodology

3.1 Data Resource

This paper uses the data on economy, population, housing prices and residents' marital status of 46 restricted cities (Treated Group) and 36 non-restricted cities (Control Group) in China from 2005 to 2019. The data of urban population, unemployment rate, public investment, education investment, teacher-student ratio and housing price are from China Statistical Yearbook and China Demographic Yearbook. We use STATA to merge data coming from different resources.

The data we obtained cover all the three important periods of the housing restriction policies. We first focus on investigating the effect of the home-purchase restriction policy in the first phase, as the regulations implemented in the 46 cities at that time were approximately the same, which is helpful for our estimation. Further, we also try to examine the impact of the deregulation of home-purchase restriction policy within the treated group in the first phase.

However, it should be noted that each city implemented the home-purchase restriction policy at different time points, but we are unable to capture this timing variation since we have no access to the monthly data for the sample cities. Moreover, the missing data in the relatively undeveloped cities may also influence our estimation results.

3.2 Methodology

In order to estimate the effect of the home-purchase restriction policy on residents' marital relations, we primarily apply a difference-in-differences method(DID) across time and city groups. To account for the potential unobserved city heterogeneity, we further add fixed effects layers to the estimation. A total of 46 cities across the country implemented the purchase restriction policy, which is the treated group in this paper. Based on the need of constructing the DID model, we introduce other 36 (due to data availability problem) non-restricted cities as the control group. The main regression equation can be shown as:

²The mortgage rate for purchasing the first home is the benchmark interest rate, for purchasing the second is 1.1 times of the benchmark interest rate; the down-payment requirement for purchasing the first home is 30%, while for the second home buyer is 60%.

$$divorcecouple_{it} = \beta_0 + \beta_1 DID + \beta_2 \ln_house_price_{it} + \gamma_c + \gamma_y + \epsilon$$

Our main outcome variable of interest is "divorcecouple", representing the total number of divorces in the specific year. $\ln_house_price_{it}$ represents the log transformation of housing price of i city in the t year; DID represents an interaction term of the dummy variable $firstround_i$ (representing whether the city belongs to Treated Group or Control Group) and the dummy variable $time_t$ (representing whether the home-purchase restriction policy is already implemented or not); γ_c and γ_y represent the city fixed effect and year fixed effect respectively.

Table 1 presents the main descriptive statistics for all sample cities in Panel (1), for treated group in Panel (2), and for control group in Panel (3). The "divorcecouple" and "marriagecouple" represent the divorce and marriage cases respectively. The "population", which is the total population of municipal district. "ln_edu_invest" and "ln_public_invest" represent the log transformation of education investment of government and public investment of government respectively. We generate the unemployment ratio "unemploy_ratio", dividing the number of unemployed by the total population. To capture the development of basic education in the local city, we introduce the teacher student ratio in the junior and primary school. We also use the forest_ratio and the number of hospitals as they have great influence on the real estate industry.

Table 1: Summary Statistics

	(1) Full Sample				(2) Policy2011				(3) Non-Policy2011			
	mean	sd	min	max	mean	sd	min	max	mean	sd	min	max
population	2641240.80	2467518.49	150000	14690000	3529390.12	2872269.24	150000	14690000	1492084.34	978464.82	243429	5640000
marriagecouple	52178.80	37486.85	1915	254091	57683.62	35010.14	3544	180600	44148.39	39516.85	1915	254091
divorcecouple	14623.93	17285.32	8	133600	17321.63	15973.67	304	105800	10711.98	18353.08	8	133600
ln_house_price	8.59	0.59	7	11	8.83	0.56	8	11	8.29	0.48	7	10
ln_edu_invest	12.46	1.29	4	16	13.01	1.19	10	16	11.76	1.04	4	14
ln_public_invest	13.78	2.32	4	18	14.15	2.61	4	18	13.31	1.79	4	17
ln_gdp_percapita	11.01	0.81	5	13	11.07	0.95	5	13	10.94	0.55	9	13
unemploy_ratio	0.01	0.01	0	0	0.01	0.01	0	0	0.01	0.02	0	0
junior_teacher_student_ratio	0.07	0.04	0	0	0.07	0.04	0	0	0.07	0.03	0	0
primary_teacher_student_ratio	0.05	0.09	0	1	0.06	0.12	0	1	0.04	0.03	0	0
forest_ratio	118.70	904.17	12	13100	182.11	1211.57	17	13100	39.96	5.59	12	72
hospital	156.66	292.17	6	3482	168.16	165.78	14	1770	142.16	397.77	6	3482
N	1230				690				540			

4 Results for Initial Regulation

4.1 The Parallel Trend Assumption

Figure 1 and Figure 2 show the trend of the number of divorce cases and the divorce rate in treated and control cities from 2005 to 2019. The difference in the trend, especially for the control group, between the two figures is clear to be seen. One of the explanations is the irregular show-ups of the missing values in our dataset. Most of the control cities have missing values either in population data or in the divorce data, hence, the divorce rate using the aforementioned two variables to calculate will contain more missing values. For this reason, we will use the number of divorce cases in the following analysis.

