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Family in China: Later Marriage, Spousal Bargaining and Intra-Household Decision Making

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Abstract

The family is the basic socio-economic unit for society, as it is regarded as crucial to organise income generation, allocate resources to its members and provide emotional and welfare support among many other activities. Despite major changes over time and enormous variations across social and economic environments, the family remains the most influential of all institutions. Through the analysis of the family, one could not only gain a thorough understanding of the social change, but also give a scientific prediction of an individual's economic behaviour. Therefore, whether in the field of Economics or Sociology, the study of the family is getting more and more attention.

Marriage forms the initial relationship of a family. The basic function of marriage is to act as a fertility system aiming to prolong the human continuity. In ancient times, a majority of marriages are arranged by feudal patriarchal in order to resist the uncertainty and limited information brought about by the affiliation with unfamiliar families. With the advent of the market-oriented economy and the transition to modern society, individuals obtained more and more decision power, and economic incentives are becoming increasingly important in the process of marital decision-making. Drawing on the definition from Family Economists: marriage is now a voluntary partnership for the purpose of joint production and consumption. Hence, the rationale of analysing marriage and family is changing over time. The models of family decision making no longer treat the household as a single decision-making entity, but emphasise the impact of the bargaining process between spouses. Thus, the approaches analysing household behaviour become far more complex than before, since the trajectory of the family could vary differently across diverse social backgrounds and cultural settings.

China is known for its universal and stable marriage. However, there are new trends in China, such as later marriage, rising divorce rates, decreasing fertility, and shrinking family size. Although these changes are not as dramatic as those in the west, they could have significant implications on demographic structure and economic development, due to the huge overall population in China. Hence, it is of great value to investigate these changes and to propose valuable suggestions. But which model would be the best to analyse the modern Chinese family? On the one hand, from the perspective of cultural heritage, China has a long history of the traditional Confucian culture that still plays a role in modern times. Given this context, the Unitary model emphasising household as a single decision-making entity may be appropriate to describe the Chinese family, because the husband who is the head of household arranges resource allocation and the preference of the family reflects the common goal set by the household head.

On the other hand, from the perspective of modernization, marriage in modern China is losing its function as a result of the high levels of marketization since the reform and opening up in 1978. Most of the gains from marriage, such as division of labour and risking pooling, could be achieved without marrying others because nearly all services are provided by the market or by governments. In the meantime, women's social status is substantially enhanced through the narrowed gap between men's and women's years of schooling, and women's increasing participation in the labour market. Chinese women have more bargaining power both when choosing partners before marriage and when negotiating with their spouses within a marriage. In this case, the Collective framework would be best to describe the Chinese family, thus explaining the mechanism of spousal bargaining.

Moreover, due to the vast territory, the pace of socio-economic transformation is different from region to region. There is a huge gap exists between rural and urban areas, coastal and non-coastal areas, in terms of the speed of urbanization, the coverage of the social security

system and the modernity of cultural values. Therefore, it is very difficult to conclude whether the Chinese family today is modern or traditional. It is also impossible to apply a one-size-fits-all model to analyse marriage and family in China.

In addition, people's family life has also experienced severe intervention from the government. The one-child policy is one of the best examples, leading to a sharp decline in fertility and an aging population nowadays. China also experienced massive population migration after the relaxation of the "hukou" system, which significantly impacts the family structure and caused social problems such as empty-nest families and leftover children. Hence, when analysing Chinese marriage and family, these particular features should not be ignored.

Although not all social issues related to marriage in China can be covered in a thesis, we choose three typical topics to give a thorough investigation, which hopefully contributes to the study of marriage and intra-household decision making in China.

Marriage formation is a starting point to study marriage and family. As an indicator of social change, the determinants of marriage timing have been investigated by numerous studies due to their important implications for fertility and population aging. Given the context of China, with its dramatic economic growth and rapid social change, we suggest that the modernity of family values will affect an individual's decision of when to get married, as suggested by both the modernization theory and the Second Demographic Transition theory. However, the relationship between ideational change toward the family and the delay of marriage has been under-investigated. Unlike previous studies utilizing public values to analyse the trend of marriage delay at an aggregate level, the first paper investigates the determinants of the individual's late first marriage by including individual-level attitudes toward traditional family values as an explanatory factor, using the 2014 wave of the Chinese Family Panel Study (CFPS). Our main findings

suggest a significant positive impact of holding less traditional family-related attitudes on the probability of having a late first marriage. It is worth noting that this positive effect is more statistically significant for women's marriage timing compared to men's, and for urban areas compared to rural areas. When looking at the heterogeneous effects across different education levels and regions with different economic development, a significant positive effect is found between the score for family-related attitudes and the late first marriage status for both men and women in the region with highest GDP level, and only for women with the highest education level. Consistent with Becker's specialization model, the impact of socio-economic factors shows opposite effects for men and women on the probability of having a late first marriage. This research demonstrates that ideational change toward family values boosts age at first marriage, while socioeconomic factors are also important parts of the picture. Since this paper provides a new perspective for understanding the determinants of marriage delay, policymakers in China or in other societies with a similar cultural background may benefit from our findings.

The second paper is inspired by the rapidly aging population and the care needs of the vulnerable oldest-olds. Given the central role in the Chinese culture of the family supporting older generations and the lack of publicly provided health support in China, the elderly often rely on their children for both care and financial assistance. Although the motives of intergenerational transfer have been explained by several models, scholars have overlooked the situation where most of the adult children are married and how much support for parents is jointly decided by spouses. Following the idea that spousal bargaining power affects married couples' transfer to both paternal and maternal elderly parents, the second paper tested Ham and Song's (2014) Two-stage Bargaining model by providing empirical evidence from China. Using the China Health and Retirement Longitudinal Study (CHARLS) dataset, this paper finds a significant positive relationship between the relative bargaining power of the husband (wife) and the share of the couple's

amount of transfer toward the husband's (wife's) parents. This positive effect is found to be more sizable and statistically significant in urban areas compared to rural areas, and for high-income households compared to relatively low-income households. Moreover, besides the share of transfer, we also explored other forms of transfer such as the transfer pattern (whether transferred or not, transferred to whom) and the actual amount of transfer to both sets of parents respectively. The results are consistent with the baseline findings. The second paper has several contributions. First, the focus on Chinese households is motivated by family-based elderly care and a rapidly aging society. In this regard, this paper provides a novel contribution to the literature on family economics in China, helping to merge the study of elderly support with works on household bargaining. Second, our study provides more comprehensive evidence of the impact of spousal bargaining power by exploring three bargaining outcomes regarding the upward transfer, compared with previous studies which only consider one of the outcomes. Finally, as we find a new determinant of intergenerational transfer to elderly parents, this paper has important policy implications for developing countries such as China, where the elderly lack publicly provided social support and rely on family for help.

The third paper is inspired by the new marriage law in 2011. Our research question is: how do couples react to this marital shock? Accounting for 70% percent of family wealth on average, the house is one of the most important household assets in the Chinese family. However, most of the residential properties in China are owned by men. This, by and large, comes from the Chinese marriage custom that the man or his family buys the house, and the woman or her family provide the dowry. Previously, there existed no problem, as the family home had been considered joint property regardless of under whose name it was registered and whether it had been bought before or after marriage. However, the implementation of the new marriage law in 2011 potentially changed the distribution of family wealth between spouses, transferring the wife's part of property ownership to the husband. Due to the disproportionate

benefits upon divorce, the wife may feel less secure and reduce her investments in marital-specific goods, thus leading to a problem of limited commitment between spouses. Although many studies have demonstrated it can induce a reduction of a couple's investment in marriage-specific capital, housing property appears to be an exception due to its function of insurance. In this paper, we propose that the married couple may adopt two strategies: changing the status of house ownership and investment in more houses. The first strategy could directly offset the influence brought about by the legal change, while the second strategy makes houses serve as a "commitment device" for the husband and provide insurance and incentives to his wife. Using the CFPS 2010-2016 dataset, this paper adopts a Fuzzy DID strategy to identify the impact of the new marriage law by employing the local 5-14 female/male sex ratio in 2000 at county-level as the continuous variable to measure the intensity of the treatment. We found that there are significant positive effects of the legal shock on the couple's reactions both in terms of changing the property ownership and investing in more houses. The results show robustness after conducting various analyses of heterogeneity and placebo tests. The third paper is the first to empirically examine how married couples will react to the marital instability brought about by China's new marriage law. The findings in this paper suggest the change of marriage law may have additional outcomes. The indirect effects should not be ignored by policymakers when designing policies.

As with most studies on these topics, our research is also limited in some ways. First, the dataset we use has a limited length of period, which posits challenges in avoiding estimation bias. Second, although various measurements of bargaining power are employed in this thesis, it still fails to find a perfect one to reflect the true position of each spouse in the marriage. Third, the contribution of this thesis is insufficient at the theoretical level. Future work may benefit from utilising longitudinal data with a longer period and extending the theoretical models of former scholars.

I would like to dedicate this thesis to my beloved wife Boyan and our baby girl Kaiyu.

Declaration

I hereby declare that except where specific reference is made to the work of others, the contents of this dissertation are original and have not been submitted in whole or in part for consideration for any other degree or qualification in this, or any other university. This dissertation is my own work and contains nothing which is the outcome of work done in collaboration with others, except as specified in the text and Acknowledgements. This dissertation contains 44957 words including appendices, bibliography, footnotes, tables and equations.

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1. What Determines Marriage Delay in Modern China? The Contribution of Family-Related Attitudes

1.1. Introduction

As an indicator of social change, numerous studies have stressed the important implications of marriage timing for fertility, population aging, labour force participation, and the maintenance of social care programmes (Nobles & Buttenheim, 2008; Xie, Raymo, Goyette, & Thornton, 2003; Yabiku, 2004). According to the China 2005 1% Population Inter-census data, the average age of first marriage increased from 20 in the 1940s birth cohort to 23 in the 1980s birth cohort for female; and from 24 in the 1940s birth cohort to 25 in the 1980s birth cohort for male. Although the degree of marriage delay is not as dramatic as in its cultural neighbours such as Japan and South Korea, China's increasing number of singles still draws scholars' attention due to the huge overall population.

Due to the fertility control policy of the early 1980s, the population in China is aging at a rapid rate, even faster than in many Western countries (Chen & Liu, 2009; Fang et al., 2015). Since non-marital childbearing is normally not accepted by the public, the linkage between marriage and bearing children is strong in China (Cai, 2010). If marriage continues to be delayed, China will face even greater population pressure in the future. Therefore, exploring the determinants of late marriage in China is of great value to both academic study and policy makers.

As a global trend, the delay of marriage has been explained from the standpoint of many theories. Scholars taking the viewpoint of modernization theory propose that marriage is losing attraction to people as the functions of the family are replaced by other institutions in a highly modernized society (Browning, Chiappori, & Weiss, 2014). Based on Becker's (1991) Specialization and Trading Model, studies show that

earning capacity in the labour market may have very different implications for men and women when finding spouses (Grossbard-Shechtman & Neuman, 1988). However, the Marriage Searching Model argues that both men and women postpone their marriage in favour of preparation for their career and to search for a suitable partner, and that women's high economic prospects should be valued in the marriage market (Oppenheimer, 1988, 1997). From a cultural shift perspective, scholars find that less traditional family values are emerging with the process of modernization, which gives rise to the trend of marriage delay (Inglehart, 1990; Inglehart & Norris, 2003). Moreover, the theory of Second Demographic Transition (SDT) directly points out that the economic models are incomplete without the ideational factors in explaining the changes in the family and marriage (Lesthaeghe, 2010).

With the long history of traditional Confucian culture, China is known for the power of family and a deeply entrenched gender division of labour. Regarding the determinants of marriage delay in China, past literature has mainly focused on the impacts of an imbalanced sex ratio and personal socio-economic attributes. Consistent with Becker's specialization model, empirical findings all demonstrate that increasing socio-economic status could delay women's marriage and increase men's chances of marriage. These findings also suggest that the prevailing mate selection criteria are still underlying traditional gender roles in China. Under these circumstances, the modernity of family values should affect an individual's decision about marriage (Bystrov, 2014). For instance, people with less traditional views toward the family may value individual autonomy and self-fulfilment more, thus delaying marriage formation. Several studies have identified the trend of changing family and gender values in China (Hu & Scott, 2016; Yeung & Hu, 2016). However, the relationship between ideational change toward the family and the delay of marriage has been under-investigated. In this paper, we aim to explore the causal effect of ideational orientation toward the family on the individual's timing of marriage to fill in the research gap.

Unlike previous studies utilizing public values to analyse the trend of marriage delay at an aggregate level, we investigate the determinants of the individual's late first marriage by including individual-level attitudes toward traditional family values as an explanatory factor. Using the 2014 wave of the Chinese Family Panel Study (CFPS), we define respondents with "late first marriage"[1] as those 'never-married' men older than 25, and 'never-married' women older than 23 in the year 2014. Our main findings suggest a significant positive impact of holding less traditional family-related attitudes on the probability of having a late first marriage. It is worth noting that this positive effect is more statistically significant for women's marriage timing compared to men's, and for urban areas compared to rural areas. When looking at the heterogeneous effects by different education levels, a significant positive effect is found between the score of family-related attitudes and late first marriage of women with the highest education level. When investigating the heterogeneous effects by regions with different economic development, a significant positive effect is found between the score of family-related attitudes and the late first marriage of both men and women in the region with highest GDP level. This paper also found significant impact of personal socio-economic attributes on the delay of marriage. The impact of socio-economic factors showed opposite effects for men and women on the probability of having a late first marriage, which is consistent with previous studies.

The remainder of this paper is organised as follows. Section 1.2 reviews the theories and previous studies. Section 1.3 outlines the context of China. Section 1.4 propose the hypotheses. Section 1.5 describes the data and the measurement of the main variables. Section 1.6 empirically analyses the casual effect of the individual's family-related attitudes on the late first marriage status. Section 1.7 presents the interpretation of

[1] Many studies have argued that marriage remains universal in contemporary China and most people will get married ultimately (Piotrowski, Tong, Zhang, & Chao, 2016; Xu, Li, & Yu, 2014). Therefore, we assume older young never-married respondents in 2014 will get married in the future.

the main results and heterogeneous effects across gender, rural-urban, education level and GDP level. Section 1.8 employs various robustness checks. Section 1.9 presents the conclusion and discussions.

1.2. Literature Review

1.2.1. Specialization and Trading Model

Although the sexual attraction which triggers “blind trust” or “love” between male and female is an emotional and biological motive for marriage, it is commonly believed that economic reasons play an important role in determining an individual’s marital decision (Browning et al., 2014). From the economists’ point of view, people will go into marriage when the utility from marriage exceeds that from remaining single. As for the gains from marriage, a longstanding consensus is that the gender specialization of labour based on spouses’ relative productivities could create increasing returns and mutual dependence of spouses (Becker, 1991; Parsons, 1943). For example, men adopt the role of breadwinner and women account for housework and childcare. The intrinsic sex differences in the biology of reproduction (or discrimination against women) tend to induce re-enforcing investments in the productive skills of men and women, respectively, in market and nonmarket production (Becker, 1991). This is known as Becker’s “specialization and trading” model, showing the way in which spouses exchange the fruits of these different skills and maximize their utility from marriage.

Under Becker’s model, earning capacity in the labour market may have very different implications for men and women when finding marriage partners for the traditional family pattern. For men, success in the labour market, like high income or education level, should increase their desirability in the marriage market. For women, more involvement in the labour market means less time devoted to domestic work, which could decrease their desirability to men. Hence, high economic status is assumed to advance men’s marriage timing and postpone women’s formation of marriage.

Much empirical evidence supports Becker's "specialization and trading" model. Based on the data from the United States, Preston and Richards (1975) found that women's employment opportunities have a negative relationship with marriage rates among 22-24 years-olds. Cready, Fossett, and Kiecolt (1997) also found that for African-American marriage in both metropolitan and non-metropolitan areas, men's socioeconomic status has a positive effect on marriage formation while that of women showed the opposite effect. Regarding macro-level factors, Bertrand, Kamenica, and Pan (2015) proposed that marriage rates will decline when a randomly chosen woman becomes likely to earn more than a randomly chosen man. Similar evidence is also found for Eastern countries. Using survey data from Japan, Raymo (2003) found that women's educational level is positively related to the timing of their first marriages. In Taiwan, Chen and Chen (2014) found that young Taiwanese men with low levels of education are disadvantaged in the marriage market, while young women with a high level of education are more likely to postpone marriage.

1.2.2. Marriage Searching Model

Another theory explaining marriage delay is presented in Oppenheimer's (1994, 1997) work. She further developed Becker's model, clarifying that the changes in marriage observed by many studies are shifts in marriage timing, not the overall decline in marriage (Coughlin & Drewianka, 2011; Goldstein & Kenney, 2001). On the basis of Job-Searching theory, Oppenheimer (1988) proposed a Marriage Searching Theory concerning the delay of marriage. She argued that it is the degree of uncertainty about future and current attributes that affects marriage timing. Since the major source of uncertainty lies in the transition to an adult economic role, young people may attempt to resolve some uncertainty about their career before entering the marriage market in order to attract better mates (Bergstrom & Schoeni, 1996; Bergstrom & Bagnoli, 1993).

Considering the traditional marriage pattern where the gender role is differentiated, young men's timing of transition to a stable work career should determine both men's and women's age of marriage under Oppenheimer's framework, as there is much less uncertainty about women's future attributes because they mainly perform domestic roles which could be learned primarily in the parental home in early life. Moreover, Oppenheimer (1988, 1994) suggested that when women increasingly invest in labour market skills over time, they will resemble men's levels of future career uncertainty. Under these circumstances, women's transition to work could also lead to their own delayed marriage. On the other hand, when looking at the modern societies where both spouses can make economic contributions to increase the total wealth of their marriage, Oppenheimer (1988, 1994) proposed that women's high economic prospects should be valued in the marriage market. People remain single because they need more time to find a better partner to cooperate in the future.

1.2.3. Modernization Theory

Marriage is the start of a family. However, the family is losing its functions as a result of the social transformation from traditional societies to industrial societies or post-industrial societies (Goode, 1963; Parsons, 1943). Although economists and sociologists use different approaches to analyse changes in marriage and the family (Browning et al., 2014), they have reached a consensus that the important function of marriage as a tool for family formation is diminishing. As noted by Becker (1991; p.178): "the economic role of the family should decrease in a long-term trend when the market and the state replace more and more family functions." In other words, the gains previously yielded from marriage are nowadays in decline.

Weiss (1997) proposed that there are five kinds of gains from marriage: (1) division of labour to exploit comparative advantage or increasing returns; (2) extending credit and coordination of investment activities (e.g. one spouse works when the other is in education); (3) sharing information and reducing costs (e.g. use of the same home and facilities); (4) risk pooling; (5) fulfilling the desire for reproducing and rearing one's own children. However, in a modernized society with high levels of marketization, most of these gains could be achieved without marrying others because nearly all services are provided by the market or by governments. For instance, with good medical or unemployment insurance, one does not need to rely on a spouse or child. With modern services and technologies, most of the housework can be done by homecare companies or machines. Moreover, given the changing laws in many countries, giving birth to a child is no longer confined to marriage, which has further decreased the attractiveness of marriage. Therefore, the reduced gains of marriage and the reduced costs of remaining single apparently motivate people to delay their marriages.

1.2.4. Culture Shift

The process of modernization could also produce cultural consequences. Inglehart (2006) found two dimensions of the change of basic values linked to modernization: firstly, the Industrial Revolution gives rise to a shift from traditional to secular-rational values; and secondly, the post-industrial phase of modernization results in a shift from survival values to self-expression values. The decline of the traditional family is linked with the first dimension, and the rise of the gender equality is linked with the second (Inglehart & Norris, 2003). Similarly, by observing the fast-changing marriage in American at the end of 20th century, Cherlin (2004) proposed the concept of "the deinstitutionalization of marriage", referring to the weakening social norms on people's marital behaviour. This growing public tolerance of alternatives to marriage demonstrates

that the institution of marriage is no longer fulfilling societal requirements nor meeting individual needs.

Moreover, this idea of the interaction between economic development and cultural shifts is also presented by the theory of Second Demographic Transition (SDT)[2] (Lesthaeghe, 1995, 2010; Van de Kaa, 1987), which proposes that the rise of postmodern marriage patterns is primarily driven by the ideational shift in the direction of individual autonomy and self-fulfilment. Unlike previous theories, SDT directly points out that the economic models are incomplete without the ideational factors in explaining the changes in the family and marriage. As the core of the SDT, changes in marriage formation are consistent with SDT theory's expectation: the increasing age at marriage and the decreasing first marriage rates become more and more common and acceptable in recent decades (Ortega, 2014).

The empirical evidence of the impact of value orientations on the postponement of marriage has been found by a number of researchers. Investigating 45 countries around the world, Bystrov (2014) found the delay of marriage is influenced most by the change in emancipative values, compared with other socio-economic factors. Lesthaeghe (2010) also claims that the SDT may have explanatory power not only for Western countries, but also for Asian countries as long as they are wealthy enough to have undergone the Maslowian drift. We do observe a growing trend of later marriage in East Asian countries, such as Japan and Korea, and their first marriage rates are declining at an even more rapid rate than Western countries (Raymo, Park, Xie, & Yeung, 2015). Hence, industrialized Asian countries are worth considering as a testing ground for the SDT.

[2] The first demographic transition refers to a historic shift from a regime of high fertility and high mortality to one of low fertility and low mortality, but marriage remained the dominant social institution for childbearing and sexual activity (Lesthaeghe, 2010). The watershed between the first and the second demographic transitions is the shift in norms, from altruistic to individualistic (Lesthaeghe, 2014).

1.2.5. Contextual Variation

None of the theories above have stressed the importance of historical continuity in marriage formation. Unlike modernization theory predicting that all societies will follow the same path as the Western model of cultural change, Inglehart and Baker (2000) argued that a society is historically shaped by cultural heritage, such as Protestantism, Confucianism or Islam, with an enduring influence from the society's value system despite the forces of modernization. Drawing on the data from the three waves of the World Values Surveys which covers 75% of the world's population, they found not only massive cultural change have taken place, but also evidence of the persistence of cultural traditions in 65 societies.

From a marriage formation perspective, a number of cross-national comparisons within industrial societies provide evidence about the influence of contextual factors. Blossfeld (1995) has compared the relationship between education, a major determinant of economic potential, and the timing of first marriage in nine Western industrialized societies. Each of the societies has different degree of traditional gender role within family. They found that the education level of women basically has no effect on the age at marriage in Sweden but could significantly increase the age at first marriage in Italy. Another more recent study, Kalmijn (2013) reported that women's education level could have varying effects on marriage entry across 25 European countries. In countries which have more traditional gender role attitudes, such as Italy, Greece, and Spain, the marriage-delaying effect is more significant. In contrast, education will facilitate marriage in countries with more gender-egalitarian attitudes, such as Denmark and Sweden.

The most typical example in East Asia is Japan. As one of the most affluent industrialized countries in the world, it is famous for its high levels of role differentiation by gender. Ono (2003) made a cross-country comparison among three counties: the U.S., Japan, and Sweden. It is

commonly believed that Sweden is a society with higher level of gender equality than that in the US, while Japan is a society with lower level of gender equality than that in the US. He found that women's income has a negative impact on the probability of having an early first marriage in Japan, while it could increase the probability of having an early first marriage both in the US and Sweden. Similarly, using a survey conducted in 1992, Raymo (2003) observed that education has a negative relationship with marriage formation among women in Japan. However, more recent work by Fukuda (2013) found a reverse impact of education level on the marriage timing of Japanese women for the latest cohort, which suggests the contextual factors are changing over time.

This evidence supports the contextual variation hypothesis that the timing of first marriage could vary between different counties with the same modernization level, or between different time periods in the same country. The degree of persistence of traditional values plays an important role in explaining this variation (Gubernskaya, 2010; Sweeney, 2002). However, as a huge country with deep-rooted traditional family values and the second largest economic volume in the world, the situation in China with regard to marriage formation is greatly under-investigated, especially from a cultural change perspective. In this paper, we extend the literature by exploring the determinants of marriage timing in China. With the special focus on the impact of people's attitudes toward traditional family values, our analysis tries to test whether late marriage in modern China is generated or partly generated by the individual's ideational change.

1.3. Context of China

Marriage in China is known for its prevalence and stability in traditional times. Due to the underdeveloped economy, the main purpose of marriage was to have children to increase the workforce and provide security for the elderly. Under the Chinese patrilineal family system, only sons can keep the family lineage alive, while a married daughter is no longer regarded as a member of her "born" family, but as a member of her husband's family (Fei, 1992). In this case, men dominate the family and women are supposed to be "virtuous wife and good mother" (Leung, 2003). There is a clear sexual division of labour within the Chinese family, with the Confucius saying "Men are primarily outside the home, and women are primarily inside the home". Stressing the "three obediences"[3], the Confucian family ideology is so strong that women had been long at a severe social disadvantage relative to men (Thornton & Lin, 1994).

To have children as soon as possible, most of the Chinese got married at a very young age. The majority of marriages were arranged by parents or other elderly relatives to avoid affiliation with unsuitable families (Xu & Whyte, 1990). It wasn't until in 1949, when the People's Republic of China had been founded, that the marriage pattern in China began to change. In 1950, the first law that Chinese government implemented is the Marriage Law, which formally legalized free-choice marriages and explicitly equalized the rights of the wife relative to those of the husband. To control the population growth, the Chinese government introduced a policy of late marriage and late birth. The legal age of marriage also increased from 20 to 22 for men and from 18 to 20 for women. Therefore, the median age of first marriage rose steadily. According to Mu and Xie's (2014) study, the average marriage age increased from 20 in the 1940s

[3] "Three Obediences" governing a woman's behaviour: as an unmarried girl she must obey her father and brothers; as a married woman she must obey her husband; and as a widow she must obey her adult sons.

birth cohort to 23 in the 1980s birth cohort for women; the increase for men was from 24 in the 1940s birth cohort to 25 in the 1980s birth cohort.

Regarding to the reason for the continuously rising age of first marriage in China, most studies focus on the impact of demographic changes. In the 1980s, the Chinese government launched the most stringent birth control campaign in history, known as 'the one-child policy', which led directly to a sharp decline in the fertility rate. Together with the preference for sons, the one-child policy also resulted in a high sex ratio at birth with an excess of males, since large numbers of girls were either aborted or abandoned after birth (Zhu, Lu, & Hesketh, 2009). Hence, the imbalance between the number of men and women available in the marriage market created a "Male Marriage Squeeze" phenomenon in China. Many studies found Chinese men are suffering from this marriage squeeze and postponing marriage, especially those with low socio-economic status (Attane, Zhang, Li, Yang, & Guilmoto, 2013; Guilmoto, 2012; Huang, 2014; Jiang, Feldman, & Li, 2014).

According to the model of the frictionless marriage market (Becker, 1973, 1974), women should benefit from their own scarcity in the marriage market. However, there have been increasing reports in China of the difficulties of elite women in finding suitable mates (Fincher 2012). This is explained by the compounding effect of women's growing socioeconomic status and prevailing marry-up preference. On the one hand, although women's education fell far below that of men in the early years of the PRC, women's educational attainment has gradually caught up with that of men. In the late 1970s, the state promoted equal employment opportunities for both men and women, which enabled urban women to achieve near universal employment in the late 1970s (Cooke, 2001). In 1999, an important policy targeted at tertiary education to reach an enrolment ratio of 15% - a level often defined as "mass higher education" - was announced. This expansion of education enabled Chinese women to narrow or even reverse the education gap with men.

As a result, large proportions of women entered professional jobs traditionally occupied only by men.

On the other hand, due to the deeply rooted perception of traditional marital matching, a "marrying up/down" preference is still popular for women/men when looking for spouses (Du, Wang, & Zhang, 2015). With the marry-up preference, the enhanced women's economic ability could reduce the pool of men they desire while expanding the pool of other marriageable women (Ong, Yang, & Zhang, 2015). Whereas for men, the pressure from the male marriage squeeze and the marry-down preference forces them to be economically competitive (Du et al., 2015; Wei & Zhang, 2011; Yuan, Rong, & Xu, 2012). Apparently, the findings in terms of marriage delay all suggest the prevailing mate selection criteria are still underlying traditional gender roles in China (Qian & Qian, 2014; Tian, 2013; Yu & Xie, 2015). Therefore, with the rapid pace of modernization in China, we pose the following research question: does the modernity of individuals' attitudes toward the family affect their decisions about when to get married? In the next section, we will incorporate the individual-level value orientation into the framework of analysis and propose our hypotheses.

1.4. Hypotheses

China is known for its rapid pace of economic growth in recent decades. According to the classic modernization theory, people should experience an ideational change from traditional values to secular-rational values, or from survival values to self-expression values (Inglehart, 2006). Moreover, since China's opening up and entry into the World Trade Organization (WTO) in 2003, Chinese people have more opportunities than ever for contact with Western cultural products, such as magazines, television programs, and the Internet, which have provided greater exposure to new attitudes, values, and lifestyles. Hence, the enormous social and economic changes in China could create a massive force to push Chinese people to adopt non-traditional family values, although the change may be relatively modest compared to other countries due to the deeply rooted Confucian family system (Raymo et al., 2015).

As predicted by the theory of Second Demography Transition, there is growing evidence of linkages between family attitudes and behaviour (Barber & Axinn, 1998; Sassler & Schoen, 1999; Willoughby, Hall, & Luczak, 2015). However, past studies mainly look at trends of ideational change toward marriage and family cross-nationally (Gubernskaya, 2010), and there are few studies examining the effect of family-related attitudes on marriage timing at the individual-level. Although traditional family and gender values in China are still prevalent in general, we still treat attitudes toward family values as an explanatory factor to investigate the determinants of the individual's delay of marriage. Just as Inglehart (1997, p.86) indicated: "Even within a given cohort, many continued to accept the established norms but others took on new orientations."

Drawing on criminological theory, both the motive and situational factors are indispensable for enabling behaviour to take place (Inglehart, 1997; Mackenzie, 2005). Regarding our analysis, on the one hand, as the internalization of cultural understandings, a relatively "modern" family-

related attitude reflects the motive for an individual's choice to avoid or delay marriage. On the other hand, the situational factors must be taken into account. First, people in possession of more socio-economic resources have more choices of lifestyle. Second, living in a society with less restricting power from traditional social norms could give individuals more opportunities to turn their thoughts into action. Therefore, after holding both individual-level and macro-level determinants constant, we suggest the following hypotheses:

Hypothesis 1: Ceteris paribus, less traditional family-related attitudes could delay the individual's marriage formation.

It is commonly believed that there are more benefits of marriage for men than women if the traditional family and gender role are prevalent. For instance, many studies found the gender division of housework remained unequal among dual-earner couples (Jia & Yu, 2012; Zuo & Bian, 2001). Obviously, with the narrowing gap of labour participation between men and women, women's motive for delaying marriage is more significant than that of men. Ample evidence has shown that there are huge economic and cultural disparities between rural and urban areas in China (Knight & Song, 1999). Compared with urban areas, the traditional family norms in rural areas are relatively strong, which gives individuals less opportunity for choosing lifestyles. Therefore, we suggest Hypothesis 2 and 3:

Hypothesis 2: Family-related attitudes may show stronger effects on the marriage delay of women, compared with that of men.

Hypothesis 3: Family-related attitudes may show stronger effects on the individual's delay of marriage in urban areas, compared to rural areas.

As an aggregative indicator of the individual's socio-economic status, education level has been widely proved to have a significant effect on the timing of marriage. On the one hand, highly educated individuals

normally have more choices in terms of lifestyle due to their strong financial position. On the other hand, traditional beliefs are more likely to be eroded by higher education (Hu & Scott, 2016). Hence, we suggest Hypothesis 4:

Hypothesis 4: Family-related attitudes may show stronger effects on marriage delay for those who have a relatively high education level, compared to those who have a relatively low education level.

The level of modernization is highly correlated with the level of economic development. In economically developed regions, on the one hand, individuals are exposed to a wider range of new attitudes, values, and lifestyles, which motivate them to stay away from the traditional family. On the other hand, people living in highly developed areas normally experience less restrictions emanating from traditional social norms. Therefore, we suggest Hypothesis 5:

Hypothesis 5: Family-related attitudes may show stronger effects on the individual's marriage delay in more economically developed regions than in less economically developed regions.

Nowadays, people in China are experiencing "a consumer revolution" (Davis, 2000), with increasingly high expectations around living standards. When looking for spouses in the marriage market, advantaged socio-economic attributes are becoming more attractive than before (Yu & Xie, 2015). Basing on previous theories, we suggest Hypothesis 6:

Hypothesis 6: Besides attitudinal factors, socio-economic attributes play an important role in affecting the individual's timing of marriage formation.

1.5. Data and Main Variables

1.5.1. Data

Our study draws on the data from the China Family Panel Study (CFPS), which is organized by the Institute of Social Science Survey (ISSS) in Peking University. The CFPS is a nationally representative sample, based on a comprehensive social investigation in China, adopting implicit layered, multi-stage and probability proportional to size (PPS) methods. The CFPS samples comprise 25 provinces in China covering the 95% of the total national population. Xie, Qiu, and Lü (2012) evaluated the quality of the 2010 wave, and found that the data distribution is extremely similar to the 6th National Population Census in 2010. The first wave of the CFPS began in 2010 and the subsequent panel surveys have been conducted every two years.

In this paper, we use the cross-sectional adult data in the CFPS (2014) for the following two reasons. Firstly, the CFPS provides very extensive socio-economic information which could help us to explore the determinants of marriage delay based on respondents' current situation. Most importantly, although the CFPS 2016 wave had already been released, the CFPS 2014 wave includes the richest attitudinal questions compared to other waves, which provide us with the opportunity to generate a score for family-related attitudes reflecting the individual's ideational orientations. As the attitudinal questions regarding marriage and family are only reported in the wave of 2014, the panel data analysis is not employed in this analysis. Secondly, many studies combine census data or repeated cross-sectional data to investigate the variation in the determinants of marriage formation in different periods (Yu & Xie, 2015). However, as our study mainly focuses on the impact of individual-level subjective attitudes toward marital behaviour, there exists no dataset for previous periods containing similar information for purposes of comparison. Therefore, this paper gives a snapshot of public opinions on traditional family values in modern China, and tries to explore the impact

of family-related attitudes on the individual's decision to have a late first marriage.

1.5.2. Late First Marriage

As the average age of first marriage[4] varies from one country to another, there is no official definition of late marriage globally. Our research takes three data sources into consideration when setting the cut-off point defining late first marriage in China. Since this paper is looking at the picture in 2014, the first data source is from the calculation by the China Family Development Report (2015) which is based on the data collected in October 2014. Table 1.1 shows the proportions of "Never Married" and "Currently Married" individuals in different age groups. In the age group "25-29", more than 50% of men and 70% percent of women got married in the year of 2014. The second source is from the National Bureau of Statistics Population Census (2010) in China. It reports that the average age at first marriage is 24.55 for men and 22.76 for women. The last source is the calculation from the CFPS 2014. When looking at the reported year of first marriage from respondents who are under 40 years old[5], we find the average figures for men and women are 23.86 and 22.26 respectively.

In this paper, we define "late first marriage" by using the 75th percentile age of first marriage in CFPS as the cut-off point, which is 26 for men, and 24 for women. In other words, 'never married' men older than 25, and 'never married' women older than 23, in the year 2014 are treated as individuals with a "late first marriage"[6]. Therefore, this paper restricts the 2014 adult sample to men from 26 to 40 years old, and women from 24 to 40 years old.

[4] We only consider first marriage because the formation of second and higher order marriages may involve different social processes (Sweet & Bumpass, 1987).
[5] The reason for using 40 years old as the cap is that very few people marry for the first time above the age 40.
[6] Although there may be a very few individuals who never marry, we use 'late marriage' to indicate the current marital status for brevity.

Table 1.1: Marital Status by Age Group and Gender in China (Percentage)

Age Group	Male		Female	
	Never Married	Currently Married	Never Married	Currently Married
15-19	99.3	0.7	97.4	2.7
20-24	85.2	14.4	68.9	30.9
25-29	47.1	51.8	25.9	73.2
30-34	16.4	80.4	6.2	91.9
35-39	7.4	89.1	1.9	94.7
40-44	4.4	91.2	0.8	94.3
45-49	2.4	94.3	0.6	94.2
50+	1.5	90.8	0.2	81.4

Note: 1. The figures are authors' calculation from China Family Development Report (2015) 2. The percentages of other marital statuses, such as "Divorced" and "Widowed", are omitted in the table.

1.5.3. Score of Family-Related Attitudes

We draw three statements reflecting attitudes toward marriage and family from the CFPS 2014, and each of them gauges one of the dimensions of family attitudes. Many studies have investigated the relationship between gender role attitudes and marital behaviour (Barber & Axinn, 1998; Davis & Greenstein, 2009). As previously mentioned, Chinese men or women could be favoured in the marriage market if their personal attributes comply with the traditional gender specialization culture. Hence, for the first dimension, we choose the question: "To what extent do you agree that men should focus on career, while women should focus on family?" to measure the gender role attitude.

As a core familial norm in China, the Confucian virtue of filial piety has a profound impact on people's values and behaviour in contemporary China. Regarding children's marriage, Chinese parents always show more enthusiasm than their children. Social media have also reported that thousands of parents gather in the park all day to find love for their children. In this case, the children will be regarded as un-filial if they refuse to meet the potential partners or express negative attitudes toward

marriage. Therefore, the second dimension we are looking at is in relation to parents. The question: “To what extent do you agree that children should respect their parents, however badly they are treated by parents?” is chosen to represent the respect for parents.

Due to the close relationship between marriage and giving birth to children in China, the third dimension relates to the issue of child bearing. The question: “To what extent do you agree that women should have at least one child?” is chosen to represent the individual’s attitude toward having children. In the questionnaire, respondents report the extent to which they agree with each statement on a 5-point scale, ranging from 1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree), to 5 (strongly agree). We coded the responses reversely, so higher values signify less support for traditional family values.

In order to combine the three dimensions into one composite score, we standardize the responses by generating z-scores for each of them. The score for family-related attitude is the sum of the z-scores of three dimensions, where a higher score represents a less traditional family-related attitude.

1.6. Methodology

We employ a Binomial Logistic Regression to model the determinants of the individual's late entry into first marriage. The Logit Model is shown as follows:

$$\ln\left(\frac{P(Late_i)}{1-P(Late_i)}\right) = \beta_1 A_i + \beta_2 X_i + \beta_3 M_i + \varepsilon_i$$

Where the dependent variable $Late_i$ is a dichotomous variable, indicating whether a respondent i has entered first marriage or not by 2014. $Late_i$=0 denotes the respondent who has already had a first marriage experience. $Late_i$=1 denotes that the respondent's marital status is still "never married" in 2014, which represents the "late first marriage" status. We include the cohabiting sample for the baseline regression[7], and conduct the robustness test without the cohabiting sample. As such, $Late_i$ is coded "1" only for those whose marital status is reported as "Never Married" in the 2014 dataset, while others are all coded "0". "A_i" is the key explanatory variable -the score of family-rated attitudes - which had been introduced in the last section. "β_1" is the main coefficient we focus on. "ε_i" denotes the error term.

"X_i" refers to respondents' socio-economic characteristics and physical attributes:

Socio-economic factors including education, personal income, assets, employment status and family background. As the most important individual determinant of a wide range of outcomes in life, education is measured by years of schooling. Personal income consists of income from internships, full-time work, pensions, fellowships and

[7] Many reasons can explain why we consider cohabitation as marriage in this analysis: (1) many studies treat cohabitation as marriage (Qian & Preston, 1993), since most of the cohabitations are rehearsals for married life; (2) considering the cohabitation sample as married can only underestimate the effect, since many studies have proven that cohabiting reflects a modern view of gender ideology.

assistantships. It is in logarithmic form since the figures vary considerably. The number of houses[8] is the proxy for family assets, which is widely believed to be a necessity for marriage, especially for men (Mu and Xie, 2014; Yu and Xie, 2015). Employment status is classified into three categories: employed, unemployed and out of the labour market. Previous research has found that family background has an effect on marriage timing (South, 2001). Instead of using parents' education level as the proxy for family background as do many studies, we use self-rated family social status in the local area so as to represent the "family background attraction" more directly. It is a 5-point magnitude variable in which "1" represents the lowest level and "5" represents the highest level. Many studies use current enrolment status as a determinant of marriage timing because of the role conflict between being a student and being married (Blossfeld & Huinink, 1991; Sweeney, 2002; Xie, 2003; Xie et al., 2003; Yu & Xie, 2015). In this paper, we will keep the student sample in the main regression and conduct a robust test without them.

In order to hold constant cohort-effects, we controlled for gender, age and age square. The rural and urban area are controlled according to the classification used by National Bureau of Statistics of the People's Republic of China.

Many studies argue that physical attributes are important for partner selection and marriage formation (Fu & Goldman, 1996; Ong et al., 2015; Sohn, 2015). Respondents' height and appearance have thus been controlled in this paper. Taking Ong et al. (2015)'s study as our reference point, we use the interviewer-rated appearance in the CFPS as a rough description of respondents' looks. It is a 7-point magnitude variable in which "1" represents the lowest level and "7" represents the highest level.

[8] The reasons we do not use house value are that (1) house prices have large regional disparities; (2) the number of houses is more relevant to marriage formation and most people in China use a house to live in rather than as an investment; and (3) house values have a large proportion of missing values which can reduce sample size significantly.

The CFPS's code of counties provides us with the opportunity to control macro-level variables which are represented by the vector "M_i". There is a voluminous literature providing evidence that sex ratio has a significant effect on marriage timing (Angrist, 2002; Bulte, Heerink, & Zhang, 2011; Edlund, 1999, 2005; Guilmoto, 2012; Li, 2007; Ong et al., 2015). In this analysis, we draw on the county-level sex ratio data from the 5-14 age group in the 2000 census. This would avoid the bias in the sex ratio measurement caused by China's huge migration waves in the past decades. First, children under the age 15 have fewer opportunities to migrate (Cameron et al., 2017), since China's law of compulsory education stipulates that children must complete nine years of compulsory education locally. Second, children aged 5-14 in 2000 will grow up to become marriageable adults aged 19-28 in 2014. The marriage market of Chinese citizens is mainly in the county where they were born, and building marriages between cities and provinces is rare (Wei & Zhang 2011b; Edlund et al, 2013; Cameron et al., 2017). The distribution of sex ratios among counties are shown in the Appendix.

This paper also controlled province dummies due to the economic development and cultural differences across provinces (Ji & Yeung, 2014). Given that respondents may have correlations within the same county, standard errors are clustered by county ID. Descriptive statistics of all the variables are shown in Table 1.2 After excluding the missing values for each variable, we were left with 5849 observations in the regression.

Table 1.2: Descriptive Statistics

Variables	Obs	Mean	Std.Dev.	Min	Max
Dependent Variable:					
Late Marriage					
No	5849	0.897	0.303	0	1
Yes	5849	0.103	0.303	0	1
Key Explanatory Variable:					
Score of Attitude	5849	0.165	2.020	-2.153	10.20
Controlling Variables:					
Gender					
Female	5849	0.552	0.497	0	1
Male	5849	0.448	0.497	0	1
Urban or Rural					
Rural	5849	0.496	0.500	0	1
Urban	5849	0.504	0.500	0	1
Age	5849	31.55	4.534	24	39
Years of Education	5849	9.888	3.840	0	19
Number of Houses	5849	0.930	0.424	0	7
Family Social Status	5849	3.037	0.869	1	5
Personal Income	5849	15707	25105	0	408400
Employment Status					
Employed	5849	0.826	0.379	0	1
Unemployed	5849	0.018	0.131	0	1
Out of Labour Market	5849	0.156	0.363	0	1
Height	5849	165.4	7.905	100	193
Looking	5849	5.841	0.977	1	7
Sex Ratio	5849	0.904	0.0557	0.667	1.027

1.7. Main Results

1.7.1. Baseline Regression Results

For the sake of convenient interpretation, the results are reported by marginal effects. Four equations controlling different covariates are displayed in four columns in Table 1.3. Column 1 provides the effect of the individual's score in family-related attitudes on the probability of having a late first marriage without controlling other variables. The results show that there is a significant positive relationship between the two variables. In Column 2, gender, age, age square, rural or urban, and a set of socio-economic covariates are controlled. Column 3 and Column 4 further control for the individual's physical attributes and macro-level covariates respectively. Across four columns, we observe robust, significantly positive effects of being less traditional in family values on the individual's delay of marriage, although both the marginal effect and the significance level drops after controlling for sex ratio and province dummies. For the full model with all controls, a one-unit increase in the score of the individual's family-related attitudes leads to a 0.4% increase in the probability of having a late first marriage, holding other variables constant. The robust positive effects of being less traditional on family values in Table 1.3 confirms Hypothesis 1. The coefficient of the score for family-related attitudes decreased remarkably after gradually controlling variables, which improves our confidence of resolving omitted variable bias.

Table 1.3: Late Marriage and Family-Related Attitude: Binary Logit Marginal Effects

VARIABLES	(1)	(2)	(3)	(4)
Dependent Variable: Whether having a late marriage				
Score of Attitude	0.012***	0.005***	0.005***	0.004**
	[0.002]	[0.002]	[0.002]	[0.002]
Gender (Ref.=Female)				
Male		0.072***	0.060***	0.062***
		[0.010]	[0.015]	[0.016]
Urban or Rural (Ref.=Rural)				
Urban		-0.008	-0.008	-0.008
		[0.008]	[0.008]	[0.009]
Age		-0.107***	-0.108***	-0.114***
		[0.014]	[0.014]	[0.014]
Age Square		0.001***	0.001***	0.002***
		[0.000]	[0.000]	[0.000]
Years of Education		0.010***	0.011***	0.011***
		[0.001]	[0.001]	[0.001]
Number of Houses		-0.008	-0.009	-0.008
		[0.009]	[0.009]	[0.008]
Family Social Status		-0.018***	-0.018***	-0.016***
		[0.006]	[0.006]	[0.005]
Income (logged)		0.003***	0.003***	0.003***
		[0.001]	[0.001]	[0.001]
Employment Status (Ref.=Employed)				
Unemployed		0.061**	0.062**	0.066**
		[0.030]	[0.029]	[0.031]
Out of labour market		-0.045***	-0.044***	-0.044***
		[0.011]	[0.011]	[0.011]
Height (cm)			0.001	0.001
			[0.001]	[0.001]
Looking			-0.014***	-0.014***
			[0.005]	[0.005]
Sex Ratio				-0.036
				[0.129]
Province Dummies	Yes	Yes	Yes	Yes
Observations	5,849	5,849	5,849	5,829
Pseudo R^2	0.012	0.212	0.215	0.229

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

Most of the results from controlling variables are consistent with previous studies. Men have higher probabilities of delayed marriage than women. Age is negatively related to the probability of having a late first marriage while the effect of age square is positive, depicting an inverted U-Shape trend. Years of education and personal income have positive effects on marriage delay. A family's social status in local area can

significantly prohibit the likelihood of late marriage. Compared with those being employed, being unemployed increases the probability of having a late first marriage, while the opposite effect is shown if people are out of the labour market, suggesting a trade-off between labour market participation and work in the home. The individual's appearance is negatively related to the probability of having a late first marriage, which fits our intuition. As for the macro-level variables, the imbalanced sex ratio can delay the individual's marriage, although the result is not statistically significant.