Figure 1 shows that the divorce trends in cities with and without home-purchase restrictions were roughly the same before implementing the restriction policy, and began to

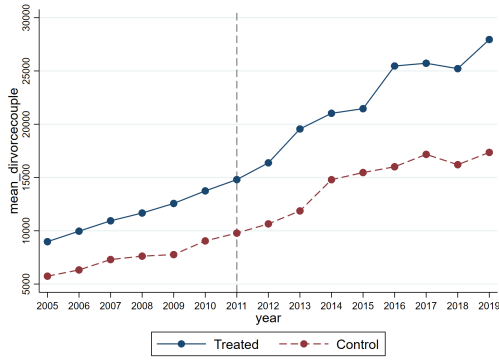


Figure 1: Mean of Divorce Couple

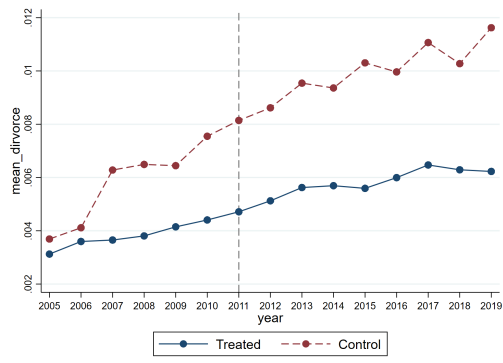


Figure 2: Ratio of Divorce Couple

show differences after the implementation of the policy, indicating that the parallel trend assumption holds for our study sample.

4.2 DID Result

Table 2: DID Result

	(1)	(2)	(3)	(4)
	mean_dirvorcecouple	mean_dirvorcecouple	mean_dirvorcecouple	mean_dirvorcecouple
did	3159.0*** (58.65)	3202.0*** (2.087)	3034.2*** (226.3)	3190.4*** (20.80)
ln.house_price	2000.0*** (222.2)	57.94** (25.02)	7639.5*** (387.5)	579.5** (242.1)
Time-FE	NO	YES	NO	YES
City-FE	NO	NO	YES	YES
Observations	1148	1148	1148	1148
R-squared	0.802	0.989	0.858	0.989

Standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

Table 2 reports the estimates of how the home-purchase restriction policy change affected residents' divorce decisions. From Column 1 to Column 4, we step by step introduce time fixed effects and city fixed effects with a total number of 1148 of observations. The main coefficient of interest on *did* is always positive and statistically significant at 1% significance level. Both the point estimate reported in Table 2 and Figure 3 indicate that after the implementation of the home-purchase restriction policy, there is an increase of 3190 in divorce cases on average.

4.3 Heterogeneity Test

In this part, we want to figure out whether the city is Metropolis or Provincial Capital would be differently affected by the home-purchase restriction policy. Accordingly, we divide the total sample into two groups in the light of whether the city belongs to Metropolis and whether the city belongs to Provincial Capital.

Table 3 reports estimates for the total sample split by metropolis and provincial capital. An intriguing finding through comparing column (1) with column (2), column (3) with (4) is that the coefficients of metropolis group and provincial capital group are much larger

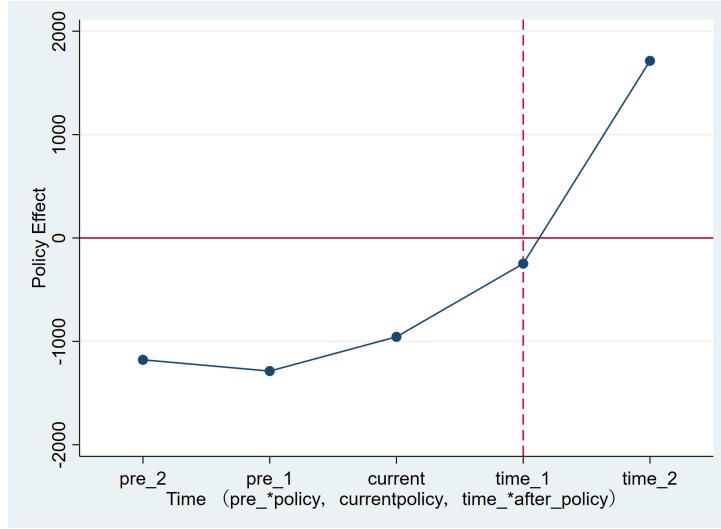


Figure 3: Policy Effect

than those of non-metropolis group and non-provincial capital group, indicating that the impact of home-purchase restriction policy on the "Fake Divorce" would be greater in the more developed area.