1.7.2. Heterogeneous Effects by Gender

Previous theories and studies have suggested that there are gender and regional differences regarding to the determinants of marriage timing. Therefore, we need to explore the effect of the attitudinal score and other controlling variables by sub-samples. In Table 1.4, Column 1 and Column 2, are displayed the results of subsamples for men and women respectively. We observe a significant positive effect of the score for family-related attitudes on the probability of having a late first marriage for women, while the result for men is positive but not statistically significant. In Column 3 and Column 4 in Table 1.4, we divide the samples by rural and urban areas. As expected, the positive effect of the score for family-related attitudes on marriage delay is only significant in urban areas, where people have more choices to decide when to get married and are less bound by traditional family values. These results support Hypotheses 2 and 3, which predict the heterogeneous effects of being less traditional in family values on the delay of marriage for men and women, and urban-rural areas.

Table 1.4: Late Marriage and Family-Related Attitude, By Gender and Rural-Urban Areas

VARIABLES	(1) Male	(2) Female	(3) Urban	(4) Rural
Dependent Variable: Whether having a late marriage				
Score of Attitude	0.005	0.004**	0.005**	0.004
	[0.003]	[0.002]	[0.002]	[0.003]
Gender (Ref.=Female)	-			
Male			0.062***	0.060***
			[0.018]	[0.023]
Urban or Rural (Ref.=Rural)				
Urban	0.004	-0.011		
	[0.013]	[0.009]		
Age	-0.125***	-0.089***	-0.118***	-0.110***
	[0.028]	[0.017]	[0.021]	[0.020]
Age Square	0.002***	0.001***	0.002***	0.002***
	[0.000]	[0.000]	[0.000]	[0.000]
Years of Education	0.004	0.015***	0.014***	0.008***
	[0.002]	[0.002]	[0.002]	[0.002]
Number of Houses	-0.021*	0.000	0.001	-0.017
	[0.012]	[0.009]	[0.010]	[0.016]
Family Social Status	-0.022**	-0.011**	-0.020***	-0.011
	[0.009]	[0.005]	[0.007]	[0.007]
Income (logged)	0.001	0.004***	0.001	0.004***
	[0.001]	[0.001]	[0.001]	[0.001]
Employment Status (Ref.=Employed)				
Unemployed	0.066*	0.039	0.050	0.053*
	[0.037]	[0.026]	[0.030]	[0.031]
Out of labour market	0.039	-0.049***	-0.070***	-0.033*
	[0.028]	[0.013]	[0.024]	[0.017]
Height (cm)	0.001	0.001	0.001	0.000
	[0.001]	[0.001]	[0.001]	[0.001]
Looking	-0.023***	-0.006	-0.016**	-0.012**
	[0.007]	[0.005]	[0.007]	[0.006]
Sex Ratio	-0.038	-0.063	0.045	-0.122
	[0.235]	[0.118]	[0.163]	[0.166]
Province Dummies	Yes	Yes	Yes	Yes
Observations	2,612	3,203	2,931	2,864
Pseudo R^2	0.152	0.366	0.279	0.200

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

Consistent with the Specialization and Trading Model (Becker, 1991), the contribution of economic resources to marriage formation may show difference for men and women. The results of controlling variables confirm Hypothesis 6. Women's duration of education and personal income show significant positive effects on marriage delay, while men's

show insignificance. Compared to the reference group being employed, being unemployed has no effect on women's marriage timing and being out of the labour market can significantly increase women's probability of not having a late first marriage. On the contrary, being unemployed has a significant positive effect on the probability of men having a late first marriage, while being out of labour market has no effect on marriage timing. The results from employment status imply a preference for gender specialization within the family in China. The number of houses individuals own has a negative effect on men's probability of having a late marriage, showing the importance of house ownership to men's position in the marriage market. Compared with personal financial capacity, the family's social status shows a negative relationship with late marriage for both men and women. As for physical characteristics, the individual's height has no effect on marriage timing for either men or women. To our surprise, being better looking can significantly decrease the probability of having a late first marriage for men, but this effect is not significant for women.

1.7.3. Heterogeneous Effects by Education Level

Since previous studies have found that individuals with more education are more likely to be exposed to a non-traditional ideology relating to family and gender roles (Cunningham et al., 2005; Davis & Greenstein, 2009; Liao & Cai, 1995; Trent & South, 1992), we assume education level plays a role in altering the effect of the family-related attitudinal score on individuals' late first marriage status. We divide educational attainment into three categories: "low" "middle" and "high". The "low" group comprises respondents who reported that their educational level is no higher than "Junior High School". The "middle" group comprises those respondents who reported that their level of educational attainment is "Senior High School", "Secondary School" or "Technical School". The "high" group comprises respondents who reported that their level of educational attainment is no lower than "College/Bachelor's Degree". The results in Table 1.5 show the heterogeneous effect of the family-related attitudinal score among men and women at different education levels.

The results demonstrate that, for the high education group, the effect of being less traditional in family values could significantly increase the probability of women's late first marriage status. However, this positive effect is not statistically significant for men with a high level of education. The results from other groups all show insignificant impacts of the family-related attitudinal score except for men with a low level of education. These results are corroborated by the study from Yu and Xie (2015), which argues that less-educated men and well-educated women find it most difficult to secure a partner. In this paper, we find that the modernity of their family-related values could further delay their marriage. Therefore, the results in Table 1.5 confirm Hypothesis 4.

1.7.4. Heterogeneous Effects by GDP Level

In order to investigate how the effect of the family-related attitudinal score on the individuals' late first marriage status is altered by areas with different economic levels, in this paper we use GDP per capita at county-level as a proxy for regional economic development. The regions are divided into three categories: "low GDP level" "middle GDP level" and "high GDP level". The "low" group comprises those counties whose GDP per capita are less than 15000 yuan. The "middle" group comprises the counties whose GDP per capita is between 15000 yuan and 35000 yuan. The "high" group comprises the counties whose GDP per capita is higher than 35000 yuan. Table 1.6 shows the heterogeneous effect of the family-related attitudinal score among men and women in regions with different GDP levels. The results demonstrate that, for the regions with a high GDP level, the effect of being less traditional on family values could significantly increase the probability of individuals' late marriage status for both men and women. However, these positive effects are not statistically significant for regions with a low GDP and middle GDP level. Even in regions with a low GDP level, men's less traditional attitudes to the family could increase the probability of marriage, although the effect is not significant. These results confirm Hypothesis 5.

Table 1.5: Late Marriage and Family-Related Attitude, By Gender and Education Level

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Education Level:	Low		Middle		High	
Dependent Variable: Whether having a late marriage	Male	Female	Male	Female	Male	Female
Score of Attitude	0.008**	0.000	-0.001	0.010	0.005	0.010*
	[0.004]	[0.002]	[0.007]	[0.007]	[0.008]	[0.006]
Urban or Rural (Ref.=Rural)						
Urban	-0.022	-0.000	0.005	-0.043	0.046	-0.048
	[0.017]	[0.008]	[0.037]	[0.031]	[0.045]	[0.034]
Age	-0.104***	-0.033***	-0.044	-0.085**	-0.201**	-0.273***
	[0.032]	[0.012]	[0.114]	[0.039]	[0.079]	[0.066]
Age Square	0.001***	0.000**	0.000	0.001	0.002**	0.004***
	[0.001]	[0.000]	[0.002]	[0.001]	[0.001]	[0.001]
Years of Education	-0.012***	0.003*	0.025	0.047***	0.023	0.059***
	[0.003]	[0.002]	[0.019]	[0.014]	[0.021]	[0.015]
Number of Houses	-0.030*	0.006	0.033	0.021	-0.078**	-0.033
	[0.018]	[0.009]	[0.030]	[0.030]	[0.035]	[0.027]
Family Social Status	-0.011	-0.007*	-0.054**	-0.042**	-0.034	-0.017
	[0.010]	[0.004]	[0.023]	[0.018]	[0.027]	[0.021]
Income (logged)	0.000	0.004***	0.003	0.003	-0.002	0.001
	[0.002]	[0.001]	[0.003]	[0.003]	[0.004]	[0.005]
Employment Status (Ref.=Employed)						
Unemployed	0.037	0.009	0.107	0.050	-0.030	0.012
	[0.060]	[0.022]	[0.073]	[0.076]	[0.121]	[0.092]

Out of labour market	0.049	-0.020*	-0.045	-0.045	-0.017	-0.204***
	[0.030]	[0.011]	[0.071]	[0.041]	[0.080]	[0.047]
Height (cm)	-0.001	0.001	0.001	0.001	0.004	-0.001
	[0.002]	[0.001]	[0.003]	[0.003]	[0.004]	[0.003]
Looking	-0.018**	0.001	-0.014	0.005	-0.053***	-0.046***
	[0.008]	[0.004]	[0.015]	[0.016]	[0.021]	[0.016]
Sex Ratio	-0.154	-0.144*	0.119	-0.197	0.186	1.243**
	[0.261]	[0.083]	[0.414]	[0.212]	[0.520]	[0.494]
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,563	1,933	430	430	488	633
Pseudo R^2	0.134	0.252	0.262	0.331	0.218	0.379

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Table 1.6: Late Marriage and Family-Related Attitude, By Gender and GDP Level

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
GDP Level:	Low		Middle		High	
Dependent Variable: Whether having a late marriage	Male	Female	Male	Female	Male	Female
Score of Attitude	-0.005	0.003	0.004	0.001	0.017***	0.008*
	[0.005]	[0.003]	[0.005]	[0.004]	[0.005]	[0.004]
Urban or Rural (Ref.=Rural)						
Urban	-0.017	-0.019	-0.032	-0.018	0.054*	0.003
	[0.019]	[0.012]	[0.024]	[0.018]	[0.029]	[0.020]
Age	-0.173***	-0.058***	-0.060	-0.091***	-0.102	-0.105**
	[0.045]	[0.016]	[0.050]	[0.026]	[0.062]	[0.041]
Age Square	0.002***	0.001***	0.001	0.001***	0.001	0.001*
	[0.001]	[0.000]	[0.001]	[0.000]	[0.001]	[0.001]
Years of Education	-0.002	0.010***	0.001	0.014***	0.009***	0.023***
	[0.004]	[0.002]	[0.004]	[0.003]	[0.003]	[0.004]
Number of Houses	-0.028	-0.004	-0.009	-0.006	-0.033*	-0.001
	[0.025]	[0.019]	[0.020]	[0.017]	[0.019]	[0.016]
Family Social Status	-0.012	-0.014	-0.017	-0.010	-0.035**	-0.007
	[0.014]	[0.009]	[0.014]	[0.009]	[0.017]	[0.013]
Income (logged)	0.004*	0.004***	-0.002	0.008***	-0.000	-0.001
	[0.002]	[0.002]	[0.002]	[0.002]	[0.003]	[0.002]
Employment Status (Ref.=Employed)						
Unemployed	-	0.013	0.153***	0.014	0.045	0.060
		[0.027]	[0.056]	[0.044]	[0.065]	[0.056]

Out of labour market	-0.007	-0.026	0.047	-0.030	0.074*	-0.094***
	[0.043]	[0.019]	[0.051]	[0.022]	[0.041]	[0.028]
Height (cm)	-0.003*	-0.002	0.004	0.004**	0.002	0.002
	[0.002]	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]
Looking	-0.009	-0.005	-0.025**	-0.018*	-0.030**	0.006
	[0.012]	[0.007]	[0.011]	[0.010]	[0.013]	[0.011]
Sex Ratio	-0.248	-0.034	0.351	-0.534**	0.663*	0.314
	[0.425]	[0.176]	[0.384]	[0.270]	[0.395]	[0.310]
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	865	1,005	815	1,071	872	1,057
Pseudo R^2	0.123	0.314	0.206	0.447	0.244	0.382

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

1.8. Robustness Tests

1.8.1. Binary Form of Attitude

As the score for family-related attitude depicts the degree of support for traditional family values, we transform the attitudinal score into a binary variable by using the median value as the cut-off point. For brevity, we use the identity tag “less traditional” to represent respondents whose attitudinal scores are higher than the median score, and use “traditional” to represent respondents whose attitudinal scores are equal to or lower than the median score. In Table 1.7, there are three columns reporting the results from the full sample, the men’s sample and the women’s sample respectively. Due to the inconvenience of interpreting coefficients, the average marginal effects are reported. It can be seen that the effects of being less traditional toward family values are positively correlated with the probability of having a late first marriage. The effects are statistically significant from the full sample and women’s sample, but not from men’s sample. These results are consistent with the baseline regression, which further confirms Hypothesis 1.

1.8.2. Propensity Score Matching

Given the huge difference between “traditional” and “less traditional” individuals in terms of marriage timing, the results may suffer from selection bias regarding family-related attitudes. This section attempts to mitigate potential estimation bias by adopting the Propensity Score Matching (PSM) approach. PSM is employed due to its quick and easily-interpretable nature. According to McLaughlin (2017), PSM provides straightforward diagnostics about the validity of analysis conditional on observable factors (p. 966). In the operationalization phase, the paper treats “traditional” individuals as the control group (D = 0) and “less traditional” individuals as the treatment group (D = 1). It is supposed that

there are two potential outcomes for the i^{th} individual: being "traditional" or "less traditional", with the corresponding late marriage status being Y_{1i} and Y_{0i}. Obviously, the marriage delay effect of being "less traditional" on the i^{th} individual (Y_{1i}- Y_{0i}) cannot be observed at the same time. Therefore, we can only estimate the Average Treatment Effect of the Treated (ATT) for being "less traditional" on respondents' late first marriage status:

$$\bar{\delta}_{i,ATT} = E[(Y_{1i} - Y_{0i})|D_i = 1] = E(Y_{1i}|D_i = 1) - E(Y_{0i}|D_i = 1)$$

In order to simulate the counterfactual scenario, the propensity score for being "less traditional" on family values is calculated. When the propensity score is approximately the same, the expectation of "traditional" individuals' late first marriage status is equivalent to the counter factual scenario of being "less traditional" Y_{0i} |D=1, which is:

$$\mathrm{E}[(Y_{0i}|\mathrm{D} = 1)|\mathrm{p}(X_i)] = \mathrm{E}[(Y_{0i}|D_i = 0)|\mathrm{p}(X_i)] = \mathrm{E}[(Y_i|D_i = 0, \mathrm{p}(X_i)]$$

Table 1.8 presents the marriage delay effect of being "less traditional" in family values based on three matching methods. The results show that, after eliminating the bias caused by the observable heterogeneity between "traditional" and "less traditional" individuals, the positive effect of being "less traditional" on the late first marriage status remains statistically significant. This finding is consistent with the baseline estimation, which further confirms that the earlier estimation results are robust.

1.8.3. Sample Restrictions

As including cohabiting samples and student samples may cause omitted variable bias, we restrict the sample size by excluding cohabiting individuals and students. Table 1.9 and Table 1.10 in the Appendix show the results of the restricted sample respectively. While the estimate

without the cohabiting sample showed a positive effect of less traditional family-related attitudes on men's having a late first marriage at the 10% significance level, the significance level for women is still higher. Consistent with the previous findings, this robustness check shows that being "less" traditional in family values significantly boosts the probability of an individual's late first marriage status.

Furthermore, the results are still robust after adjusting the cut-off age for late first marriage. Recently, the phenomena of "leftover women" and "leftover men"[9] have been widely discussed by social media and become amongst the hottest social issues in China (Fincher, 2012; Magistad, 2013). Despite the fact that the word "leftover" is commonly believed to be a derogatory label, the phenomena indicate a trend of later marriage for both Chinese men and women. Inspired by the old Chinese saying "men should be well-established at thirty" and the definition of leftover women from the Ministry of Education of China[10], we restrict the sample to men older than 29 years and women older than 27 years. In other words, 'never married' men older than 29 and 'never married' women older than 27 in the year 2014 are treated as individuals with a "late first marriage". Table 1.11 in the Appendix shows the results after the sample restriction. Although the effect of the family-related attitudinal score on the probability of an individual's late first marriage status is no longer significant for the full sample, it still demonstrates a positive relationship between the family-related attitudinal score and women's probability of having a late first marriage at the 5% significance level. These findings are consistent with the baseline estimation.

[9] The terminology of "leftover women" refers to those highly educated but unmarried women, while "leftover men" refers to single men above age of 30 with a wide range of social statuses.
[10] In 2007, the Ministry of Education of China released an official statement defining "leftover women" as any "unmarried women over the age of 27" and added it to the national lexicon.

1.9. Conclusion

Previous studies investigating the determinants of marriage delay in China have neglected the influence of ideational change. With the rapid pace of economic growth and modernization, China is worth considering as a testing ground for the Second Demographic Transition theory. Unlike previous studies utilizing public values to analyse the trend of marriage delay at an aggregate level, we investigate the determinants of the individual's late first marriage by including individual-level attitudes toward traditional family values as an explanatory factor, using the 2014 wave of the Chinese Family Panel Study (CFPS).

Our main findings suggest a significant positive impact of holding less traditional family-related attitudes on the probability of having a late first marriage. It is worth noting that this positive effect is more statistically significant for women's marriage timing compared to men's, and for urban areas compared to rural areas. When looking at the heterogeneous effects by different education levels and regions with different economic development, a significant positive effect is found between the score for family-related attitudes and the late first marriage status for both men and women in the regions with highest GDP level, and only for women with the highest education level. These findings are consistent with criminologists' behavioural theory of motives and opportunity.

This paper also found a significant impact of personal socio-economic attributes on the delay of marriage. Consistent with Becker's specialization model, the impact of socio-economic factors showed opposite effects for men and women on the probability of having a late first marriage. It also suggests that the prevailing mate selection criteria are still underlying traditional gender roles in China. This research has shown that ideational change toward family values boosts age at first marriage, while socio-economic factors are important parts of the picture.

Our research makes several contributions. Firstly, besides economic factors, we fill in the research gap by empirically identified the causal effect of ideational orientation toward family on the timing of marriage. Secondly, to the best of our knowledge, this paper is the first to use the individual-level attitudes to measure the modernity of family values, which is different from other studies depicting the trend of value change and marriage delay at an aggregate level. Finally, since this paper offers a new perspective for understanding the determinants of marriage delay, policy makers in China or in other societies with a similar cultural background may benefit from our findings.

Appendix

Table A. 1: Robustness Test, Change Attitudinal Score to Binary Variable

VARIABLES	(1) Full	(2) Male	(3) Female
Dependent Variable: Whether having a late marriage			
Being Less Traditional	0.017**	0.014	0.018**
	[0.007]	[0.013]	[0.009]
Gender (Ref.=Female)			
Male	0.061***		
	[0.016]		
Urban or Rural (Ref.=Rural)			
Urban	-0.008	0.004	-0.011
	[0.009]	[0.013]	[0.009]
Age	-0.114***	-0.124***	-0.089***
	[0.014]	[0.028]	[0.017]
Age Square	0.002***	0.002***	0.001***
	[0.000]	[0.000]	[0.000]
Years of Education	0.011***	0.004*	0.015***
	[0.001]	[0.002]	[0.002]
Number of Houses	-0.009	-0.021*	-0.001
	[0.008]	[0.012]	[0.009]
Family Social Status	-0.016***	-0.022**	-0.011**
	[0.005]	[0.009]	[0.005]
Income (logged)	0.003***	0.001	0.004***
	[0.001]	[0.001]	[0.001]
Employment Status (Ref.=Employed)			
Unemployed	0.066**	0.065*	0.040
	[0.030]	[0.037]	[0.026]
Out of labour market	-0.044***	0.039	-0.049***
	[0.011]	[0.028]	[0.013]
Height (cm)	0.001	0.001	0.001
	[0.001]	[0.001]	[0.001]
Looking	-0.014***	-0.023***	-0.006
	[0.005]	[0.007]	[0.005]
Sex Ratio	-0.028	-0.028	-0.056
	[0.130]	[0.236]	[0.119]
Province Dummies	Yes	Yes	Yes
Observations	5,829	2,612	3,203
Pseudo R^2	0.229	0.151	0.366

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

Table A. 2: Robustness Test, PSM Matching

Matching Methods	Number of Treatment Group Samples (Modern)	Numbers of Control Group Samples (Non-Modern)	ATT for Treatment Group	t-Value
Nearest Neighbor Matching	2829	3013	**0.127**	2.63
Radius Matching	2829	3013	**0.127**	7.45
Kernel Matching	2828	3013	**0.127**	2.54

Table A. 3: Robustness Test, Excluding Cohabit Samples

	(1)	(2)	(3)
VARIABLES	Full	Male	Female
Dependent Variable: Whether having a late marriage			
Score of Attitude	0.005**	0.005*	0.004**
	[0.002]	[0.003]	[0.002]
Socio-Economic Characteristics	Yes	Yes	Yes
Biological Attributes	Yes	Yes	Yes
Sex Ratio	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes
Observations	5,798	2,597	3,187
Pseudo R^2	0.231	0.153	0.366

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

Table A. 4: Robustness Test, Excluding Cohabit Samples

	(1)	(2)	(3)
VARIABLES	Full	Male	Female
Dependent Variable: Whether having a late marriage			
Score of Attitude	0.004**	0.005	0.004**
	[0.002]	[0.003]	[0.002]
Socio-Economic Characteristics	Yes	Yes	Yes
Biological Attributes	Yes	Yes	Yes
Sex Ratio	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes
Observations	5,798	2,597	3,187
Pseudo R^2	0.231	0.153	0.366

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

Table A. 5: Robustness Test, Late Marriage (Male 30; Female 28)

VARIABLES	(1) Full	(2) Male	(3) Female
Dependent Variable: Whether having a late marriage			
Score of Attitude	0.002	0.004	0.003**
	[0.001]	[0.003]	[0.001]
Gender (Ref.=Female)			
Male	0.048***		
	[0.016]		
Urban or Rural (Ref.=Rural)			
Urban	-0.008	-0.000	-0.013*
	[0.007]	[0.015]	[0.008]
Age	-0.072***	-0.062	-0.035
	[0.023]	[0.055]	[0.024]
Age Square	0.001***	0.001	0.000
	[0.000]	[0.001]	[0.000]
Years of Education	0.003**	-0.002	0.007***
	[0.001]	[0.002]	[0.001]
Number of Houses	-0.003	-0.001	-0.003
	[0.006]	[0.011]	[0.009]
Family Social Status	-0.005	-0.006	-0.007
	[0.004]	[0.008]	[0.005]
Income (logged)	0.001	0.001	0.001
	[0.001]	[0.001]	[0.001]
Employment Status (Ref.=Employed)			
Unemployed	0.021	0.019	0.018
	[0.028]	[0.044]	[0.019]
Out of labour market	-0.007	0.014	-0.005
	[0.012]	[0.031]	[0.013]
Height (cm)	-0.000	-0.000	0.000
	[0.001]	[0.001]	[0.001]
Looking	-0.010***	-0.016**	-0.005
	[0.004]	[0.007]	[0.004]
Sex Ratio	-0.064	-0.048	-0.108
	[0.107]	[0.230]	[0.084]
Province Dummies	Yes	Yes	Yes
Observations	3,867	1,571	1,911
Pseudo R^2	0.113	0.058	0.218

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

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2. Does Spousal Bargaining Affect Intergenerational Transfer?--Evidence from Married Couples and their Elderly Parents in China

2.1. Introduction

The population in China is aging at a dramatic rate, caused by prolonged life expectancy and falling fertility (Chen & Liu, 2009; Fang et al., 2015). Due to the fertility control policy in the early 1980s, the pace of population ageing is even faster in China than in many other western countries. According to statistics from United Nations Population Division (2019), China's elderly population (aged 60 and over) reached 241.5 million in 2019, taking up 16.8% of the total population; among them 26 million are the oldest-old (age 80 and over), accounting for 1.8% of the total population. Moreover, it is predicted that the speed of aging in China will be relatively rapid in global terms. By 2030, compared with the expected global population aged 60 and over (30.6%) and the expected global population aged 80 and over (2.4%), the figures in China are higher, with the expected proportion of people aged 60 and over increasing to 44.5%, and the expected proportion of elderly people aged 80 and over reaching 2.8%. Therefore, associated with the increasing elderly population, China is facing a big challenge regarding elderly support, especially for the care needs of the vulnerable oldest-old (Liu, Guo, & Bern-Klug, 2013).