To rationalize this difference, one should consider that the population size of metropolis cities or provincial capital is much larger than that of non-metropolis cities or non-provincial capital. Moreover, since housing prices are higher in metropolises and provincial capitals, in which with better education system and infrastructures, people there are more motivated to fake divorce to have eligibility to buying additional homes for the investment and speculation gains. Given the influence of the traditional Chinese culture, it is also probable that compared with metropolises or provincial capitals, there is still stigma attached to being divorced in non-metropolises and non-provincial capitals. Furthermore, people in these less-developed areas are more likely to know each other, hence, they are less willing to take the risk of getting divorced.

Table 3: Result of Heterogeneity Test

	(1) Metropolis	(2) Non-Metropolis	(3) Provincial Capital	(4) Non-Provincial Capital
did	10261.6*** (238.4)	2270.3*** (14.10)	5743.5*** (52.15)	-892.5*** (1.061)
Time-FE	YES	YES	YES	YES
City-FE	YES	YES	YES	YES
Observations	560	1092	910	742
R-squared	0.971	0.990	0.982	0.994

Standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

4.4 Placebo Test

We further construct a placebo test to examine if the the measurement error, which may cause the endogeneity problem, exists in our estimation. We randomly selected 46 cities in the total sample as the treatment group, and the rest as the control group. Repeating

the above randomization process 500 times, we find that the effect of the home-purchase restriction policy on the number of divorce cases is no longer significant.

Figure 4 presents the distribution of coefficients after randomly generating the treated group 500 times. The coefficients centralized around zero, and far smaller than our true estimate of 3190.4 (as the red dashed vertical line shows). This suggests that our estimates are unlikely to have been obtained by chance or influenced by other policy and stochastic factors.

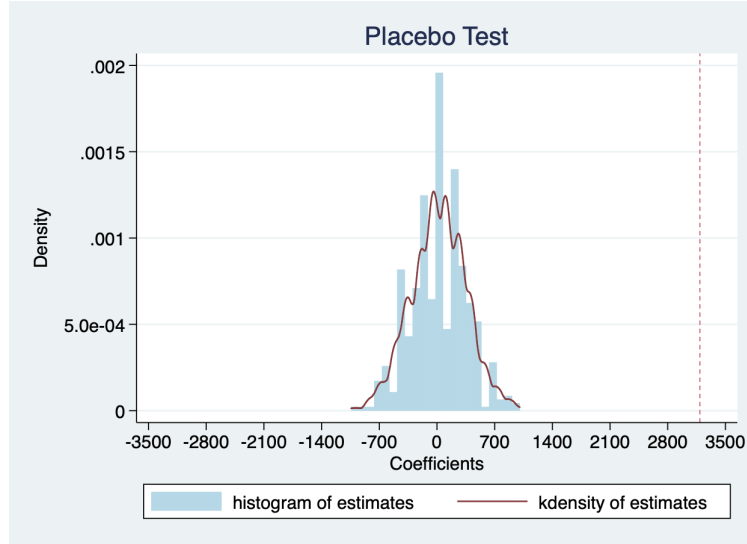


Figure 4: Placebo Test

4.5 Propensity Score Matching and DID

Although this paper adopts the quasi-experimental method, DID, to analyze the impact of the home-purchase restriction policy, it still cannot solve the endogeneity problem caused by the selection bias as the randomization is not feasible. In our case, it is obvious that the selection of cities to implement the purchase restrictions is not random, but most influenced by housing prices. Besides, it is difficult to find control cities, comparable with the first-tier cities, such as Beijing, Shanghai, Guangzhou, and Shenzhen, in the treated group. Thus, using only the DID method will result in a biased estimate.

Considering the baseline heterogeneity, we therefore introduce the Propensity Score Matching (PSM) method to our DID model. Conditional on the covariates we use, which are education investment, public investment, GDP per capita, unemployment ratio, teacher-student ratio, green area ratio and the number of hospital, we assume that the treatment is independent of the potential outcomes, and the Conditional Independence Assumption (CIA) holds.