China's current healthcare system, however, is still weak facing this challenge. Though the Chinese government has launched ambitious and comprehensive health reforms and the coverage of health insurance programmes[11] has aggressively expanded since 2009, the gap between the government's capacity to pay and the rising pressures from

[11] Under the current design of the social insurance system in China, there are mainly three insurance programs: (1) Urban Employee Basic Medical Insurance (UEBMI) for worker or retirees who work or used to work for formal sectors in urban areas; (2) Urban Resident Basic Medical Insurance (URBMI) for urban residents who do not have a formal job; and (3) New Cooperative Medical Scheme (NCMS) for all residents living in rural areas.

healthcare demands is large (Lee, Chang, & Kaplan, 2019; Song, Storesletten, Wang, & Zilibotti, 2015; Yu, 2015). With the problem of funding deficits, unequal health services and under-compensation of insured persons (Nundy, 2016; Zhang, Nikoloski, & Mossialos, 2017), it is extremely difficult for the current healthcare system to satisfy people's needs. Unlike many western countries where provided pensions and health insurance have replaced the function of family, Chinese elderly people still lack publicly provided social support and rely on family member's transfer for both care and financial help (Cai, Giles, O'Keefe, & Wang, 2012).

Traditionally, the family plays a central role in supporting the older generations in China. Obeying the Confucian virtue of filial piety – a core familial norm in the Chinese social value system – adult children have the primary responsibility for taking care of their elderly parents (Ikels, 2004; Xie & Zhu, 2009). There are mainly two forms of adult children's caregiving: daily care and economic assistance. As a time-intensive service, daily care is often achieved by co-residence. However, the weakening ties of family members and greater mobility of the population make the household size smaller and smaller. Considering the proportion of elderly Chinese living with their children has substantially declined in recent decades (Ren & Treiman, 2015; Zeng & Wang, 2003), the children's obligation to support parents is mainly reflected by the economic assistance which is achieved by providing monetary or in-kind transfers. Although co-residence is still important for supporting parents in China, adult children's financial transfer becomes the dominant mean of caregiving and has important implications for the well-being of the elderly. According to the National Transfer Accounts (NTA)[12] and many scholars' findings, China and many Asian countries such as India, Indonesia, South Korea, Thailand and Vietnam are commonly believed

[12] The National Transfer Accounts (NTA) system provides a comprehensive approach to measuring all reallocations of income across age and time at the aggregate level. See the National Transfer Accounts (NTA) website (http://www.ntaccounts.org) for the general pattern of the intergenerational transfers in various countries such as China, India, Indonesia, Japan, South Korea, Thailand and Vietnam.

to be the countries where the elderly's 'income' is mainly composed of private transfers (inter-household transfer and intra-household transfer) they received from their children (Lillard & Willis, 1997; Mason, Lee, Tung, Lai, & Miller, 2009; Queiroz, 2014). So which factors influence adult children's transfer to their elderly parents? Are there any determinants still under-investigated by previous studies? Our research question is of great value to Chinese elderly people's welfare.

Past literature mainly provides three theories relevant to the issue of intergenerational support: the Need-based Model (Kotlikoff & Spivak, 1981; Lee, Parish, & Willis, 1994), the Altruism Model (Becker, 1991), and the Exchange or Mutual-aid Model (Aldieri & Fiorillo, 2015; Altonji, Hayashi, & Kotlikoff, 1997; Cox, 1987; Cox & Rank, 1992; Lillard & Willis, 1997; Secondi, 1997). However, scholars overlooked the situation where most adult children are married and how much support devoted to each set of parents is jointly decided by spouses. Supposing husbands and wives are more interested in caring for their own parents than their in-laws, the upward transfer to paternal/maternal parents should be considered as husband's/wife's private consumption. As such, the magnitude of support towards each set of parents should be determined by the bargaining process between spouses.

The effect of bargaining between spouses on family decisions did not attract much attention from scholars until Bargaining Models surpassed Unitary Models in explaining household behaviours in modern times (Lee, 2007; Lundberg, Pollak, & Wales, 1997; Pezzin & Schone, 1997). Treating the household as a single decision-making entity, the Unitary Models were developed when the male breadwinner mode was dominant. With women's increasing economic status and the growing number of dual-earner households, many scholars began to compliment the Unitary Models by looking into the household resource allocation from a bargaining perspective. Several game-theoretic models were proposed, such as the Cooperative Model and Non-cooperative Model. The later Collective Model, forged by Chiappori (1992), encompasses both the

Unitary and Bargaining frameworks so that each becomes a special application of the collective approach. In the Collective model, household utility is the weighted sum of the utilities of individual members in the household. These Pareto weights (distributional factors) can be interpreted as proxies for each member's bargaining power. Family members' bargaining power determines the 'sharing rule', which refers to the proportions of the household expenditure being attributed to different household members.

Although the effect of spousal bargaining on intra-household resource allocation has been widely identified (Browning, Bourguignon, Chiappori, & Lechene, 1994; Haddad & Hoddinott, 1994; Lee, 2007; Pezzin, Pollak, & Schone, 2015; Song, 2008), few studies treat the intergenerational transfer from adult couples toward their elderly parents as a bargaining outcome. Incorporating elderly parents' utility into an adult child's utility, the Collective model implies that as a spouse's bargaining power increases, the resources provided to his/her partner's parents declines, while the resources provided to his/her own parents rises. Given women's increasing power in family decision making due to the enhanced social status of women and the transformation of the demographic structure in China (Jiang, Feldman, & Li, 2014), we assume the Collective model or bargaining framework best describes the modern Chinese family, thus explaining the mechanism of up-flow transfer within the family in China. Based on the China Health and Retirement Longitudinal Study (CHARLS) dataset from 2011 to 2015, this paper tries to merge the study of elderly support with works on household bargaining by empirically investigating the effect of spousal bargaining power on monetary transfers between a married couple and both sets of parents in China.

Our main findings suggest significant impact of spousal bargaining power on the transfer to elderly parents who are not living together. There is a significant positive relationship between the relative bargaining power of husband (wife) and the share of the couple's amount

of transfer toward the husband's (wife's) parents. It is worth noting that this positive effect is more sizable and statistically significant in urban areas compared to rural areas, and for high-income households compared to relatively low-income households. When looking at the transfer pattern, a significant positive effect is found between the relative bargaining power of the husband and the probability of the couple's decision to only transfer to paternal parents in urban areas. When using the amount of transfer to each set of parents as the dependent variables, increasing the relative bargaining power of the husband will negatively affect the amount of the couple's transfer to the wife's parents, both for the full sample and the urban sample.

The remainder of this paper is organized as follows. Section 2.2 reviews the previous studies. Section 2.3 outlines the theoretical framework and proposes the hypotheses. Section 2.4 describes the data and measurement. Section 2.5 empirically analyzes the relationship between spousal bargaining power and the share of the couple's transfer to each set of parents, and searches for the heterogeneity effect. Section 2.6 employs various robustness checks, such as exploring additional transfer outcomes, employing different estimation method, changing the measurement of bargaining power, and changing the calculation of transfer. Section 2.7 proposes the conclusion and discussions.

2.2. Literature Review

2.2.1. The Motives of Intergenerational Transfer

The motives for adult children to transfer financial support to their elderly parents can be explained by several models. With the family functioning as an insurance institution (Kotlikoff & Spivak, 1981; Lee et al., 1994), the need-based transfer model specifies that transfers between generations are based on the needs of the elderly parents. According to this model, the extent of need is specified in elderly parents'

health and economic status. On the other hand, the amount of financial support would be decided by their adult children's own financial capacity and circumstances. In the study by Lee and Xiao (1998), transfers to elderly parents from their adult children are found to be higher when the socioeconomic standing of the parents is lower. This implies that the motivation for providing financial support is largely decided on the needs of the parents in China. By using survey data from Baoding in China, Sun (2002) found the elderly's needs and children's capacity are positively correlated with the payment to the elderly parents showing that the level of needs of parents and the financial capacity of children both play crucial roles in eliciting the upward transfers.

Another explanation of an individual's transfer behavior is derived from Gary Becker's economics of family. The altruism model (Becker, 1991; Becker & Tomes, 1979) proposed that family members (usually the household head) are supposed to be altruistic in distribution of family resources in order to maximize the household utility. Altruism prompts the family to act as a "corporate unit", with resources pooled and efficiently distributed to guarantee that no alternative allocation could improve the welfare of any given member without reducing the welfare of another member. Analyzing the data from Taiwan, Lee et al. (1994) found many up-flows to elderly parents continue even though the culture of filial piety has been commonly believed to be weakened now by radical economic and social change, showing evidence of an altruism motivation of transfer.

Many scholars reject the altruism model empirically and argue that transfer behaviour is based on exchange or the so-called mutual aid model (Aldieri & Fiorillo, 2015; Altonji et al., 1997; Cox, 1987; Cox & Rank, 1992; Lillard & Willis, 1997; Secondi, 1997). Mutual aid can be discussed in two cases: short term and long term. In the short term, for example, elderly parents who care for grandchildren or help adult children to do housework are more likely to receive transfers in exchange (Morgan & Hirosima, 1983). In the long term, those who received earlier

investment from their parents in their childhood are more likely to contribute support to their parents in later life. Examining the transfer between adult children and their parents in Indonesia, Frankenberg, Lillard, and Willis (2002) provided strong evidence showing that some children's transfers are exchanged for parents' time, and some of the transfer is regarded as repayments to parents for educational loans. In a study conducted by Lee and Xiao (1998), the pattern of short-term exchange and long-term mutual aid between adult children and elderly parents was also found in China.

Another strand of literature explaining intergenerational transfer is from the bargaining perspective. One argument is that the economic and social changes are drastically weakening parental power and thus reducing the support from adult children to parents (Nugent, 1985; Parsons, 1943). Accompanying industrialization, the older generation is losing competitiveness compared with the younger generation. Also, with the shrinking household size and increased emphasis on the centrality of the husband-wife relationship, the intergenerational family obligation is weakening. As a result, parents' control of resources is declining, as well as their power to extract obedience and resources from children. Under this framework, children will be more likely to provide gifts or services to the elderly with more economic resources, and those children with relatively higher incomes are less likely to provide support to their parents. Many studies researching the issue of intergenerational relations in American families support this argument (Behrman & Rosenzweig, 2006; Eggebeen & Hogan, 1990; Hogan, Eggebeen, & Clogg, 1993; Pezzin & Schone, 1997). However, in many eastern Asian countries, where values of filial piety have been deeply instilled into children's belief system, evidence was found that children do not provide help to parents with more economic power (Lee et al., 1994; Sun, 2002). On the contrary, relatively disadvantaged parents who are in need of help have stronger bargaining power over their children's transfer or support.

Given that most elderly parents have multiple children, scholars moved their attention to the interaction among siblings regarding caregiving toward parents (Checkovich & Stern, 2002; Pezzin et al., 2015; Wolf, Freedman, & Soldo, 1997). Using data from the 1982 and 1984 National Long Term Care Surveys (NLTCS), Checkovich and Stern (2002) found children's caregiving decisions are independent across neither time nor siblings, but how much care to provide for elderly parents is significantly affected by the number of siblings, which indicates a sharing responsibility among children. Based on a bargaining framework, Pezzin et al. (2015) examined the effect of changes in parent–child co-residence on caregiving decisions of non-resident siblings over a 5-year period. Their findings confirmed the hypothesis that the formation of a joint household between parents and one of their children raises the bargaining power of non-resident siblings, who then reduce their care to the parents. Similarly, the dissolution of a parent–child household is expected to increase the bargaining power of the child who no longer co-resides with the parent relative to her siblings.

Bargaining processes about the support to parents are not only between parents and children, or among siblings, but also between adult children and their spouses. However, past literature overlooked the situation where most adult children are married and both spouses jointly decide about how much support to devote to parents. For example, a wife with higher income than her spouse may bargain with her husband over the amount of support provided to her own parent (Lee et al., 1994). This influence from a spouse about the transfer to parents is particularly pronounced when the married couple and their parents do not share the same household, which is a commonly observed trend in modern societies. In this paper, we try to fill the gap in the study of elderly support by taking adult children's bargaining with spouses into consideration, with a special focus on contemporary China.

2.2.2. The Gender Bargaining Framework

Over decades, there have been several models framing the mechanisms underlying individual behaviour within households. The first model of family behaviour is the Unitary Model, which posits that the household behaves like a single decision maker (Becker, 1973, 1974). In Becker's 'Treatise on Family', household members are assumed to rationally take on specialized roles based on their relative productivities, with the ultimate goal of increasing overall household utility. In the typical case, women specialize in home production and men in market production (Becker, 1991). However, there is no impediment to women specializing in market production and men in home production, as long as it benefits the interest of all. Regarding resource allocation, it implies that all income is pooled so that family demand behaviour depends solely on total family income. In other words, family decisions (such as consumption and time-allocation decisions) are invariant to the division of resources among individual members. Conflicts within the family are allowed but they are not seen as problematic because specialization would minimize potential conflicts within families by creating dependencies between family members and by stimulating efficiency (Becker, 1981).

Apparently, the Unitary Model was developed in times and places where the male breadwinner model was predominant. With women's increasing economic status enhanced by their enrollment in high-level education and participation in the labour market, the Unitary Model was later challenged by the changing roles of women and the growing number of dual-earner households in society. As the resource pooling hypothesis is often rejected empirically (Duncan, 1990; Lee, 2007; Lundberg et al., 1997; Pezzin & Schone, 1997), many scholars begin to compliment the Unitary Models by looking into the household resource allocation from a bargaining perspective. In bargaining models, it is assumed that family members often have divergent and competing preferences. Relying on their individual endowments, such as education and income, husband

and wife can negotiate on the decisions affecting the household. The relative amount of influence that one spouse has within the household compared to the other is called the spousal bargaining power. As such, the spouse with more bargaining power will command a larger share of household consumption or a greater say in family decisions.

Family bargaining is explained by several game-theoretic models: the Cooperative Model, the Non-cooperative Model and the Collective Model. The Cooperative Model, which is also known as the Nash Bargaining Model, is the earliest family bargaining model. In this model, bargaining power was identified by the relative fallback positions or "threat points" of the individuals in the bargaining process. To be specific, each partner's bargaining power is determined by the availability of alternatives or the expected well-being outside marriage. The "threat point" is defined as the situation where both 'outside' and 'inside' options are equally attractive. Manser and Brown (1980) and Mcelroy and Horney (1981) introduced the Cooperative Model and suggested "divorce" as the threat point. In contrast, Lundberg and Pollak (1993, 1994) replaced the divorce threat with a non-cooperation threat point which is internal to marriage. In the Non-cooperative Model, divorce is treated as an external "outside option". When the internal threat point is reached, spouses may contribute to the household public good by personal preference, which leads to "separate spheres" in a low-functioning marriage.

Collective models encompass both the Unitary framework and Cooperative Models so that each becomes a special application of the collective approach (Chiappori, 1992). As with other bargaining models, Pareto efficiency is one of the basic features, which can be defined as a state in which any improvement in a certain member's wellbeing will negatively affect the wellbeing of the other negotiator. In the Collective Model, household utility is the weighted sum of the utilities of individual members in the household. These Pareto weights (distributional factors) can be interpreted as proxies for each member's bargaining power.

Another feature of Collective Models is the presence of the 'sharing rule', which means proportions of the household expenditure being attributed to different household members. The sharing rule is determined by individual bargaining power, although the final outcomes of the negotiation will also depend on household preferences.

A common implication of those bargaining models is that changes in the husband's (wife's) relative bargaining power could affect household production and consumption patterns. Blundell, Chiappori, Magnac, and Meghir (2007) and Chiappori, Fortin, and Lacroix (2002) found the relative bargaining power between spouses could have an impact on men's and women's labor supply and leisure activities, although they used different measurement of bargaining power. Apps and Rees (1997) also incorporate home production into a bargaining framework. As for household expenditure, children's welfare attracted much attention from scholars. In Cote d'Ivoire, Haddad and Hoddinott (1994) found there will be more purchase for children if women's bargaining power is enhanced; by contrast, men appear to spend a greater proportion of the income they earn on goods such as alcohol and cigarettes. Similarly, Song (2008) found the share of spending on children's education and clothing rises with women's bargaining power in rural China.

Besides children's goods, scholars also explored the impact of spousal bargaining power on husband's goods and wife's goods. Using the Canadian data on couples with no children, Browning et al. (1994) found each partner's consumption of clothing in the household depends on the relative incomes of the spouses. Using longitudinal data from South Korea, Lee (2007) found the bargaining power measured by relative earnings could affect spouses' pocket money [13] which is culturally defined in South Korea as private expenditure. In their view, the division of pocket money between spouses will give us a good approximation of the household's sharing rule. Behrman and Rosenzweig (2006)

[13] Lee (2007) defines pocket money as spending on items such as recreation, hobbies, and alcoholic beverages.

considered a couple's number of visits to the husband's parents and wife's parents as their measures of semi-private consumptions. They found wealthier parents are more likely to increase their child's bargaining power, thus receiving more visits from the married couple.

Supposing husbands and wives are more interested in caring for their own parents than their in-laws, the upward transfer to paternal/maternal parents should be considered as the husband's/wife's semi-private consumption. As such, the degree of support couples provide to each side of their parents respectively should be determined by the bargaining process between spouses. However, few studies incorporate the intergenerational transfer from adult couples toward their elderly parents into the couple's consumption behaviour. In this paper, we try to incorporate elderly parents' utility into adult child's utility taking Ham and Song (2014)'s work for reference. Using a survey data from 2011 to 2015 in China, we extend the bargaining literature by empirically investigating the effect of spousal bargaining power on monetary transfers between a married couple and each set of parents.

2.2.3. Spousal Bargaining and Upward Transfer to Parents in China

In traditional China, caring for parents is primarily the responsibility of sons and daughters-in-law, as a married daughter is no longer regarded as a member of her "born" family, but as a member of her husband's family. Given this context, the Unitary model may be appropriate to describe the traditional Chinese family, since it is the husband who is the head of household and arranges for the intra-household resource allocation. However, such cultural norms are rapidly changing, with the increasing social status of women and the transformation of the demographic structure. In 1949, the founding of the People's Republic of China changed the traditional pattern of marriage through a high degree of state control over economic development and individuals'

social lives, such as legally abandoning the old form of marriage and requiring both men and women to participate in production activities. Later on, the economic reforms that began in 1978 further enhanced women's social status, since which time gender difference has been substantially reduced through the narrowed gap between men and women's years of schooling, and women's participation in the labour market is now common. Moreover, the sex ratio in China had been highly skewed due to the 'one child' policy in the 1980s, leading to a serious male marriage squeeze (Jiang, Feldman, & Li, 2014; Poston & Glover, 2005). The surplus males also weakened their bargaining power in the marriage market. Hence, the enhanced economic ability and the skewed sex ratio gives women more bargaining power both when choosing partners before marriage and when negotiating with their spouses within marriage. Given the context that women are more and more powerful in family decision-making, we believe women are playing a more substantial role in caring for elderly parents in China, especially for their own biological parents. Therefore, in this paper, we hypothesize that the Collective framework would be best to describe the Chinese family. Thus, explaining the mechanism of up-flow transfer within the family in China could also be applicable.

When extended to include elderly support, the Collective model implies that as a spouse's bargaining power increases, the resources provided to his/her partner's parents declines, while the resources provided to his/her own parents rises. Such bargaining power is a function of distribution factors that influence outcomes through the bargaining process and do not affect individual preferences over various other goods (Blundell et al., 2007). There are some important papers specifically on support from children to parents using a bargaining approach. Kazianga (2006) conducted an extensive investigation of the motives for household private transfers by constructing a two-stage collective bargaining model in Burkina Faso. Raut and Tran (2005) test two models in Indonesia – the "Pure Loan" model and the "Two-Sided Altruism" model; they reject the former and accept the latter. Ham and Song (2014) extend the work

of Raut and Tran (2005) and Kazianga (2006) on intergenerational transfers in developing countries by considering transfers between a married couple and both sets of parents in South Korea. Regarding the empirical studies in China, Pan (2009) adopts women's labour market participation to identify bargaining power and finds the share of transfers towards a wife's own parents is positively correlated with her employment status and work hours. Using the sex ratio as a distribution factor, Porter (2017) found the time devoted to caring for husbands' parents is reduced when women become less scarce. In a recent study by Zheng and Di (2018), bargaining power was constructed as an index, and the economic support to parents was investigated using CGSS 2006 as the database. However, in Zheng and Di (2018)'s study, the economic support to each side's parents are represented by scales and the actual amount of transfers are not explored as a result of dataset deficiency.

We extend previous papers in several directions. First, besides the main bargaining outcomes – share of transfer between paternal and maternal parents – we also explored other types of transfer such as the transfer pattern (whether transferred or not, transferred to whom) and the actual amount of transfer to both set of parents respectively. Compared with previous studies that only consider one of these outcomes, our study provides more comprehensive evidence of the impact of spousal bargaining power. Second, past literature normally does not rule out the observations that the elderly parents living together with their adult children when exploring the determinants of upward transfer, or just treating co-residence as a controlling variable in the econometric model. In this paper, we only keep the samples where the adult couples and their parents are in separate households, as the inter-household transfer can minimize the confusion caused by intra-household behaviors, such as the exchange of money and time between the couple and the elderly parents (Cox, 1987). Third, the focus on Chinese households is motivated by family-based elderly care and the rapidly aging society. In this regard, this paper provides a novel contribution to the literature on family economics in China, helping to merge the study of elderly support with

works on household bargaining. Finally, this paper has important policy implications for developing countries such as China, where the elderly lack publicly provided social support and rely on family for both care and financial help.

2.3. Hypotheses

Our hypotheses are derived from the two-stage bargaining model proposed by Ham and Song (2014). Given the income of the husband's parents Y^{hp}, the income of the wife's parents Y^{wp}, the consumption of husband's parents C^{hp}, and the consumption of the wife's parents C^{wp}, then the transfer to parents is given by

$$T^{hp} = C^{hp} - Y^{hp}, \quad (1)$$
$$T^{wp} = C^{wp} - Y^{wp}, \quad (2)$$

In this model, the husband is only concerned with his consumption and his own parents' consumption, while the wife is only concerned with her consumption and her own parents' consumption. Thus, the transfers to each set of parents are considered as semi-private consumptions for husbands and wives respectively. If C^h and C^w represent the consumption of the husband and the wife respectively, the husband's and wife's utility function are

$$U^h(C^h, C^{hp}) = lnC^h + \alpha lnC^{hp}, \quad (3)$$
$$U^w(C^w, C^{wp}) = lnC^w + \alpha lnC^{wp}, \quad (4)$$

α is the altruism parameter. Parents are allowed to have altruism parameters different from their children's if k ≠ 1. In a similar way, the utility function of the husband's parents and the wife's parents are

$$U^{hp}(C^h, C^{hp}) = lnC^{hp} + k\alpha lnC^h, \quad (5)$$
$$U^{wp}(C^w, C^{wp}) = lnC^{wp} + k\alpha lnC^w, \quad (6)$$

In this model, the process of bargaining between each of the spouses and their own parents is in Stage One, and the process of bargaining between spouses is in Stage Two[14]. Based on the setting of the sharing rule in Collective model, the optimal consumption levels of paternal and maternal parents are derived and presented by functions of income and bargaining power[15]. Therefore, the transfer functions are:

$$T^{hp} = \theta\mu^{h}(Y + Y^{hp} + Y^{wp}) - Y^{hp} \quad (7)$$
$$T^{wp} = \theta(1 - \mu^{h})(Y + Y^{hp} + Y^{wp}) - Y^{wp} \quad (8)$$
$$\text{Where} \quad \theta = \frac{1+\mu^{p}(X)(1-\alpha)}{1+\alpha+\mu^{p}(X)\alpha(k-1)}$$

where μ^{h} denotes the relative bargaining power of the husband, which is between 0 and 1. Then $(1 - \mu^{h})$ denotes the wife's relative bargaining power. Y denotes the couple's total income. Parents' bargaining power is represented by $\mu^{p}(X)$, which is between 0 and 1. It is a function of parents' characteristics, such as their age, health status, the number of children and so on.