Based on above-mentioned observed characteristics, we use the caliper matching method to identify treatment and control groups with similar probabilities of being selected in a treatment. Figure 5 shows that most true treated and control groups are within the same range, indicating the sample data satisfies the common support condition. Figure 6 presents the difference between treated group and control group becomes smaller, in which means that the selection bias is reduced by matching.

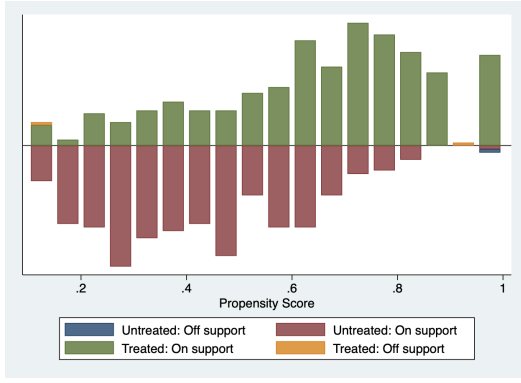


Figure 5: Common Support for the Distribution of Propensity Scores

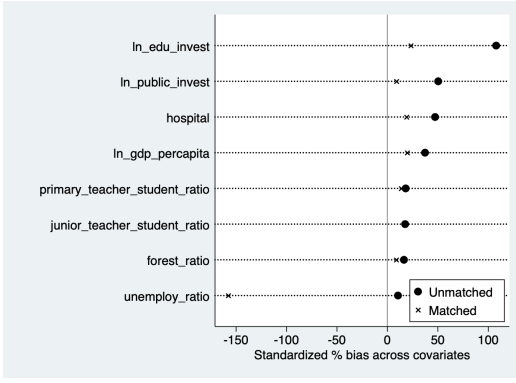


Figure 6: Reduced Bias in Covariates after Matching

Table 4 compares the results of DID with original sample and DID with PSM sample. After matching, the number of observation decreases from 1148 to 631, and the coefficient of interest decreases from 3190 to 2456, significant at 1% significance level.

Table 4: PSM-DID Result

	(1)	(2)
	mean_dirvorcecouple	mean_dirvorcecouple
did	3190.4*** (20.80)	
psm_did		2456.4*** (53.75)
Time-FE	YES	YES
City-FE	YES	YES
Observations	1148	631
R-squared	0.989	0.986

Standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

5 Results for Deregulation: Time-Varying DID

Subsequently we extend our analysis by investigating how deregulation on the real estate affects the marriage market. Most treated cities in the first phase have successively deregulated the restriction policy since 2014. As these cities ended the policy at different time, we use the differences-in-differences with multiple time periods method to estimate the effect of the deregulation. The regression is as follows:

$$divorcecouple_{it} = \beta_0 + \beta_1 Deregulated_{it} + \beta_3 \sum Z_{it} + \beta_4 X + \gamma_c + \gamma_y + \epsilon$$

Where, $Deregulated_{it}$ representing whether the city deregulated the home-purchase restriction policies or not; Z_{it} represents the difference between current year and when the

city deregulated the home-purchase restriction policies; γ_c and γ_y represent the city fixed effects and year fixed effects respectively.

Among the 46 cities which implemented the home-purchase restriction policies during the first phase, there are 19 cities deregulating the policies and 27 cities still implementing the policies. We regard the 19 cities as the treated group and the rest as the control group. With the term "event" calculating the difference between current year and when the city deregulated the home-purchase restriction policies in STATA, we can indicate whether the city is before, during or after the deregulation policy implemented. Similarly as before, we add the city fixed effects and year fixed effects to control for unobserved characteristics .

Table 5 presents the difference-in-differences with multiple time periods estimates. In Column 4, the coefficient is statistically significant at 1% level and indicates that, holding other factors constant, the deregulation of home-purchase restriction policies is associated with a decrease of 2071 in divorce cases on average. However, we are not able to conclude that this change is caused by the deregulation on the real estate industry. After the initial regulation in the first phase, cities have acted differently to regulate the real estate industry. Many other policies, such as the home-sale restriction policy ³ and the "many school scribbling" policy ⁴ have limited the family's arbitrage behaviours and "fake divorce" decisions, indicating that our model is highly likely to lead to biased estimates.