In order to investigate the determinants of the share of couple's transfer towards each set of parents more intuitively, we change the transfer function (7) and (8) into a proportion form:

$$Share^{h} = \frac{T^{hp}}{T^{hp}+T^{wp}} = \frac{\theta\mu^{h}(Y+Y^{hp}+Y^{wp})-Y^{hp}}{\theta(Y+Y^{hp}+Y^{wp})-(Y^{hp}+Y^{wp})} \quad (9)$$

Since the share is always positive, and the denominator of equation (9) is a constant[16], there is a positive relationship between the relative bargaining power of the husband and the share of the couple's transfer to the paternal parents. If we switch to the wife's perspective of bargaining power, the relationship should be negative. This paper thus suggests the following research hypothesis:

[14] It should be noted that bargaining between the adult children and their in-laws, or between the in-laws, are not allowed in the model.
[15] For brevity, the derivation process is omitted.
[16] For simplicity, we treat θ as a constant when the focus is on spousal bargaining power.

Hypothesis 1: Ceteris paribus, increasing one spouse's relative bargaining power will increase the share of the couple's transfer towards his/her own elderly parents, relative to the parents-in-law.

Ample evidence has shown that there are huge disparities between rural and urban areas in China (Knight & Song, 1999). In terms of the power of intra-household bargaining, although we assume the Collective model/bargaining framework best describes household resource allocation in modern China, heterogeneity between urban and rural areas is still possible due to the difference of women's position within the family. Firstly, education levels of women are higher in urban areas compared to rural areas, which enables women to be more competitive in the labour market. As a result, urban wives usually earn higher income and hold more power within the family. According to the study by Xu, Li, and Yu (2014), although men are far more likely to be the decision maker both in urban and rural areas, the gender gap is much larger in rural areas. Secondly, traditional gender norms are much weaker in urban areas, since urban areas are more developed and offer more exposure to modern culture values. However, in rural areas, men's power over women is deeply rooted. Women are supposed to care for their husband's parents instead of their own parents. Therefore, we suggest Hypothesis 2:

Hypothesis 2: The effect of spousal bargaining on the transfer from a couple to both sets of elderly parents may be more significant in urban areas compared to rural areas.

Besides the heterogeneity between urban and rural areas, we expect social class differences to emerge in marriage and family behaviours. Specifically, households with higher income may have more options for family members to act on their preferences, whereas households with lower income may not have enough 'room' for members to bargain due to the limited resources. We thus suggest Hypothesis 3:

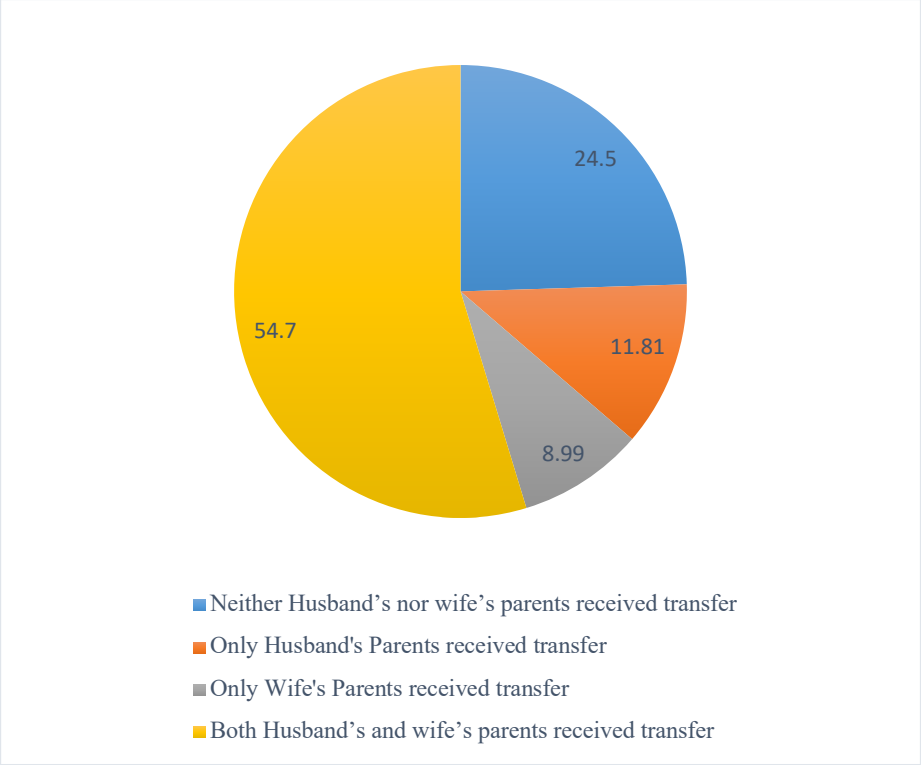
Hypothesis 3: The effect of spousal bargaining on the transfer from a couple to both sets of elderly parents may be more significant for high-income households, compared to low-income households.

Figure 2.1 shows a weighted distribution of the transfer pattern from the China Health and Retirement Longitudinal Study (CHARLS) 2011 to 2015 datasets. The pie chart shows that more than half of middle-aged couples in China (55%) transfer money to both the husband's and the wife's parents. The proportion of only transferring to the husband's parents (12%) is slightly higher than that of only transferring to the wife's parents (9%). The proportion of couples not transferring to either set of parents is 24%. This is a considerable proportion and we cannot ignore this group. Hence, although exploring a couple's share of transfer to each set of parents can best reflect the outcome of spousal bargaining, the effect of spousal bargaining on the transfer pattern (whether transferred or not, transferred to whom) is worth investigating. Moreover, equations (7) and (8) also demonstrate that the relative bargaining power of the husband (wife) is positively related to the amount of transfer to paternal (maternal) parents.

If the transfer pattern and the amount of transfer to elderly parents are significantly affected by adult children's spousal bargaining power, then our argument that spousal bargaining power is an important determinant of the upward transfer to elderly parents is further confirmed. We thus suggest Hypothesis 4:

Hypothesis 4: Increasing one spouse's relative bargaining power impacts not only the share of transfer between paternal and maternal parents, but also other forms of transfer such as the transfer pattern (whether transferred or not, transferred to whom) and the actual amount of transfer to each set of parents.

Figure 2.1: Transfer Pattern, Weighted Sample (Sample Size: 2887; Population Size: 65217559)



Note: (1) The figures are authors' calculation from CHARLS 2011-2015 datasets.
(2) Couples living together with their elderly parents are excluded.

Besides the key independent variable – spousal bargaining power – we expect the financial and health status of elderly parents and the circumstances of adult children to have an impact on the transfer to elderly parents, with the suggestion of the Needs-based Model and Mutual-aid Model. From the transfer equations (7)-(9), a positive relationship between the bargaining power of elderly parents and the transfer to themselves, and a negative relationship between their own income and the transfer they receive are observed. Therefore, we suggest Hypothesis 5:

Hypothesis 5: The financial and health status of the elderly parents and the circumstances of adult children can have an impact on the couple's transfer to elderly parents.

2.4. Data and Measurement

2.4.1. Data

Our analytical data in this paper is from the China Health and Retirement Longitudinal Study (CHARLS)[17], which is a nationally representative longitudinal survey of the middle-aged and elderly population of China. As our research is targeting the economic support that the elderly received from their adult children, CHARLS offered us the opportunity to study this topic with its rich information of community residents' social, economic, and health circumstances, especially the support between generations.

The national baseline survey of CHARLS was conducted in 2011 and followed up by every two years, using a face-to-face computer-assisted personal interview (CAPI) method. So far, it has released three waves of data, in 2011, 2013 and 2015. The survey followed strict randomization procedures. At the first stage of sampling, counties were randomly chosen with the probability proportional to scale (PPS) from all county-level units of China excluding only Tibet. At the second stage, three communities (administrative villages in rural areas or resident committees in urban areas) were randomly chosen from all communities in a certain selected county with the PPS method. At the third stage, the households in a community were randomly selected, and the respondents were also randomly selected within the households, so long as the respondents satisfied the criteria of age 45 or older[18]. As our aim is to investigate the effect of the bargaining process between spouses on the upward transfer, we only kept the respondents who currently had a spouse. In other words, "couple" is the unit of observations in our sample. The main respondent was selected from the spouses and reports the information of the couple.

[17] CHARLS is conducted by National School of Development at Peking University.
[18] It should be noted that the spouses of those chosen were not necessarily above 45 years old.

To ensure the homogeneity of the sample, three further restrictions were applied to the data. First, we only kept couples where each spouse had at least one living parent[19] so that the couple's transfer to paternal and maternal parents were both captured. Second, as we are focusing on the inter-household transfers, the observations if the couple lived together[20] with their parents in the same household were excluded to avoid the confusion caused by intra-household behaviours, such as the exchange of money and time between the couple and the elderly parents (Cox, 1987). Third, as we are focusing on the share of couple's transfer to each set of parents, the observations that couples transfer neither to paternal parents nor to maternal parents are excluded. After cleaning the data, we finally got 2239 couples in three waves, 1027 in urban areas and 1212 in rural areas[21].

2.4.2. Measurement of Bargaining Power

The most widely used measurement of bargaining power is income (Blundell et al., 2007; Browning et al., 1994; Haddad & Hoddinott, 1994; Lee, 2007). The assumption is that the person who earns more has more influence on household decisions. However, utilizing personal income to measure bargaining power between spouses is not appropriate for our analysis. Firstly, only actual (reported) income is available in our data, which has drawbacks compared to potential income. For example, in Cooperative Bargaining Models, it is the potential income that is

[19] Direct questions have been asked in the questionnaire as to whether the parent is alive or not. However, there are still some observations whose "parents alive or not" values contradict their parents' other information, such as health status, income, and living arrangements. For example, where the "parents alive or not" variable indicates one's parent is dead, but this parent still has information of income or health status. After checking all the variables related to the parents, we conjecture this problem may result from two reasons: a. The parents died in the interview year. In this case, the respondents report all the information of parents in the last year but report "parents alive or not" variable to be "not alive". b. The respondent has little contact with his/her parents, which leads to large number of missing values of parents' information. To tackle these problems, we decided to treat parents to be "alive" so long as they have at least one type of socio-economic variables to be non-missing values.

[20] The definition of living with parents is that the couple and their elderly parents are living in the same household. Elderly parents living in adjacent dwellings/courtyards to their children is not considered as living together.

[21] The classification of urban and rural areas refers to respondents' residential area, which is defined by the National Bureau of Statistics of China.

determined by one's ability outside the household that affects the bargaining power inside the household even if he or she chooses to stay at home. Secondly, using reported income and testing its impact could be problematic for reasons of endogeneity, as bargaining power sometimes determines both income and economic outcomes (Doss, 2013). Imagine a scenario in which the person with more bargaining power insists he or she holds a particular job at the expense of moving home overseas or making frequent moves which severely limits the options for the other person. Even individual's income is not supposed to be related to bargaining power, a positive relationship between income and economic decisions could be observed. A negative relationship between income and economic decisions could also be observed if the spouse with more bargaining power decides not to work or only to work limited hours. Thirdly, regardless of the drawbacks above, the personal income reported from CHARLS itself poses great difficulties in measuring and estimating. Many sources of personal income are reported as missing values. After aggregating all kinds of personal incomes[22] that the survey provided, a large proportion (one-third) of the couples still shows "no income". Apparently, treating the bargaining power as 0.5 for all couples where both spouses' personal income reported "0" is not appropriate.

Literature also explored the outside factors to identify the relative bargaining power, such as the sex ratio at marriage ages (Porter, 2017). If there is a low sex ratio for a certain area, then females will have more bargaining power inside the household due to females' greater outside options in the marriage market in this area. As our samples are all middle-aged, the effect of sex ratio should be very limited. Another outside factor is the change in legislation being a "natural experiment". Specifically, scholars use a change in policy or a shock outside the control of the household as a "before and after" experiment to demonstrate the impact of the intervention on the outcomes translated by

[22] The detail of the calculation of couple's income is shown in the Appendix

the shift of male/female's bargaining power. For example, researching a law that improves women's financial position after divorce in Canada, Ligon, Hoddinott, and Adam (2003) found suicide rates are reduced among older married women, which reveal a causal relationship between the change of policy and women's bargaining power. However, it is difficult to find exogenous change during our observation period from 2011 to 2015.

Due to the tradition of son preference in China, past literature also utilizes "whether a woman has a son" to measure women's bargaining power, as women who give birth to a boy might receive more respect from the older generations and have a higher status in the family. However, as most of the respondents' ages are above 45 years old, it has been long time since they got married. The information around the time when they get married, such as giving birth to a son, can hardly affect their current bargaining power. Other studies found proxies of spousal bargaining power from the decision-making process of family issues, such as the person who is the household head, the person who dominates the purchase of expensive household goods (Zheng & Di, 2018). Unfortunately, we cannot find these indicators due to the limitations of the dataset.

In this paper, I will choose the years of husband's education[23] relative to that of his wife as the main proxy indicating the husband's bargaining power. Education may increase an individual's bargaining power in two ways. First, those with higher education means his or her ability to earn more money. Second, especially for the middle-aged people whose education level is significantly lower than that of young people in China, it is expected that individuals with higher education will be more comfortable in dealing with the modern economy and the rapidly

[23] In the questionnaire, only education level was reported by the respondents. We transformed the education level into education year based on the following rule: 1 "No formal education, 0 year" 2 "Did not finish primary, 3 years" 3 "Elementary, 6 years" 4 "Middle school, 9 years" 5 "High school, 12 years" 6 "Vocational School, 12 years" 7 "Three-year College, 15 years" 8 "Four-year University, 16 years" 9 "Master and above, 19 years".

changing society thus having more bargaining power both in the community and within the household. These individuals will be more likely to have access to formal markets, credit and government services than those with less education. Therefore, education is an aggregative indicator for spousal bargaining power that may affect intra-household decisions both directly and indirectly. Moreover, besides the measurement by education, we still employ the couple's relative income[24] to test the robustness of our conclusion.

2.5. Share of Transfer and Spousal Bargaining Power

2.5.1. Descriptive Statistics

To explore the relationship between spousal bargaining power and the upward transfer to each set of parents, we choose the share of the couple's transfer to the husband's parents in the total transfer to both the husband's and the wife's parents as the main bargaining outcome. Excluding the category that couples "neither transfer to the husband's parents nor the wife's parents" in Figure 2.1[25] and missing values, there are 2239 couples reported as having transferred to their elderly parents. Table 2.1 displays the summary statistics of the variables. The detailed definitions of variables are provided in Appendix Table 2.6.

Considering the impact of inflation rates, the values of transfer in 2013 and 2015 are adjusted to the inflation level in 2011. In Table 2.1, we observe that couples' transfers to their parents make up more than half of their parents' per capita income, which shows the importance of couples' transfers to the elderly's well-being. Although the proportion of

[24] The bargaining power measured by relative income is calculated by husband's/wife's personal income divided by couple's total income. After excluding the observations that couple's income reported "0" or "Missing", we finally got a sample size of 1510 in our study. The results of the bargaining power measured by relative income are reported in the Appendix.

[25] The value of the share of couples' transfers to the husband's or the wife's parents is between 0 and 1. If the "no transfer" samples are included, then the value of the proportion should be zero divided by zero, which is meaningless. Treating these values as "0" is also not appropriate because of the confusion from the zero values generated by couples "only transferring to the wife's parents".

couples' transfers to the husband's parents/wife's parents is around fifty percent, we find the mean of couples' transfer to the husband's parents is 332 yuan higher than that to the wife's parents at the 2011 inflation level.

For simplicity, we present spousal bargaining power from the husband's perspective. The mean value of the relative bargaining power of the husband is 0.617, showing an overall figure that husbands have slightly higher bargaining power over wives in China. The average education year of husband is 8.5, which is higher than that of wife's 6.3 years. As for parents' age, we take the age of the elder parent to be the value if both father and mother are alive (if only one parent is alive, then we take the age of the living parent directly). It can be seen that the elderly parents in our sample are the oldest-old, whose average age is nearly 80 years old, and the couples are all middle-aged, whose average age is around 50 years old. Around a quarter of the parents are in poor health. Both husbands and wives had around three siblings. Being all middle-aged, less than one-third of the couples have a child in school.

Table 2.1: Descriptive Statistics

Variables	Obs	Mean	Std.Dev.	Min	Max
Main Dependent Variable:					
T_share_hp					
(1-T_share_wp)	2239	0.537	0.298	0	1
Additional Dependent Variables:					
T_pattern (Categories)					
Neither	2899	0.227	0.419	0	1
Only to hp	2899	0.109	0.312	0	1
Only to wp	2899	0.093	0.290	0	1
Both	2899	0.571	0.495	0	1
T_amount_hp	2239	1809	4224	0	96000
T_amount_wp	2239	1477	4510	0	96000
Key explanatory variable:					
Bargain_h					
(1-Bargain_w)	2239	0.617	0.217	0	1
Controlling Variables:					
Age_hp	2046	78.71	6.432	60	98
Age_wp	2017	77.93	6.693	55	98
Income_hp	2239	3569	8949	0	110217
Income_wp	2239	3480	8102	0	68370
Health_hp (Categories)					
Widowed/Both in Poor	2239	0.255	0.436	0	1
One Poor, the Other not Poor	2239	0.131	0.337	0	1
Widowed/Both Not Poor	2239	0.615	0.487	0	1
Health_wp (Categories)					
Widowed/Both in Poor	2239	0.272	0.445	0	1
One Poor, the Other not Poor	2239	0.0965	0.295	0	1
Widowed/Both Not Poor	2239	0.632	0.482	0	1
Age_h	2239	51.68	4.934	39	69
Age_w	2239	49.87	5.085	30	69
Edu_year_h	2239	8.560	3.775	0	19
Edu_year_h	2239	6.275	4.482	0	19
Sibling_N_h	2239	3.636	1.807	0	10
Sibling_N_w	2239	3.641	1.690	0	10
School_child					
No	2239	0.696	0.460	0	1
Yes	2239	0.304	0.460	0	1
Hincome_per	2239	13304	21612	0	505161

2.5.2. Methodology

Although the panel data structure has advantages to deal with certain types of endogeneity by employing a fixed effect method, we still adopt a pooled cross-sectional approach for the following reasons. Firstly, as the respondents in our sample are all middle-aged and their education

level did not change within the observing period 2011-2015, the spousal bargaining power measured by education is constant across time. Hence, the effect of our key explanatory variable – spousal bargaining power – will be omitted if the fixed effect method is used. Secondly, the sample used in our analysis satisfies the requirement of pooling since the observations in each wave are randomly sampled and time dummy variables can be used to capture structural change over time.

As our analysis is focusing on the share of a couple's transfer to the husband's parents relative to the wife's parents, the dependent variable is a continuous variable and its values are bounded between 0 and 1. This poses challenges to econometric modelling. On the one hand, it may produce predicted values that lie outside the unit interval if we simply use a traditional OLS model. On the other hand, nonlinear approaches such as Log-Odds regression requires arbitrary adjustment for all observations taking on boundary values 0 and 1, which is not favoured here. Tobit models and truncated regressions may attenuate the shortcomings of the method mentioned above. However, they are not suitable since Tobit models and truncated models are usually used in the case of censored samples. Additionally, Tobit regressions are particularly sensitive to issues generated by heteroskedasticity, which cause inconsistency and invalidate usual test statistics (Arabmazar & Schmidt, 1981). Our paper employs a Fractional Response Model (FRM) developed by Papke and Wooldridge (1996, 2008). The FRM provides several advantages: (a) it does not require any special correction of the values observed at the bounds, (b) it accounts for the non-linearity in the data, (c) it is fully robust under generalized linear model assumptions, and (d) it allows for direct recovery of the regression function for the dependent variable given the set of predictors.

The share of transfer not only takes values between 0 and 1, but also the values at the bounds. The fractional logit estimation is of advantage to other methods because it only requires the conditional mean be specified correctly to obtain consistent estimates and it allows for direct estimation

of the desired fractional response variable. The fractional logit model employs a quasi-maximum likelihood estimator (QMLE) method with conditional mean assumption:

$$\mathrm{E(y|x)} = \frac{\exp\,(X\beta)}{1+\exp\,(X\beta)} = \Lambda(X\beta)$$

where $\Lambda(\cdot)$ is the logistic cumulative distribution function satisfying $y \in [0,1]$, which is different from the binary logit that the values of dependent variable are either 0 or 1. X is a vector of independent variables including husband's bargaining power, elderly parents' information, couple's information and other controlling variables. β is a vector of coefficients. The quasi-maximum likelihood estimators (QMLE) of β are consistent and asymptotically normal, regardless of the distribution of the dependent variable. The quasi-log likelihood for observation i is the same as for the logit binary response model:

$$L_i(\beta) = y_i \log[\Lambda(X_i\beta)] + (1-y_i)\log\,[1-\Lambda(X_i\beta)]$$

In our analysis, the function form could be written as:

$$\mathrm{E(T_share|X)} = \Lambda(\beta_0 + \beta_1 Bargain_i + \beta_2 Parents_i + \beta_3 Couple_i + \mu_i + \lambda_i + \varepsilon_i)$$

where T_share is the dependent variable, defined as the proportion of couple's transfer to husband's parents (paternal parents) in the total transfer to both sides of parents. $Bargain_i$ is the key explanatory variable, the husband's relative bargaining power to his spouse for the "i"th couple, which is measured by the ratio of the husband's education in years to the sum of the years both husband and wife received.

Our controlling variables are from both the parents' and the children's perspectives:

$Parents_i$ refers to a vector of elderly parents' information. Based on the mutual-aid theory, transfers between generations are made as needs arise in each generation, with the family functioning as an insurance policy (Frankenberg et al., 2002; Lee & Xiao, 1998). Hence, both paternal and maternal parents' age, income and health status are included[26]. Given some missing values of parents' age, we transform parents' age into age groups and set a dummy variable for missing values.

With the suggestion of the need-based model, we expect the couple would decide to transfer to his or her own parent if the parents are poorer in financial and health status. This could be explained under the Chinese context dominated by Confucian values emphasizing filial piety. As for parents' income, we take the average income of the elderly married couple if the father and mother are both alive (if only one parent is alive, then we take the income of the living parent directly). Inflation is treated by years of the period. Incomes in other years are standardized based on the inflation level in 2011.

Health status is asked separately for elderly fathers and mothers in the questionnaire in five scales: "Very good" "Good" "Fair" "Poor" and "Very poor". However, it poses difficulty in depicting the combined health status of elderly parents. First, the health status of one of the parents may be different from that of the other one. Second, the health status of the couple is not comparable with that of the widowed. Assuming 'two' is better than 'one', we generate combined health status categories for the parents: (1) Widowed Parent/Both Parents in Poor Health, (2) One Parent in Poor Health, The Other Not in Poor Health, (3) Widowed Parent/Both Parents Not in Poor Health. Under this classification rule, the categories "Very good" "Good" and "Fair" are combined as "Not in poor health". Categories "Poor" and "Very poor" are combined as "In poor health".

[26] All of the elderly parents' information is reported by the married respondent.

$Couple_i$ is a vector of the couple's characteristics, including the couple's age, sibling numbers, whether they have children in school or not, and the couple's household per capita income[27]. The reason for controlling the couple's sibling numbers is that a large number of elderly people's children could disperse the elderly's reliance on a certain adult child, thus affecting the transfer behaviour (Lin et al., 2003; Tolkacheva, van Groenou, & van Tilburg, 2010; Zimmer & Kwong, 2003). Moreover, intergenerational transfer consists of not only upward transfer to parents but also downward transfer to children, especially when children are still in school. Costly in-school children could occupy some share of the household budget, thus affecting the transfer to elderly parents. Hence, whether couples have in-school children has been controlled. Moreover, we controlled the household per capita income to proxy for the couple's financial ability because of its direct impact on the couple's transfer decision (Liu et al., 2013). The inflation issue has also been treated for household income.

Due to economic development and cultural differences, the pattern of intergenerational transfer may show some extent of heterogeneity across regions and years. In this paper, the remaining unobserved systematic variations across provinces and years are captured by province and year fixed effects μ_i and λ_i. ε_{ij} is the idiosyncratic error term.

Given that there is correlation across three waves for the same couple, standard errors are clustered by couple's ID. The robust standard errors are computed by default in the fractional logit regression.

[27] As couples and parents are not living in the same household, the reported household income is assigned to the couple's information. Besides the aggregate value of couple's personal income, the household income also includes other household member's personal income and the incomes that are not attributable to individuals, such as the agricultural income and household subsidies.

2.5.3. Baseline Regression Results

Table 2.2 presents the baseline results of fractional logistic regression on the share of the couple's transfer to husband's parents (paternal parents) in the total transfer to both sides of parents. Marginal effects are reported due to the difficulty of interpreting coefficients. Column 1 reported the effect of spousal bargaining power on the share of transfer without controlling other variables. The results show that there is a significant positive correlation between the two variables. In Column 2, we control for a set of elderly parents' information. The marginal effect and the level of significance for the relative bargaining power of the husband are both raised. In Column 3, once a set of couple's information is controlled, both the marginal effect and the p-value for the bargaining power drops. Column 4 shows the full model with all controls. When year and province dummies are controlled for, the effect of spousal bargaining power still remains significant at the 10% significance level, after holding other variables fixed. The average marginal effect shows each 10% increase in husband's relative bargaining power is associated with an increase of 0.58% in the proportion of the couple's transfer to the husband's parents (also a decrease of 0.58% in the proportion of the couple's transfer to the wife's parents). The robust positive effects of the relative bargaining power of the husband in Table 2.2 confirms Hypothesis 1.

Regarding controlling variables, the financial and health status of elderly parents demonstrate significant impacts on the share of the couple's transfer to paternal or maternal parents. For financial status, 10% increase in the per capita income of the husband's parents is associated with a decrease of 5% in the share of couple's transfer to the husband's parents, holding other variables fixed. For health status, taking the health status category "Widowed/both parents in poor health" as the baseline group, the husband's parents being "Widowed/both parents not in poor health" will decrease the share of the couple's transfer to paternal parents by 2.9% at the 10% significance level, holding other variables fixed. On

the other hand, significant opposite effects are observed from the side of the wife's parents. The healthier the wife's parents, the larger the proportion of the couple's transfer to the husband's parents. The wife's parents being "Widowed/both parents not in poor health" will increase the share of the couple's transfer to the paternal parents by 3.4% at the 5% significance level, holding other variables fixed. The results demonstrate that the couple will increase the share of transfer to the set of parents who are more vulnerable in financial and health status, which confirms Hypothesis 5.

Table 2.2: Share of Transfer and Spousal Bargaining Power: Fractional Logit Marginal Effects

VARIABLES Dependent Variable: T_share_h	(1)	(2)	(3)	(4)
Key Independent Variable:				
Bargain_h	0.059*	0.064**	0.061*	0.058*
	[0.033]	[0.032]	[0.033]	[0.034]
Controlling Variables				
Parents' Characteristics				
Age_hp (Ref.=Below 80)				
80-90		-0.006	-0.012	-0.012
		[0.015]	[0.016]	[0.015]
90 and above		-0.017	-0.030	-0.018
		[0.031]	[0.033]	[0.034]
Age_wp (Ref.=Below 80)				
80-90		-0.010	-0.014	-0.012
		[0.015]	[0.016]	[0.016]
90 and above		-0.004	-0.012	-0.003
		[0.038]	[0.039]	[0.039]
Income_hp (logged)		-0.005***	-0.006***	-0.005**
		[0.002]	[0.002]	[0.002]
Income_wp (logged)		-0.004*	-0.004*	-0.004**
		[0.002]	[0.002]	[0.002]
Health_hp (Ref.= Widowed/Both in Poor)				
One Poor, the Other not Poor		0.040*	0.042*	0.036
		[0.022]	[0.022]	[0.022]
Widowed/Both Not Poor		-0.022	-0.023	-0.029*
		[0.016]	[0.016]	[0.016]
Health_wp (Ref.= Widowed/Both in Poor)				
One Poor, the Other not Poor		-0.018	-0.020	-0.020
		[0.024]	[0.024]	[0.024]
Widowed/Both Not Poor		0.038**	0.035**	0.034**
		[0.016]	[0.016]	[0.016]
Couple's Characteristics				
Age_h			0.002	0.003
			[0.002]	[0.003]

Age_w			0.001	-0.000
			[0.003]	[0.003]
Sibling_N_h			0.004	0.003
			[0.004]	[0.004]
Sibling_N_w			-0.001	-0.003
			[0.004]	[0.004]
School_child (Ref.=No)				
Yes			0.025	0.025
			[0.016]	[0.016]
Hincome_per(logged)			0.003	0.003
			[0.002]	[0.002]
Year FE	Yes	Yes	Yes	Yes
Province FE	No	No	No	Yes
Observations	2,252	2,242	2,239	2,239
Pseudo R^2	0.0011	0.0055	0.0064	0.108

Standard errors in brackets
Average marginal effects reported; Results of missing values dummy for couple's parents' age not reported
*** p<0.01, ** p<0.05, * p<0.1
Source: CHARLS 2011 2013 2015

2.5.4. Heterogeneous Effects

Table 2.3 shows the heterogeneous effects of spousal bargaining power by rural-urban region and income-level of households. The results in Column 1 demonstrate the relative bargaining power of the husband has a more sizable and statistically significant effect for urban couples compared to the results of the full sample. After holding other variables fixed, each 10% increase in the relative bargaining power of the husband is associated with an increase of 1.23% in the share of couple's transfer to paternal parents at the 5% statistical significance level in urban areas. However, for rural couples, the results in Column 2 show an insignificant relationship between spousal bargaining power and the share of the couple's transfer to parents, although a positive effect is observed. The difference of the results between urban and rural areas confirms Hypothesis 2.

To examine the variation of spousal bargaining power by households with different income-level, we divide the sample into two groups using the median value of household income per capita as the cutting point.

Households with higher income than the median value are categorized as the "High income" group, while households with lower income than the median value are categorized as the "Low income" group. The results in Column 3 and 4 demonstrate that spousal bargaining power has a more sizable and statistically significant effect for high-income households compared to the low-income households. After holding other variables fixed, each 10% increase in the relative bargaining power of the husband is associated with an increase of 0.92% in the share of the couple's transfer to the paternal parents at the 10% statistical significance level for high-income households. However, for low-income households, the results in Column 4 show an insignificant relationship between spousal bargaining power and the share of the couple's transfer to parents, although a positive effect is observed. The difference of the results between relatively high and low households confirms Hypothesis 3.

Table 2.3: Share of Transfer and Spousal Bargaining Power: by Urban-Rural Sub-Samples and Income-Level Sub-Samples

VARIABLES	(1)	(2)	(3)	(4)
			High	Low
Dependent Variable: T_share_h	Urban	Rural	Income	Income
Key Independent Variable:				
Bargain_h	0.123**	0.027	0.092*	0.046
	[0.054]	[0.045]	[0.052]	[0.044]
Controlling Variables				
Parents' Characteristics				
Age_hp (Ref.=Below 80)				
80-90	-0.008	-0.013	0.011	-0.032
	[0.023]	[0.021]	[0.021]	[0.022]
90 and above	0.020	-0.068	0.026	-0.052
	[0.048]	[0.045]	[0.049]	[0.041]
Age_wp (Ref.=Below 80)				
80-90	-0.020	0.002	-0.029	0.005
	[0.022]	[0.021]	[0.021]	[0.023]
90 and above	-0.032	0.037	0.021	-0.016
	[0.057]	[0.053]	[0.054]	[0.053]
Income_hp (logged)	-0.005*	-0.005	-0.005*	-0.005
	[0.003]	[0.003]	[0.003]	[0.003]
Income_wp (logged)	-0.005	-0.005*	-0.004	-0.004
	[0.003]	[0.003]	[0.003]	[0.003]
Health_hp (Ref.= Widowed/Both in Poor)				
One Poor, the Other not Poor	-0.019	0.071**	-0.007	0.081***
	[0.035]	[0.028]	[0.030]	[0.030]
Widowed/Both Not Poor	-0.045*	-0.028	-0.014	-0.044**
	[0.026]	[0.021]	[0.023]	[0.022]

Health_wp (Ref.= Widowed/Both in Poor)				
One Poor, the Other not Poor	-0.039	0.009	-0.013	-0.023
	[0.037]	[0.030]	[0.030]	[0.037]
Widowed/Both Not Poor	0.046*	0.030	0.033	0.032
	[0.025]	[0.020]	[0.021]	[0.022]
Couple's Characteristics				
Age_h	0.002	0.003	0.003	0.003
	[0.004]	[0.004]	[0.003]	[0.004]
Age_w	-0.001	0.001	-0.000	0.000
	[0.004]	[0.004]	[0.003]	[0.004]
Sibling_N_h	0.010*	-0.001	0.007	-0.002
	[0.006]	[0.005]	[0.005]	[0.006]
Sibling_N_w	-0.004	-0.007	-0.008	0.001
	[0.006]	[0.006]	[0.006]	[0.006]
School_child (Ref.=No)				
Yes	0.025	0.025	0.028	0.030
	[0.024]	[0.023]	[0.021]	[0.024]
Hincome_per(logged)	0.005	0.002	0.001	0.006*
	[0.003]	[0.003]	[0.015]	[0.003]
Year FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Observations	1,027	1,212	1,154	1,085
Pseudo R^2	0.0188	0.0145	0.0143	0.0161

Standard errors in brackets
Average marginal effects reported; Results of missing values dummy for couple's parents' age not reported
*** p<0.01, ** p<0.05, * p<0.1
Source: CHARLS 2011 2013 2015

2.5.5. Robustness Checks

2.5.5.1 Transfer Pattern

Given that the share of transfer to each set of parents only reflects the behavior of couples who have already made the decision to transfer, this paper further examines the effect of spousal bargaining on the transfer pattern by including "No transfer" couples.

A multinomial logistic regression is employed to estimate what determines the couple's transfer pattern to their parents. The random utility for couple i, associated with decision j, could be expressed as

$$U_{ij} = \beta_{1j} Bargain_i + \beta_{2j} Parents_i + \beta_{3j} Couple_i + \mu_i + \lambda_i + \varepsilon_{ij}\ , j = 1, 2, 3, 4$$

Suppose that the married couple's choice is j, then the utility brought by decision j is higher than the other choices

$$U_{ij} - U_{ik} > 0, k = 1,2,3,4\ ; k \neq j$$

The probability equation is written as

$$\text{Prob}(T_pattern_i = \text{j} \mid X_i) = \frac{\exp\ (U_{ij})}{\sum_{m=1}^{j} \exp\ (U_{im})}, j = 1,2,3,4$$

The dependent variable, "Transfer Pattern" ($T_pattern_i$), is defined as

j=1, if neither of the husband and wife's parents got a transfer from the couple
j=2, if only the husband's parents got a transfer from the couple
j=3, if only the wife's parents got a transfer from the couple
j=4, if both the husband's and the wife's parents got a transfer from the couple.

The independent variables and the defining rules of them are exactly the same with those employed in baseline regression.

Table 2.4 shows the results of the Multinomial Logistic regression on the couple's transfer pattern. For the convenience of interpretation, marginal effects are reported instead of coefficients. The couple's choice of neither transferring to the husband's parents nor the wife's parents is the base category. The results show that the relative bargaining power of the husband has significant positive effect on the probability of choosing the decision of only transferring to the husband's parents in urban areas, while the marginal effect of bargaining power displays insignificance for the full sample and the rural sample. For the urban sample, the predicted probability of only transferring to the paternal parents is on average about 1.29% higher for each 10% increase in the relative bargaining power of the husband. 10% increase in the relative bargaining power of the husband is associated with a decrease of 0.18% in the predicted probability of only transferring to the wife's parents, although not significantly so. The results are consistent with the main regression and further confirm Hypothesis 1.

Regarding controlling variables, the financial and health status of husband's/wife's parents show significant negative/positive impacts on couple's decision that only transferring to paternal/maternal parents. This further confirms Hypothesis 5. As expected, household per capita income is positively related to couple's decision that transferring both to paternal parents and maternal parents, and negatively related to couple's decision that transferring neither to paternal parents nor maternal parents.

Table 2.4: Transfer Pattern and Spousal Bargaining Power: Multinomial Logit Marginal Effects, by Urban and Rural Sub-samples

VARIABLES	Total				Urban				Rural			
Dependent Variable: Transfer Pattern	Neither	Only to Husband's Parents	Only to Wife's Parents	Both	Neither	Only to Husband's Parents	Only to Wife's Parents	Both	Neither	Only to Husband's Parents	Only to Wife's Parents	Both
Bargain_h	-0.057	0.039	-0.020	0.038	-0.101	0.129**	-0.018	-0.009	-0.022	-0.002	-0.024	0.049
	[0.036]	[0.028]	[0.026]	[0.043]	[0.065]	[0.051]	[0.044]	[0.077]	[0.045]	[0.036]	[0.034]	[0.053]
Age_hp (Ref.=Below 80)												
80-90	0.007	-0.005	0.008	-0.010	0.002	-0.003	0.004	-0.003	0.005	-0.011	0.010	-0.004
	[0.018]	[0.014]	[0.013]	[0.021]	[0.028]	[0.021]	[0.019]	[0.033]	[0.024]	[0.019]	[0.018]	[0.028]
90 and above	0.032	-0.020	0.004	-0.016	0.053	-0.010	-0.003	-0.040	0.008	-0.037	0.024	0.006
	[0.039]	[0.026]	[0.025]	[0.043]	[0.059]	[0.037]	[0.036]	[0.064]	[0.050]	[0.034]	[0.040]	[0.059]
Age_wp (Ref.=Below 80)												
80-90	0.006	-0.002	0.021	-0.026	-0.018	-0.007	0.029	-0.005	0.031	0.005	0.010	-0.047*
	[0.018]	[0.014]	[0.013]	[0.021]	[0.027]	[0.019]	[0.019]	[0.031]	[0.024]	[0.019]	[0.018]	[0.028]
90 and above	-0.013	0.084**	0.069**	-0.140***	-0.023	0.059	0.091*	-0.127*	0.004	0.110*	0.052	-0.165***
	[0.036]	[0.037]	[0.033]	[0.045]	[0.052]	[0.050]	[0.049]	[0.065]	[0.050]	[0.057]	[0.047]	[0.063]
Income_hp (logged)	0.005	-0.004*	0.001	-0.001	0.007	-0.003	-0.000	-0.004	0.003	-0.006*	0.001	0.002
	[0.003]	[0.002]	[0.002]	[0.003]	[0.004]	[0.003]	[0.003]	[0.005]	[0.004]	[0.003]	[0.003]	[0.004]
Income_wp (logged)	-0.002	-0.002	0.001	0.003	-0.001	-0.001	0.000	0.002	-0.004	-0.004	0.002	0.006
	[0.003]	[0.002]	[0.002]	[0.003]	[0.004]	[0.003]	[0.003]	[0.005]	[0.004]	[0.003]	[0.003]	[0.004]
Health_hp (Ref.= Widowed/Both in Poor)												
One Poor, the Other not Poor	-0.047*	0.004	-0.038**	0.082***	-0.048	-0.042	-0.014	0.103**	-0.052	0.047	-0.055**	0.061
	[0.025]	[0.021]	[0.017]	[0.030]	[0.040]	[0.030]	[0.026]	[0.047]	[0.032]	[0.030]	[0.022]	[0.039]
Widowed/Both Not Poor	-0.006	-0.007	-0.002	0.014	-0.027	-0.018	0.006	0.039	0.004	-0.001	-0.003	0.001
	[0.018]	[0.014]	[0.013]	[0.021]	[0.028]	[0.023]	[0.019]	[0.034]	[0.024]	[0.019]	[0.019]	[0.028]

Health_wp (Ref.= Widowed/Both in Poor)												
One Poor, the Other not Poor	0.004	0.007	0.004	-0.015	0.010	0.008	0.038	-0.056	-0.008	0.011	-0.017	0.013
	[0.029]	[0.021]	[0.022]	[0.033]	[0.046]	[0.030]	[0.036]	[0.052]	[0.037]	[0.028]	[0.027]	[0.043]
Widowed/Both Not Poor	-0.019	0.028**	-0.021	0.013	-0.042	0.033*	-0.017	0.026	-0.013	0.030*	-0.017	0.000
	[0.018]	[0.013]	[0.013]	[0.021]	[0.028]	[0.020]	[0.020]	[0.033]	[0.023]	[0.018]	[0.018]	[0.027]
Age_h	0.001	0.002	0.001	-0.004	0.001	-0.001	0.001	-0.002	0.000	0.003	0.003	-0.006
	[0.003]	[0.002]	[0.002]	[0.003]	[0.004]	[0.003]	[0.003]	[0.005]	[0.004]	[0.003]	[0.003]	[0.004]
Age_w	0.004	-0.001	-0.003*	0.000	0.004	0.001	-0.001	-0.004	0.003	-0.002	-0.006**	0.005
	[0.003]	[0.002]	[0.002]	[0.003]	[0.004]	[0.003]	[0.003]	[0.004]	[0.004]	[0.003]	[0.003]	[0.004]
Sibling_N_h	-0.013***	0.004	-0.003	0.012**	-0.010	0.007	-0.005	0.008	-0.013**	0.001	-0.004	0.016**
	[0.005]	[0.004]	[0.003]	[0.005]	[0.007]	[0.005]	[0.005]	[0.008]	[0.006]	[0.005]	[0.005]	[0.007]
Sibling_N_w	-0.000	-0.005	0.002	0.003	0.002	-0.006	0.001	0.003	-0.001	-0.006	0.005	0.002
	[0.005]	[0.004]	[0.004]	[0.006]	[0.007]	[0.005]	[0.005]	[0.008]	[0.007]	[0.005]	[0.005]	[0.008]
School_child (Ref.=No)												
Yes	-0.005	0.013	-0.016	0.008	0.003	0.007	-0.010	-0.001	-0.006	0.018	-0.017	0.005
	[0.017]	[0.014]	[0.012]	[0.021]	[0.026]	[0.020]	[0.018]	[0.031]	[0.023]	[0.019]	[0.017]	[0.028]
Hincome_per(logged)	-0.005*	0.000	-0.003*	0.008**	-0.008*	0.001	-0.004	0.010**	-0.003	-0.001	-0.002	0.006
	[0.003]	[0.002]	[0.002]	[0.003]	[0.004]	[0.003]	[0.003]	[0.005]	[0.004]	[0.003]	[0.003]	[0.004]
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2899	2899	2899	2899	1339	1339	1339	1339	1560	1560	1560	1560
Pseudo R^2	0.081				0.102				0.102			

Standard errors in brackets

Average marginal effects reported; Results of missing values dummy for couple's parents' age not reported

*** p<0.01, ** p<0.05, * p<0.1

Source: CHARLS 2011 2013 2015

2.5.5.2 Amount of Transfer

As the descriptive statistics show in Table 2.1, the mean values of the couple's amount of transfer to the husband's parents and the wife's parents are 1809 and 1477 yuan per year respectively, whereas the mean value of the parents' per capita income is only around 3500 yuan per year. For couples who have only one of the parents alive, their transfer to him/her accounts for nearly fifty percent of their elderly father's or mother's income. Even for couples who have both of their parents alive, their transfer accounts for nearly one-quarter of their elderly parents' income, which is apparently a considerable part of the parents' livelihood and of great importance to their well-being. In this section, therefore, we will further explore the effect of spousal bargaining power on couples' transfer to their elderly parents by investigating the actual amount of couples' transfer to each set of parents. If a significant effect of spousal bargaining power is observed from the results, then evidence is provided to corroborate the findings in previous sections. Moreover, calculating the actual amount of transfers offers an intuitive understanding of elderly people's well-being affected by spousal bargaining power.

We run regressions on two dependent variables in this section: Couples' amount of transfer to the husband's parents, Couples' amount of transfer to the wife's parents. Since there are a large amount of zero transfers to either the husband's parents or the wife's parents, we suppose the dependent variable is a latent variable $T_amount_i^*$, which is unobservable and has a lower bound of zero. Subscript i denotes different couples. The observable variables Y_i are equal to the latent variable whenever the latent variable is above zero, and zero otherwise:

$$T_amount_i = \begin{cases} T_amount_i^* & if\ Y_i^* > 0 \\ 0 & if\ Y_i^* \leq 0 \end{cases}$$

Therefore, a Tobit model is employed to estimate:

$$T_amount^{*}_{j,i} = \beta_0 + \beta_1 Bargain_i + \beta_2 Parents_i + \beta_3 Couple_i + \mu_i + \lambda_i + \varepsilon_{j,i}, \quad j = h, w$$

where $T_amount^{*}_{j,i}$ is the dependent variable, defined as the amount of the couple's transfer to their elderly parents. When subscript j equals to h, the equation is to estimate the amount of transfer to the husband's parents. When subscript j equals to w, the equation is to estimate the amount of transfer to the wife's parents. The dependent variables are transformed to a logged form. The independent variables and the defining rules of them are exactly the same with those employed in baseline regression. Given that there may be correlation across three waves for the same couple, standard errors are clustered by couple's ID.

Column 1 and 4 in Table 2.5 show the results of full sample regressions on the amount of transfer to paternal parents and maternal parents respectively. Other columns show the results from the rural and urban sub-samples. Due to the inconvenience of interpreting coefficients, the average marginal effects are reported. The average marginal effect shows each 10% increase (decrease) in the relative bargaining power of the husband (wife) is associated with a 7.48% decrease of in the amount of the couple's transfer to the wife's parents for the full sample and a 12.36% decrease for the urban sample at the 5% statistically significance level. Although the results do not show significant effect of spousal bargaining power from the husband's side, the results from the wife's side still provide evidence to support Hypothesis 1 and corroborate the findings in the previous section.