Table 5: Results for Deregulation (DID with Multiple Treatment Periods)

	(1)	(2)	(3)	(4)
	ex_dirorcecouple	ex_dirorcecouple	ex_dirorcecouple	ex_dirorcecouple
now	-4481.0*** (511.6)	-4634.1*** (185.3)	1067.2** (521.1)	-2071.7*** (199.0)
after1	-1534.1*** (352.2)	-4554.9*** (256.0)	3820.9*** (389.9)	-2035.5*** (248.9)
after2	-1214.0*** (407.5)	-3807.0*** (243.5)	3488.0*** (318.1)	-1158.8*** (181.2)
after3	-1352.0** (510.1)	-2671.2*** (342.6)	3001.2*** (517.1)	100.3 (257.0)
ln_house_price	7160.9*** (614.1)	1257.1*** (281.7)	12207.9*** (355.8)	-70.72 (161.8)
policy2	7496.4*** (411.3)	1494.4*** (330.0)	651.3*** (212.6)	633.1*** (178.4)
Time-FE	NO	YES	NO	YES
City-FE	NO	NO	YES	YES
Observations	644	644	644	644
R-squared	0.566	0.965	0.831	0.995

Standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

³This policy requires that the newly purchased house can be traded after 3 years of obtaining the property certificate, restraining people's speculation demand on houses.

⁴This policy helps to curb the skyrocketing housing prices near the well-known schools as one area corresponds to many schools.

6 Conclusion

In this paper, we have investigated how the home-purchase restriction policy affect people's marital relations, finding that the number of divorce cases substantially increases after the implementation of the regulation. The results show that the home-purchase restriction policy leads to an increase of 3190 in divorce cases on average. Moreover, people living in metropolises or the provincial capitals are more likely to "Fake divorce" to obtain the additional home-purchase eligibility.

Furthermore, this paper also assesses the effect of the deregulation of home-purchase restriction policies by adopting the DID with multiple time period method. We find a dramatically decrease of divorce cases associated with the restriction policy deregulation.

However, as the relatively undeveloped cities (control group) have more missing data, we would suggest that there may be a positive bias on our estimates of the impact of the home-purchase restriction policies on people's "fake divorce" strategy. Considering China's special conditions, this kind of results are difficult to be generally replicated in other countries with different political systems and cultural backgrounds. Taking these caveats into account, we believe that our paper provides some causal evidences that the home-purchase restriction policy affects divorce, but cannot have useful policy implications for other countries and areas.

Beyond this, there is still much to do in the further studies. For example, it is worth comparing the home-purchase restriction policy in the first phase (2010 and 2011) and that in the third phase (after 2016). The substitution effect of the home-purchase restriction policies should also be estimated, that is, the families in the home-purchase restricted cities do not "fake divorce" for the sake of purchasing houses, but choose to buy houses in the neighboring non-restricted cities, thus causing the spatial shift of the rise of house prices. To analyze this kind of spillover effect, we should also consider the population mobility between cities, from restricted cities to less-restricted cities and from less restricted cities to non-restricted cities.