Table 2.5: Amount of Transfer and Spousal Bargaining Power: Tobit Marginal Effects, by Urban and Rural Sub-samples

VARIABLES	(1) To Husband's Parents			(2) To Wife's Parents		
Dependent Variable: Amount of Transfer	Total	Urban	Rural	Total	Urban	Rural
Key Independent Variable:						
Bargain_h	-0.022	0.587	0.140	-0.748**	-1.236**	-0.127
	[0.299]	[0.521]	[0.386]	[0.337]	[0.600]	[0.410]
Controlling Variables:						
Age_hp (Ref.=Below 80)						
80-90	-0.183	-0.138	-0.203	0.032	0.024	0.050
	[0.144]	[0.223]	[0.184]	[0.154]	[0.256]	[0.191]
90 and above	-0.090	0.023	-0.309	0.149	0.014	0.367
	[0.341]	[0.491]	[0.440]	[0.315]	[0.530]	[0.376]
Age_wp (Ref.=Below 80)						
80-90	-0.218	-0.191	-0.221	0.009	0.076	-0.113
	[0.147]	[0.221]	[0.187]	[0.143]	[0.220]	[0.180]
90 and above	-0.771**	-0.934*	-0.547	-0.814**	-0.689	-0.945**
	[0.360]	[0.525]	[0.484]	[0.368]	[0.559]	[0.465]
Income_hp (logged)	-0.009	-0.015	-0.003	0.041*	0.024	0.053*
	[0.020]	[0.029]	[0.028]	[0.021]	[0.032]	[0.028]
Income_wp (logged)	-0.000	-0.008	-0.009	0.041*	0.023	0.054*
	[0.020]	[0.029]	[0.027]	[0.021]	[0.032]	[0.029]
Health_hp (Ref.= Widowed/Both in Poor)						
One Poor, the Other not Poor	0.532***	0.303	0.559**	0.241	0.759**	-0.195
	[0.196]	[0.328]	[0.232]	[0.218]	[0.351]	[0.275]
Widowed/Both Not Poor	-0.065	-0.172	-0.152	0.256	0.543*	0.046
	[0.149]	[0.244]	[0.190]	[0.158]	[0.281]	[0.188]

Health_wp (Ref.= Widowed/Both in Poor)						
One Poor, the Other not Poor	-0.171	-0.592	0.084	0.021	-0.102	-0.044
	[0.226]	[0.371]	[0.268]	[0.217]	[0.360]	[0.266]
Widowed/Both Not Poor	0.348**	0.334	0.232	-0.150	-0.301	-0.190
	[0.145]	[0.234]	[0.179]	[0.144]	[0.253]	[0.179]
Age_h	-0.011	0.010	-0.053*	-0.028	0.004	-0.055
	[0.023]	[0.033]	[0.032]	[0.026]	[0.042]	[0.036]
Age_w	0.032	-0.014	0.076**	0.010	-0.017	0.026
	[0.024]	[0.030]	[0.036]	[0.027]	[0.043]	[0.038]
Sibling_N_h	-0.011	0.030	0.012	-0.087**	-0.124*	-0.022
	[0.037]	[0.056]	[0.050]	[0.039]	[0.067]	[0.050]
Sibling_N_w	-0.063	-0.065	-0.051	-0.004	0.012	0.042
	[0.039]	[0.058]	[0.051]	[0.045]	[0.069]	[0.058]
School_child (Ref.=No)						
Yes	0.263*	0.249	0.188	-0.149	-0.179	-0.179
	[0.151]	[0.236]	[0.195]	[0.154]	[0.238]	[0.197]
Hincome_per(logged)	0.082***	0.082**	0.047	0.033	0.008	0.026
	[0.022]	[0.033]	[0.028]	[0.023]	[0.038]	[0.027]
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,239	1,027	1,212	2,239	1,027	1,212
Pseudo R^2	0.016	0.020	0.022	0.015	0.018	0.017

Standard errors in brackets
Average marginal effects reported; Results of missing values dummy for couple's parents' age not reported
*** p<0.01, ** p<0.05, * p<0.1
Source: CHARLS 2011 2013 2015

2.5.5.3 Other Estimation Methods

Scholars typically compare results derived from OLS regression with results derived from fractional logistic regression (Papke and Wooldridge, 1996). Some researchers have also considered using censored normal regression techniques such as Tobit on proportions data, especially when the distribution of the dependent variable presents observations piling up at both extremes (Armstrong, 2007). Therefore, it is worth employing the two methods (OLS and Tobit) to check the robustness of our results.

This paper employs an OLS regression and a two-limit Tobit procedure (lower bound 0, upper bound 1) on the full sample and rural and urban sub-samples as the robustness tests. Table 2.7 in the Appendix shows the comparison of results using the two approaches. It can be seen that the key explanatory variable – the relative bargaining power of the husband – shows significant positive effects from OLS in Column 1 and Column 2, at the 5% statistical significance level. It is worth noting that the coefficient of the relative bargaining power of the husband from OLS is the same as the marginal effects from the baseline regression. Using the Tobit Model, Column 5 shows a significant effect of spousal bargaining power in urban areas. Although results from the Tobit Model are insignificant for the full sample, the p-value (0.109) is around the 10% significance level edge. The results from OLS regression and Tobit Model demonstrate the robustness of our analysis.

2.5.5.4 Other Measurements of Bargaining Power and Transfer

Besides the relative years of education, we further employ the relative income of spouses as the measurement of spousal bargaining power to test the robustness of our conclusion. The relative bargaining power of the husband measured by income is defined as the ratio of the husband's personal income to the couple's total income[28]. Due to the inconvenience of interpreting coefficients, the average marginal effects are reported in Table 2.8 in the Appendix. Column 1 shows the results of bargaining power measured by relative income. The results in Column 1 are consistent with baseline regression regarding the key independent variable – the relative bargaining power of the husband.

As the married couple's parents in our sample are all the oldest-olds, we choose upward transfer instead of net transfer to generate the share variable in the baseline regression, as transfers are predominantly from middle-aged children to elderly parents (Lei et al., 2012). Even so, we still employ the share of the couple's net transfer toward each set of parents as the dependent variable to check the robustness of our conclusion. Column 2 in Table 2.8 shows the results from the regression on the share of net transfer. Compared with the results of baseline regression, it is observed that the marginal effect of the relative bargaining power of the husband has stronger positive impact on the dependent variable at the same significance level.

The consistency of the results from different measurements of bargaining power and transfer demonstrates the robustness of our finding that spousal bargaining power has a significant impact on the share of couple's transfer to each set of elderly parents.

[28] If both husband and wife reported zero personal income, then we treat the spousal bargaining power as "0.5".

2.6. Conclusion

Following the idea that spousal bargaining power affects married couples' transfer to both paternal and maternal elderly parents, this paper tested Ham and Song (2014)'s Two-stage Bargaining Model by providing empirical evidence from China. Using the CHARLS 2011-2015 data, this study finds a significant positive relationship between the relative bargaining power of the husband (wife) and the share of couple's amount of transfer toward the husband's (wife's) parents. It is worth noting that this positive effect is more sizable and statistically significant in urban areas compared to rural areas, and for high-income households compared to relatively low-income households.

Another important finding is that increasing one spouse's relative bargaining power impacts not only the share of transfer between paternal and maternal parents, but also other forms of transfer, such as the transfer pattern (whether transferred or not, transferred to whom) and the actual amount of transfer to each set of parents. For the transfer pattern, a significant positive effect is found between the relative bargaining power of the husband and the probability of the couple's decision to only transfer to paternal parents in urban areas. For the amount of transfer to each set of parents, increasing the relative bargaining power of the husband will negatively affect the amount of the couple's transfer to the wife's parents both for the full sample and the urban sample. Compared with previous studies, which only consider one of these outcomes, our study provides more comprehensive evidence of the impact of spousal bargaining power.

Due to the data limitation, this research is unable to capture the household fixed effect, which may result in estimation bias. Nevertheless, the pooled cross-sectional approach adopted in this research still has strong explanatory power, since various robustness checks are employed, such as employing different estimation method, changing the measurement of bargaining power, and changing the calculation of

transfer. Finally, as we find a new determinant of intergeneration transfer to elderly parents, this paper has important policy implications for developing countries such as China, where the elderly lack publicly provided social support and rely on family for both care and financial help.

Appendix

Table B. 1: Definition of Variables

Variables	Definition
T_amount (hp/wp)	Couple's amount of transfer to husband's/wife's parents: Couple's transfer to parents is the aggregated transfer for the whole year including cash and in-kind transfer.
T_share (hp/wp)	Share of Couple's Transfer to Husband's/Wife's Parents (T_share_h = 1 - T_share_w) $T_{share_h} = \frac{T_amount_h}{T_amount_h + T_amount_w}$
T_pattern	Transfer Pattern (1-4): 1 "Neither Husband's nor wife's parents got transfer" 2 "Only Husband's Parents got transfer" 3 " Only Wife's Parents got transfer " 4 "Both Husband's and wife's parents got transfer"
Bargain (h/w)	Relative Bargaining Power of Husband/Wife: (BP_h = 1 – BP_w) $BP_h = \frac{Husband's\ years\ of\ education}{Couple's\ total\ years\ of\ education}$ (Note: bargaining power is treated as 0.5 if both spouse's years of education are equals to zero)
Age (hp/wp)	Husband/Wife's Parents' age: We take the age value of the elder parent if both father and mother are alive. If only one parent alive, then take the age value of the alive parent directly. Given some missing values for parents' age, we transform parents' age into age groups and set a dummy variable for missing values: "Below 80" "80-90" "90 and above" "Missing"
Income (hp/wp)	Husband/Wife's Parents' Per Capita Income (Yuan/year): Parents' income is reported by the couple in the survey. Transfer from their children are not included.
Health (hp/wp)	Husband/Wife's Parents' Health Status (1-3): Health status is asked separately for elderly father and mother in the questionnaire in the form of "Very good, good, fair, poor, very poor", we transformed them into combined health status categories: 1 " Widowed Parent/Both Parents in Poor Health " 2 " One Parent in Poor Health, the Other in not Poor Health " 3 " Widowed Parent/Both Parents in not Poor Health "
Age (h/w)	Husband/Wife's age
Sibling_N (h/w)	Husband/wife's Sibling numbers: In this paper, we only consider siblings who is alive.
School_child	Whether Have In-school Child (0-1): Code: 0 "No"; 1 "Yes" (Note: the in-school child can be either inside or outside the household)
Hincome_per	Household per capita income (Yuan/year): $\frac{Household\ Income}{Number\ of\ Household\ Members}$ Household income including 1. couple's personal income, 2. other household members' income, 3. Household agricultural income (including cropping, forestry, livestock, and fish), 4. government transfer, dibao, and 5. other household member's personal income.

Provinces	(Note: Personal income including wage, bonus, pensions, self-employment income, side job income and past-time jobs income) Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan, Shanxi, Anhui, Jiangxi, Henan, Hubei, Hunan, Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Harbin, Jilin, Liaoning)

Table B. 2: Other Estimation Methods

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
		OLS			Tobit	
Dependent Variable:						
T_share_h	Total	Urban	Rural	Total	Urban	Rural
Bargain_h	0.058*	0.123**	0.027	0.074	0.162**	0.032
	[0.035]	[0.055]	[0.046]	[0.046]	[0.072]	[0.062]
Parents' Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Couple's Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,239	1,027	1,212	2,239	1,027	1,212
R^2/Pseudo R^2	0.041	0.076	0.053	0.029	0.059	0.036

Standard errors in brackets
Average marginal effects reported; Results of missing values dummy for couple's parents' age not reported
*** p<0.01, ** p<0.05, * p<0.1
Source: CHARLS 2011 2013 2015

Table B. 3: Other Measurements of Bargaining Power and Transfer

	(1)	(2)
Dependent Variable: T_share_h	Income Ratio	Net transfer
Bargain_h(income)	0.045**	
	[0.022]	
Bargain_h(eduyear)		0.063*
		[0.036]
Parents' Characteristics	Yes	Yes
Couple's Characteristics	Yes	Yes
Year FE	Yes	Yes
Province FE	Yes	Yes
Observations	1,510	2,203
Pseudo R^2	0.013	0.012

Standard errors in brackets
Average marginal effects reported; Results of missing values dummy for couple's parents' age not reported
*** p<0.01, ** p<0.05, * p<0.1
Source: CHARLS 2011 2013 2015

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3. How do Chinese Married Couples React to the Change of Marriage Law? —A Quasi-Natural Experiment on Housing Property

3.1. Introduction

With the characteristics of both consumption and investment, the house is one of the most important household assets in the Chinese family, accounting for 70% percent of family wealth on average (Xie & Jin, 2014). However, the gender distribution of this wealth is extremely uneven, with most of the residential properties in China owned by men (Deng, Hoekstra, & Elsinga, 2019; Fincher, 2016; Hu, 2017; Li & Wu, 2017). According to the statistics from the Third National Survey on the Social Status of Chinese Women, only 37.9% of women own housing property including the case of joint ownership. Among those already married, there are only 13.2% of women as sole owner of their property, 28.0% jointly own the property with their spouses, while the figures for married men are 51.7% and 25.6% respectively.

Besides the gender inequality in wealth, the reason behind this phenomenon is by and large explained by the tradition that the male should provide the house for a marriage, and the female should bring with her the dowry (Wei & Zhang, 2011; Wei et al., 2012). If the house needs to be paid for in instalments, it is usually the man who makes the down payment and the property ownership registration is mainly under the man's name. The house serves not only as a visible form of wealth indicating attractiveness in the marriage market, but also an insurance to the women for future marital life. Both men and women expect their partners to follow the “rules”, since there is a legal consensus that personal assets will become joint assets once married, no matter whether the assets were obtained before or after marriage.

On August 13, 2011, China’s Supreme People’s Court issued a new interpretation of the 1980 Marriage Law. Compared with previous laws

and regulations, the new marriage law clarifies that when only one spouse's parents assist in the purchase of immovable property within marriage, and the property is registered under the name of that spouse, the property is that spouse's personal property (Article 7). If one of the spouses has signed the sales contract for the house in his/her own name before marriage, and the down payment is made with his/her personal account, the property belongs to the registered spouse, even if the couple may jointly repay the loan after marriage (Article 10). In addition, the interest and natural appreciation generated from personal property after marriage are not classified as the couple's joint assets.

Although the new regulation is aimed at protecting personal property, it is essentially not gender-neutral in the context of China, given that most of the residential properties in China are owned by men. Suppose that the wife and her family have made substantial contributions toward the purchase of the house and maintenance of the mortgage (normal situation), the wife will lose it all to the husband when they divorce if their property falls into that category. Therefore, it is commonly believed that the implementation of the new marriage law is a potential redistribution of family wealth at the legal level, which could massively damage women's welfare (Fincher, 2016; Sargeson, 2012; Zang, 2020).

Since property division is the focus of most divorce disputes in China, the implementation of the new marriage law has had a broad social impact. Social media, legal popularization, TV series and authorities have all focused on the new regulations and their potential impacts. However, there are few academic studies researching on this issue. The most recent work exploring the consequences of the new marriage law is a study by Zang (2020) who found that the new 2011 marriage law led to a decrease in women's subjective well-being but had no significant impact on men's subjective well-being in households where only the husband's name is on the certificate. In her study, only the mental outcomes are considered, but people's possible behavioural reactions are

neglected. In this paper, we will further examine how the couple's behaviour is affected by the implementation of the new marriage law.

As a legal shock, the new marriage law may not necessarily lead to a couple's divorce but could result in a problem of limited commitment between spouses (Manser & Brown, 1980; Mcelroy & Horney, 1981; Roff, 2017; Stevenson, 2007). We propose that married couples may adopt two strategies to rebuild the commitment: changing the status of house ownership and investing in more houses. Apparently, the former could directly offset the influence brought about by the new marriage law. The latter is based on the model from Lafortune and Low (2018). Since the new rules of property division upon divorce will potentially transfer the wife's part of property ownership to the husband, the wife is unable to assure that her husband will not want to separate due to the disproportionate divorce benefits. In this case, the gains from marriage are reduce for both spouses, since the wife may feel less secure and reduce her investments in domestic works. To solve this, married couple could invest in more houses as an additional commitment for marriage, as the houses bought after the marriage are jointly owned by the spouses. In this way, houses serve as a "commitment device" for the husband and provide insurance and incentives to his wife.

Drawing on the data from the waves of the 2010, 2012, 2014 and 2016 China Family Panel Study (CFPS), we employ a Fuzzy Differences-in-Differences strategy to identify the impacts of the implementation of the new marriage law on a couple's behaviour regarding changing house ownership and investment in additional properties. We also provide evidence to help understand the mechanism underlying the link between the legal shock in 2011 and married couples' reactions. Using the local 5-14 female/male sex ratio in 2000 at county-level as the continuous variable to measure the intensity of the treatment, we found that there are significant positive effects of the implementation of the new marriage law on the couple's reactions both in terms of changing the property

ownership and investing in more houses. The results show robustness after conducting various analyses of heterogeneity and placebo tests.

The remainder of this paper is organised as follows. Section 3.2 outlines the legal background and the context of marriage in China. Section 3.3 reviews the theories and propose the hypotheses. Section 3.4 describes the data and the empirical strategy. Section 3.5 empirically analyses the impact of the new marriage law on the couple's reaction in terms of changing property ownership. Section 3.6 empirically analyses the impact of the new marriage law on the couple's reaction in the form of greater investment in housing assets. Section 3.7 presents the conclusion and discussions.

3.2. Background

3.2.1. House Ownership in China

China now has the largest residential real-estate market in the world, worth more than 30 trillion UDS in 2013 (Fincher, 2016). The Third National Survey on the Social Status of Chinese Women in 2010 reports that, including joint ownership, only 37.9% of women own housing property. Among those already married, there are only 13.2% of women as sole owner of their property, 28.0% jointly own the property with their spouses, while the figures for married men are 51.7% and 25.6% respectively.

A commonly believed reason behind this phenomenon is the gender inequality in terms of the downstream intergenerational transfer. Under the traditional Chinese culture, a married daughter is no longer regarded as a member of her "born" family, but as a member of her husband's family (Brown, 2009; Fei, 1992). Hence, there is a son-bias regarding wealth transfer from parents, and females usually receive less intergenerational transfers than males. This phenomenon is still persistent today because of the intense competition between men in the marriage market caused by male "Marriage Squeeze". Due to the one-child policy, the male-female sex ratio kept rising since the 1980s, which makes it difficult for men to find a spouse. Being the most important household asset with the characteristics of both consumption and investment, housing property is a visible form of wealth indicating attractiveness in the marriage market (Wei, Zhang, & Liu, 2012, 2017). However, considering the booming house prices in China, young adults can hardly afford a house by themselves without deriving resources from the family. In order to attain an advantageous position in the marriage market, parents must help their sons buy houses in preparation for the marriage.

According to Li and Wu's (2017) findings, families with a son have a higher probability of house ownership, own more and larger houses, and buy their house earlier. While for adult daughters, parents would not acquire a house for them, since they expect that their daughter's future husband will do so. Not only parents, but also most of the daughters agree that "men should purchase a house before marriage" so as to provide security for their future marital life (Li & Wu, 2017). Apparently, females' expectations come from the legal consensus that personal assets will become joint assets once married, no matter whether the assets were obtained before or after marriage. Under these circumstances, ownership of housing assets is much less common among women than among men in China.

3.2.2. The New Marriage Law in 2011

The first law promulgated by the CCP government in 1950 was the marriage law, which played a huge role in breaking the institution of feudal marriage and establishing the equal status of husband and wife within family. After the economic reform, the Chinese government promulgated a new marriage law, which was amended in 2001 and is still in use today. To keep the law up to date with rapid social change, the Supreme People's Court issued two interpretations [29] of the "2001 Marriage Law (Amendment)" on December 24, 2001 and April 1, 2004 respectively. More detailed provisions on the identification of joint property between husband and wife are proposed, which made up for the deficiencies of the "2001 Marriage Law (Amendment)".

Although the "2001 Marriage Law (Amendment)" and two judicial interpretations had offered detailed identification of family properties, there is still a lack of clearly applicable legal standards in the

[29] In China, although the law acquired legal power immediately after its adoption by the people's congress, it could not be enforced without judicial interpretation. This is because, in most cases, the law is usually set only as a principle and leaves "discretion" in the decision (Wang, 2006). Therefore, the judicial interpretation promulgated by the supreme people's court has the same legal power as the law.

identification of the gains from personal property after marriage, the ownership identification of the house which is funded by parents, and the identification of property rights related to a house bought by one of the spouses using loans. Finally, in August 13, 2011, China's Supreme People's Court issued a new interpretation of the 1980 Marriage Law, focusing on a detailed explanation of the previously unclear marital property relations. Compared with previous laws and regulations, the new marriage law further clarifies the approach for identifying family property rights, which are embodied in the following two measures:

First, it standardized the identification of immovable property ownership. To be specific, when only one spouse's parents assist in the purchase of immovable property within marriage, and the property is registered under the name of that spouse, the property is that spouse's personal property (Article 7). In addition, if one of the spouses has signed the sales contract for the house in his/her own name before marriage, and the down payment is made with his/her personal account, the house property belongs to the registered spouse, even if the couple may jointly repay the loan after marriage (Article 10). Secondly, it clarified the ownership of the gains from personal property after marriage. Article 5 clearly stipulated that the interest and natural appreciation generated from personal property after marriage are not classified as couple's joint assets.

Although not nominally taking sides, the new marriage law is not gender-neutral in the context of China. As introduced in Section 3.2.1, the marriage custom in China is that the man or his family buys the house, and the woman or her family provides the dowry. If the house needs to be paid for in instalments, it is usually the man who makes the down payment and the property ownership registration is mainly under the man's name. Previously, there existed no problem, as the family home had been considered joint property regardless of under whose name it was registered and whether it had been bought before or after marriage. After the introduction of the new marriage law, however, even if the wife

and her family made substantial contributions toward the purchase of the house and maintenance of the mortgage, the wife loses it all to the husband when they divorce (Fincher, 2016; Sargeson, 2012; Zang, 2020). In fact, it is a potential redistribution of family wealth at the legal level. Since the house accounts for 70% of total assets on average for most families in China (Xie & Jin, 2014), the implementation of the new marriage law could massively damage women's welfare and lead to an instability of marriage.

3.2.3. Legal Popularization

Disputes over property rights are at the heart of divorce negotiations in China. After the promulgation of the new marriage law, an article titled "The Disappointed Mother-in-law" was frequently retweeted on Weibo. Within a few days, there were more than 400,000 discussions on mothers-in-law and property ownership. Netizens' discussions of the new marriage law could be seen everywhere on BBS community platforms. Only three days after the new marriage law was promulgated, the online search index reached 20,481[30]. Besides the Internet, traditional media represented by newspapers and magazines also paid great attention to the law. Within one week of the promulgation of the new marriage law, 5,569 reports were published in newspapers across the country with the new marriage law as the headline or main topic[31]. Not only influential newspapers like People's Daily and Guangming Daily, but also regional newspapers sponsored by various regional government departments had reported this hot issue.

Moreover, the new marriage law had been heavily advertised on the "Law Popularization Day" (December 4) and the next year's "Women's Day" (March 8). Another important event concerning the publicity for the new marriage law was the TV series "Mother-in-law Is Coming",

[30] Data from the platform of Baidu Index, see website: https://index.baidu.com
[31] Data from China Digital Library, which is calculated by the authors.

which began to be broadcasted on major TV stations in 2012. The TV series tells a story in which a mother-in-law insists upon strict property requirements for her future son-in-law, directly reflecting the regulations in the new marriage law. We believe this TV series has had a wide-ranging influence, as many studies have shown that TV series can have an important impact on individual and family decisions (Jensen & Oster, 2009; La Ferrara, Chong, & Duryea, 2012).

In addition, the influence of the new marriage law has even attracted the attention of the authorities. Shaohua Shang, a member of Chinese People's Political Consultative Conference (CPPCC), submitted a proposal regarding the amendment of the new interpretation of marriage within the law, together with other 25 members during the national "two sessions" period in 2012. They thought the implementation of the new marriage law had led to adverse consequences, thus suggesting that the Supreme Court needs to take action[32]. These phenomena all demonstrate the huge influence of the new marriage law on people's social lives.

[32] See http://finance.sina.com.cn/china/20120311/150011561157.shtml.

3.3. Conceptual Framework

3.3.1. Marital Instability and Household Behaviour

From the economists' point of view, people will go into marriage when the expected utility from marriage exceeds that from remaining single (Becker, 1973, 1974). Over time, however, it is also possible that the utility from remaining married falls below the utility expected from separation, which could lead to divorce or marital instability. In the pioneering research by Becker, Landes, and Michael (1977), surprises or shocks are emphasized as the main driver of marital instability, since anything known to the couple would have already been considered in advance of the decision to marry. The type of shocks influencing marital dissolution could be divided into two categories: family-level characteristics and macro-level factors (Betsey Stevenson & Wolfers, 2007). To enhance the stability of marriage, individuals always show a strong preference for assortative matching[33] when looking for partners. Hence, unexpected changes concerning family-level factors, such as the earning capacity of each spouses, further schooling, giving birth to children and so on, could cause the couple to reconsider their original decisions, thereby affecting marital stability (Boheim & Ermisch, 2001; Weiss & Willis, 1997).