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Appendix

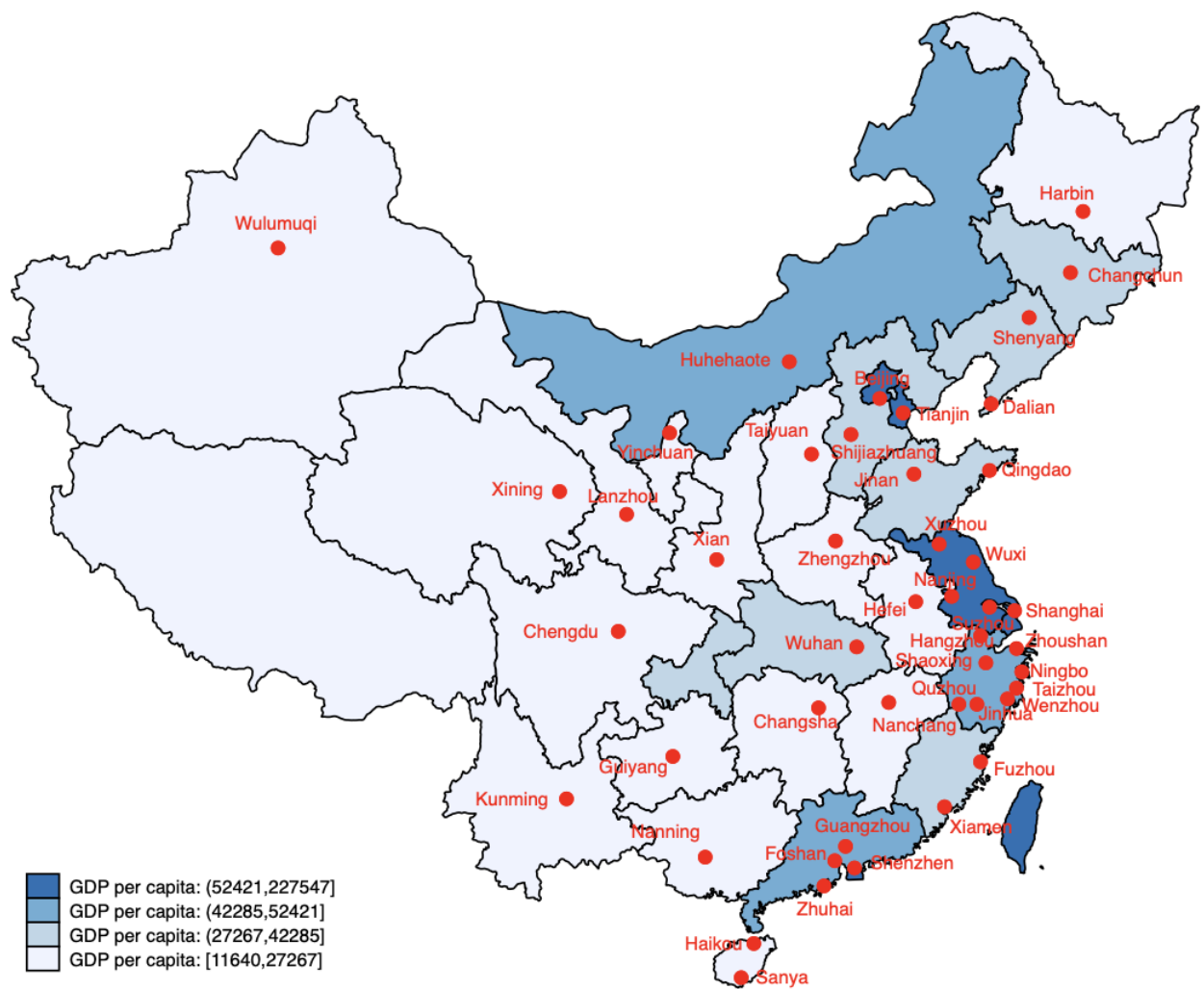


Figure 7: The map of treated cities

City List

Policy Implementation since 2011

Treated Group:

- Sanya, Shanghai, Wulumuqi, Foshan, Lanzhou, Beijing, Nanjing, Nanning, Nanchang, Xiamen, Taizhou, Hefei, Huhehaote, Haerbin, Dalian, Tianjin, Taiyuan, Ningbo, Guangzhou, Xuzhou, Chengdu, Wuxi, Kunming, Hangzhou, Wuhan, Shenyang, Jinan, Haikou, Shenzhen, Wenzhou, Zhuhai, Shijiazhuang, Fuzhou, Shaoxing, Zhoushan, Suzhou, Quzhou, Xining, Xian, Guiyang, Zhengzhou, Jinhua, Yinchuan, Changchun, Changsha, Qingdao

Control Group:

- Dongguan, Linyi, Lishui, Baoding, Kelamayi, Nantong, Jilin, Xianyang, Jiaxing, Datong, Ningde, Yichang, Changzhou, Huizhou, Yangzhou, Fushun, Qujing, Liuzhou, Zhuzhou, Shantou, Quanzhou, Luoyang, Zibo, Huzhou, Zhanjiang, Baiyin, Shizuishan, Mianyang, Putian, Lianyungang, Zunyi, Eerduosi, Anshan, Maanshan, Qiqihaer, Longyan

Policy Deregulation since 2014

Treated Group:

- Wulumuqi, Lanzhou, Nanning, Hefei, Huhehaote, Haerbin, Taiyuan, Wuxi, Kunming, Wuhan, Shenyang, Jinan, Suzhou, Xining, Xian, Zhengzhou, Jinhua, Yinchuan, Changchun

Control Group:

- Sanya, Shanghai, Foshan, Beijing, Nanjing, Nanchang, Xiamen, Taizhou, Dalian, Tianjin, Ningbo, Guangzhou, Xuzhou, Chengdu, Haikou, Shenzhen, Wenzhou, Zhuhai, Shijiazhuang, Fuzhou, Shaoxing, Zhoushan, Quzhou, Guiyang, Changsha, Qingdao