Macro-level factors refer to those unexpected shocks from outside of marriage. Hellerstein and Morrill (2011) and Schaller (2013) found that divorce rates are negatively related to unemployment rates. There is also evidence showing that negative house price shocks increase the risk of partnership dissolution, while positive house price shocks could stabilize marriage (Farnham, Schmidt, & Sevak, 2011; Klein, 2017; Rainer & Smith, 2010). The shocks influencing marital stability also comes from policy and legal changes. Tjøtta and Vaage (2008) found the level of

[33] Here we mainly refer to the social assortative mating, which is defined as the tendency of humans to mate within their socio-economic peers, that is, those with similar social standing, job prestige, educational attainment, or economic background as themselves.

public transfer to family could increase the probability of divorce, and the distribution of transfers in favour of the wife increases this probability.

It should be noted that marital instability does not necessarily lead to divorce, but could affect the couple's household behaviour. The most typical example is the switch in law from mutual consent divorce to unilateral divorce[34] in the US between 1970 and 1985. Unlike the long-running debates upon whether the implementation of unilateral divorce law causes a salient increase in the divorce rate (Friedberg, 1998; Peters, 1986, 1992; Wolfers, 2006), many studies have reached a consensus that the change in divorce law could result in a wide range of household behaviours motivated by the increased probability of divorce. Testing the cooperative bargaining model (Manser & Brown, 1980; Mcelroy & Horney, 1981), Gray (1998) found that the unilateral divorce law could affect women's labour supply and decrease the time spent on domestic labour. Studies have also shown that the unilateral divorce laws can reduce domestic violence and suicide rates among women (Dee, 2003; Stevenson & Wolfers, 2006). Moreover, there is evidence showing that the unilateral divorce laws lead to a decrease in marital investment, such as the investments on children and housework (Roff, 2017; Stevenson, 2007). These responses from spouses confirms that marital instability has a significant impact on intra-household behaviour.

3.3.2. The Role of Housing Property

Although many studies have demonstrated that marital instability can reduce a couple's willingness to invest in marriage-specific capital, housing property appears to be an exception (Stevenson, 2007). On the one hand, as the biggest component of family wealth, high levels of

[34] Unilateral divorce allows marriages to end where one person wants to terminate the marriage and the other person wants to remain married.

housing property could increase the cost of divorce (Weiss & Willis, 1997). Lafortune and Low (2017) found that individuals holding more assets at the time of marriage have less risk of divorce. They tend to specialize more and invest more in children. Evidence by Farnham et al. (2011) shows that the price fluctuations of houses could lock spouses inside marriage, making divorce too costly for them. Furthermore, as an insurance for future marital life, holding house ownership has long been seen as a precursor to marriage (Wei & Zhang, 2011; Wei et al., 2012).

On the other hand, investing more in houses could serve as a "commitment device" when the couple come across a problem of limited commitment in the marriage (Lafortune & Low, 2018; Matouschek & Rasul, 2008). For example, wives will respond to the unilateral divorce law by increasing their investments outside the marriage and reduce their intra-household devotions. However, under the property law that assets are jointly divided upon divorce, husbands could incentivize higher levels of devotion from their spouse by investing more in jointly-owned properties. This may come at a cost to the husband's own income, but benefit both spouses. Similarly, Wickelgren (2007) also provides a theoretical model arguing that when compared with mutual consent divorce, unilateral divorce provides incentives for cooperative investments. Therefore, as long as remaining married is beneficial to both spouses, investing in housing property could be a possible way to add commitment and stabilize marriage.

3.3.3. Hypotheses

Despite the huge influence of China's new marriage law in 2011, there are few studies that have investigated its impacts, especially employing an empirical research method. The most recent work exploring the consequences of the new marriage law is a conference paper by Zang (2020). Using a Differences-in-Differences strategy, she found that the

new 2011 marriage law led to a decrease in women's subjective well-being but had no significant impact on men's subjective well-being in households where only the husband's name is on the certificate, which shows a gender inequality within household. However, her study only considered the mental outcome but neglected the possible behavioural reactions. In this paper, we will further examine how the couple's behaviour is affected by the implementation of the new marriage law.

As discussed in Section 3.2.2, the new marriage law is not gender-neutral in the context of China because most of the residential properties in China are owned by men. The new rules of property division upon divorce will potentially change the distribution of family wealth between the spouses, transferring the wife's part of property ownership to the husband. Even if the actual divorce does not take place, the implementation of the new marriage law still acts as a shock, affecting the couple's "mental accounting" (Thaler, 1999), thus influencing spouses' behaviour. So, our research question is: how do couples react to this marital shock?

One possible reaction is divorce. In this paper, however, we argue that the new marriage law is incapable of leading to a divorce. First, unlike that the unilateral divorce law in the US which directly makes divorce much easier, the divorce law in China is still based on "mutual consent". Second, partners go into a marriage through matching various characteristics so as to maximize the gains from marriage. Although men would gain financially if divorce takes place, the other's losses from divorce can be even greater. Third, in general, marriage is universal and stable in China. Divorce itself has a negative evaluation in China, such as the divorce stigma, a bad impact on children, and so on. Although rising, the divorce rate remains relatively low compared to other countries. Moreover, our argument is supported by Zang's (2020) work. Using a Differences-in-Differences strategy, she found a relatively low probability of divorce for the experimental group, which suggests that

the new marriage law does not lead to divorce, but does generate marital instability. In this case, we ignore the divorce and only focus on the behaviours of couples who have experienced the shock yet maintained the marital relationship.

If we restrict the observations, our study suggests that the gains from marriage are greater than those from divorce for those "bounded" couples. However, the marital instability caused by the potential wealth redistribution between spouses cannot be overlooked. We hypothesize two strategies for the couple to eliminate the adverse impacts and secure their marriage. The first one is changing the current property ownership arrangements. This strategy could directly offset the influence brought about by the new marriage law. Social media have widely reported that wives increasingly require that their husbands add their names to the housing property certificates after the implementation of the new marriage law. According to an online survey interviewing 176 female internet users in China, 48% of the respondents support having wives' names added [35] . However, there exists no academic research investigating this phenomenon. In this paper, we empirically examine whether the couple will offset the legal shock by changing the status of property ownership.

The second strategy we hypothesize is that of investing in more houses. Singles or cohabiters enter marriage because of the high level of legal and interpersonal commitment provided by marriage (Poortman & Mills, 2012). As the new marriage law potentially transfers the part of the property rights that belonged to the wife to the husband, the wife is unable to assure that her husband will not want to separate due to the disproportionate divorce benefits. Hence, the wife may feel less secure and reduce her investments in marital-specific goods, thus decreasing the marital gains for both spouses. Drawing on the model from Lafortune and Low (2018), the spousal relationship may face a problem of limited

[35] See https://gz.leju.com/news/2011-08-17/08423887885.shtml

commitment and marital instability after the implementation of the new marriage law. To solve this, married couple could invest in more houses as an additional commitment for marriage, as the houses bought after the marriage are jointly owned by the spouses. In this way, houses serve as a "commitment device" for the husband and provide insurance and incentives to his wife. Furthermore, being both a consumption good and an investment asset (Arrondel & Lefebvre, 2001; Dusansky & Koç, 2007), the house not only enhances commitment but also has investment value, especially in China with its booming housing markets and rapidly rising housing prices (Li & Wu, 2017). Investing more in houses can generate benefits in the future, which further increase the costs of divorce.

Overall, to answer our research question about how married couples react to the marital instability caused by the implementation of the new marriage law, we hypothesize that couples may adopt two strategies: changing the status of house ownership and investing in more houses. We will investigate the two strategies in Section 3.5 and Section 3.6 respectively.

3.4. Research Design

3.4.1. Data

Our study draws on the data from the China Family Panel Study (hereafter, CFPS), which is organized by the Institute of Social Science Survey (ISSS) in Peking University. The CFPS is a nationally representative sample, based on a comprehensive social investigation in China, adopting implicit layered, multi-stage and probability proportional to size (PPS) methods. The CFPS samples comprises 25 provinces in China covering 95% of the total national population. The CFPS covers not only the household information and personal information of respondents such as working status, income level and social status, but also information about house ownership and investment, which provides us with the opportunity to investigate the impact of the new marriage law on a couple's housing behaviour. As a panel survey, the CFPS captures the dynamic changes in families and amongst individuals and has become one of the most authoritative sources of tracking survey data for academic research in China.

The first wave of the CFPS began in 2010 and the subsequent panel surveys have been conducted every two years. Our analysis adopts four waves of the CFPS data from 2010, 2012, 2014 and 2016, since the new marriage law was introduced in 2011. We combined the information by matching the database about family, the database about adults and the database about family relations. According to the research needs, we selected samples by the following rules: (1) the marriage date of couples should before the year of 2010, as we are looking at the impact of the new marriage law on the married couples; (2) the couples should have remained married during the observation period, as we do not consider the situation of divorce; (3) households where the household heads are neither the husband nor the wife are excluded, since the couples do not have the power of decision making in this case; (4) households where the husband is older than 55 and the wife is older than 50 are excluded,

since the new marriage law will have limited impacts on older people; (5) households where the household heads are still at school are excluded due to the contradiction between student status and independence of decision making; (6) households where the houses are "rented", "provided by the government for free", "provided by the work unit for free", "provided by other relatives and friends" and "provided by parents/children", are excluded. Only those instances in which the house is "completely owned by the couple" or "shared property rights with the work unit" are retained.

3.4.2. Empirical Strategy

As the new marriage law was in effect nationwide and implemented at the same time for all regions of the country, the standard differences-in-differences (DID) strategy is not suitable for employment in this analysis, since there is no standard geographic experimental group and control group. Under this circumstance, our estimation strategy adopts a continuous measure of the intensity of treatment and thereby captures greater variation in the data (Bai & Jia, 2016; De Chaisemartin & D'Haultfœuille, 2018; Nunn & Qian, 2011). In other words, even though the policy is implemented at the same time for the whole nation, the intensity of the policy's impact often varies due to the different regional characteristics. The variation of intensity from low to high gives us the opportunity to identify the effect of the policy. This estimation strategy is often called Fuzzy Differences-in-Differences (Fuzzy DID), and the core of this method is to find a proper continuous variable to measure the intensity.

In this paper, we employ the local 5-14 female/male sex ratio[36] in 2000 at county-level as the continuous variable to measure the intensity of the treatment. Firstly, due to China's one-child policy in the 1980s, the sex ratio of new-borns in China has risen year by year. However, the

[36] We use female/male instead of male/female sex ratio for the convenience of interpretation.

implementation of the one-child policy in different regions was not consistent, resulting in a large regional disparity in terms of sex ratio (Ebenstein, 2011). According to previous studies, the local sex ratio could affect the bargaining power of women in the marriage market (Angrist, 2002; Chiappori, Fortin, & Lacroix, 2002; Siow, 1998). In a marriage market where the number of women surpasses that of men, women have less choice in the marriage market and lower status within the family. Hence, there should be a relatively stronger impact of the new marriage law on households in the region with a relatively high female/male sex ratio, since husbands in these regions have more incentive to divorce and wives are facing a more competitive marriage market and feel less secure in the marriage.

Secondly, the marriage market is "local" for most Chinese (Wei et al., 2017). Building marriages between counties or provinces is rare in China. Thus, sex ratio in the county of birth can better reflect the situation of the marriage market that individuals are facing. Most importantly, the number of Chinese rural citizens migrating to cities has increased rapidly since the 1990s, from 39 million in 1997 increased to 166 million in 2015. The local sex ratio could be affected since the gender structure of migrants is not balanced. However, the sex ratio excludes migrants who are not reported at county-level, but at province-level in the China Statistical Yearbook. In this case, we use the county-level sex ratio of those aged 5-14 from the 2000 Population Census, which could avoid the measurement bias caused by migration. On the one hand, children under the age 15 have fewer opportunities to migrate because of China's law of compulsory education stipulating that children must complete nine years of compulsory education locally (Cameron, Meng, & Zhang, 2017). On the other hand, children aged 5-14 in 2000 will have grown up to become marriageable adults aged 19-28 in 2014, which is a similar age range to that adopted by other studies (Edlund, Li, Yi, & Zhang, 2013).

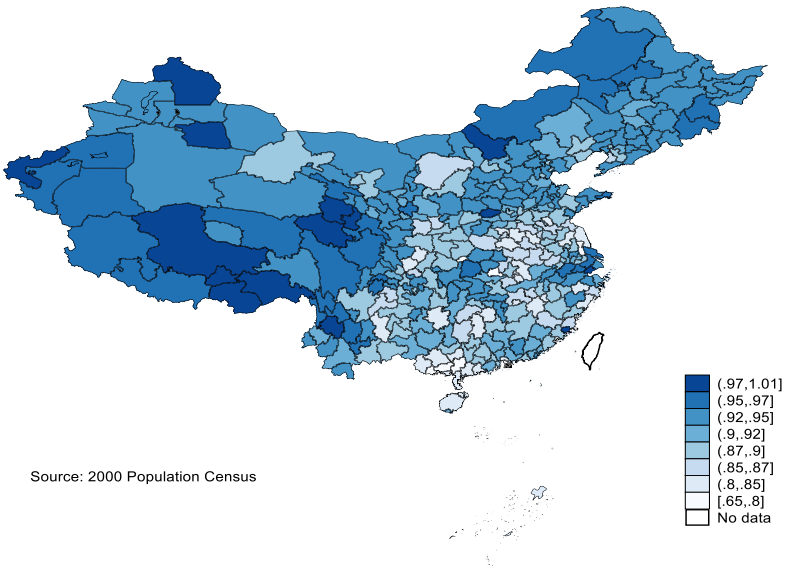
Figure 3.1 shows the sex ratio in 2000 across all ages. The blue line represents the sex ratio with migrants, and the red line represents the sex ratio without migrants. It can be seen that the sex ratios with and without migrants display no difference within the age range of 5-14, which supports our calculation. Figure 3.2 illustrates a map of counties in China with the 5-14 female/male sex ratios in 2000.

Figure 3.1: Female/Male Sex Ratio in China (2000), With and Without Migrants



Source: 2000 Populaton Census

Figure 3.2: County-level Distributions of 5-14 Female/Male Sex Ratio in China (2000)

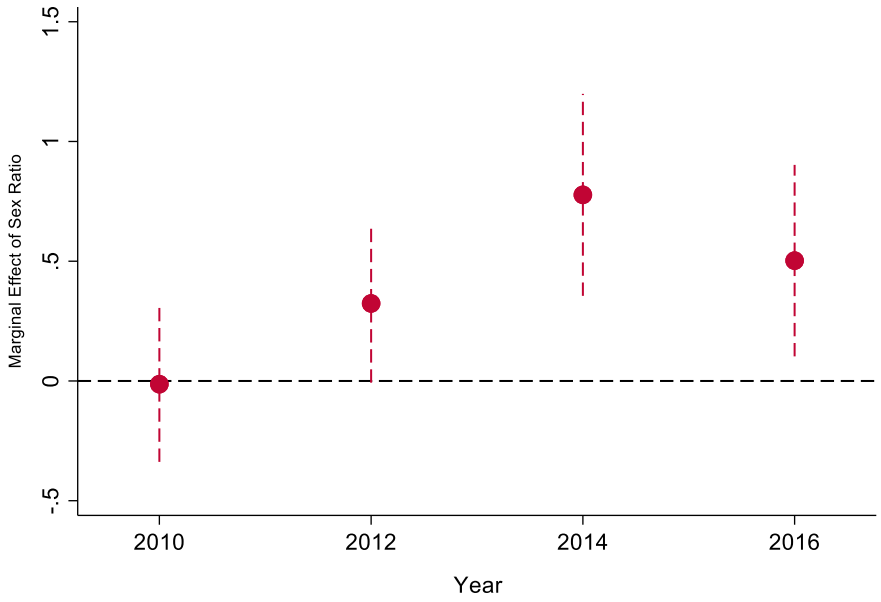


Source: 2000 Population Census

3.4.3. Tests of Parallel Trend

Our identification of the legal shock requires two assumptions: first, there were no other specific shocks in the year 2011 correlated with the couple's investment in more houses; second, counties should follow the parallel trend if the new marriage law had not happened. To the best of our knowledge, there were no other big events in 2011 correlated with people's housing investment or ownership change. As for the latter, we based upon the approach employed by Nunn and Qian (2011). Using the 2010, 2012, 2014 and 2016 CFPS datasets, Figure 3.3 shows a plot of the marginal effect of sex ratio on the couple's housing investment in 2010, 2012, 2014 and 2016. It can be seen that in 2012 (after the legal shock), the marginal effect of sex ratio shows a significant increase compared to the figure in 2010 (before the legal shock). In the year 2014, this effect continued to increase and dropped down in the year 2016. Although this test has limitation since there is only one year captured before the turning point, we believe these figures confirm the parallel trend.

Figure 3.3: Test of Parallel Trend, Marginal Effect of Sex Ratio



Source: CFPS 2010-2016

3.5. House Ownership

3.5.1. The Distribution of House Ownership

Although with a limited sample size, the names on the certificate of home ownership are provided in the CFPS. However, it only reports the ownership of the current residential property, while the ownership of the rest of the houses is not covered. To mitigate the estimation bias, we restrict the sample to the couples who only possessed one house through the whole observation period. Based on this house ownership information in the CFPS, Table 3.1 shows the distribution of housing property ownership from four waves between 2010 and 2016[37]. We generated three classificatory categories describing the ownership status[38]: (1) the husband solely owns the house, (2) the husband and the wife jointly own the house, and (3) the wife solely owns the house. Consistent with previous studies, we can observe that in more than 85% of the families the property right solely belongs to the husband.

In Table 3.1, it can be seen that there is a decreasing trend in the proportion of houses solely owned by the husband from 2010 to 2016. In contrast, we can observe an increasing trend in the proportion of houses that are jointly owned by the husband and wife, while the proportion of houses solely owned by the wife remains constant across the four waves. From the descriptive statistics of the distribution, we conjecture this changing pattern is caused by the implementation of the new marriage law in 2011. Wives increasingly require their husbands to add their names on the housing property certificates, in order to offset the adverse impact of legal change. We will test our hypothesis empirically in the following sections.

[37] The dramatic decrease in the observations is caused by the high attrition rate in 2016. In the CFPS, the attrition rate for 2010-2012, 2012-2014, and 2014-2016 at the individual level is 19.3%, 13.9%, and 25.5%, respectively.

[38] The categories of "Property jointly owned by the husband and his parents" and "Property jointly owned by the wife and her parents" are not included in the sample, since parents' involvement may significantly affect the couple's decision making.

Table 3.1: The Distribution of House Ownership by Waves in CFPS

	Only Husband	Husband and Wife	Only Wife	Total
2010	1688	48	100	1836
	(91.94%)	(2.48%)	(5.17%)	(100%)
2012	1398	120	87	1603
	(87.10%)	(7.48%)	(5.42%)	(100%)
2014	1019	153	73	1245
	(81.85%)	(12.29%)	(5.86%)	(100%)
2016	373	85	26	484
	(77.07%)	(17.56%)	(5.37%)	(100%)
Total	4478	406	286	5170
	(86.62%)	(7.85%)	(5.53%)	(100%)

Note: The figures are authors' calculation from CFPS 2010-2016 datasets

3.5.2. Model Specification

To capture the change of property ownership from sole ownership by the husband to joint ownership or sole ownership by the wife, we generate a dichotomous dependent variable with the property solely owned by the husband coded "0" and the property jointly owned by the husband and wife or solely owned by the wife coded "1". Employing a fuzzy DID method, our strategy of policy identification is to generate the interaction term of county-level female/male sex ratio and post dummies indicating whether the "new Marriage Law" had been introduced in a certain year. Since the new marriage law was implemented in 2011, the post dummy in the year 2010 is coded "0" and the post dummies in the years of 2012, 2014 and 2016 are coded "1". Due the categorical nature of the dependent variable, we employ a Binomial Logistic Regression with random effect to estimate the impact of the new marriage law on the probability of adding wives' names to the certificate or directly changing ownership to the wives.

Following is the estimating equation:

$$\ln\left[\frac{P(Y_{j,i,t})}{1-P(Y_{j,i,t})}\right] = \beta_1 SR_j \times Post_t + \beta_2 SR_j + \beta_3 Control_{j,i,t} + \gamma_t + \tau_j + \epsilon_{j,i,t}$$

where i indexes couples, j indexes counties, and t indexes year, which are 2011, 2012, 2014 and 2016. SR_j denotes the 5-14 female/male sex ratio at the county-level in 2000. β_1 is the main coefficient we focus on. $\epsilon_{j,i,t}$ denotes the error term. $Control_{j,i,t}$ is a set of controlling variables, including the household-level characteristics and county-level information.

Since wives with more bargaining power are more likely to successfully persuade their husbands to change the house ownership status, household-level characteristics mainly include the information about wives indicating their bargaining position, such as gender of household head, the wife's age and age square, the wife's hukou status, whether the wife has a job, the wife's self-reported socio-economic status, the wife's duration of education, and the difference in the number of years of education between the husband and wife. Besides the wife's information, we also controlled the characteristics of the household, such as the location of the household (rural or urban), family size and disposable household income. Furthermore, we controlled for the length of marriage due to its high correlation to the length of time since they bought the house. Couples married for a long time are not likely to be affected by the new marriage law.

As we are identifying the impact of the new marriage law at the county-level, controlling county-level characteristics is required. To proxy the bargaining power of women in the marriage market in a certain region, the female labour force participation rate is controlled. In addition, GDP per capita and housing price are controlled for, indicating the economic development and housing market at the county-level.

γ_t and τ_j indicate province and year fixed effects to control for all time-invariant difference between provinces and changes over time that affect all provinces similarly. Given that there may be correlations across four waves for the same couple, standard errors are clustered by the couple's ID.

Table 3.2 presents the descriptive statistics of independent variables. The mean value of female/male sex ratio at the county-level is 0.911, which shows China is still a society with more men than women. The female/male sex ratio between different regions in China shows a relatively large difference with the maximum value 1.027 and minimum value 0.667. This variation further demonstrates that using local sex ratio to measure the intensity of the treatment is reasonable. After excluding the missing values, 4,423 observations entered regression.

Table 3.2: Descriptive Statistics (Change of Ownership)

Variable	Obs	Mean	Std.Dev.	Min	Max
Dependent Variable:					
Change of Ownership					
Yes	5170	0.134	0.341	0	1
No	5170	0.866	0.341	0	1
Key Independent Variable:					
Female/Male Sex Ratio	5023	0.911	0.051	0.667	1.027
Controlling Variables:					
Gender of Household Head					
Female	5170	0.152	0.359	0	1
Male	5170	0.848	0.359	0	1
Wife's age	5170	42.48	5.452	22	50
Non-agricultural Hukou (wife)					
Yes	5159	0.776	0.417	0	1
No	5159	0.224	0.417	0	1
Whether has a job (wife)					
Yes	5097	0.726	0.446	0	1
No	5097	0.274	0.446	0	1
Wife's Socio-economic status (SES)					
Low	5092	0.280	0.449	0	1
Middle	5092	0.523	0.500	0	1
High	5092	0.197	0.398	0	1
Years of Education (wife)	5001	5.682	4.795	0	23
Year Gap of Education (Husband - wife)	4878	1.382	4.250	-15	15
Length of Marriage (year)	4997	20.04	6.515	0	40
Disposable Household Income (yuan)	5098	46349	43320	0	255251
Family Size	5170	4.008	1.284	1	12
Living in Rural or Urban area					
Rural	5151	0.416	0.493	0	1
Urban	5151	0.584	0.493	0	1
County-level:					
Female Labour Force Participation Rate	5170	0.609	0.127	0.334	0.930
Per capita GDP (yuan)	5170	39711	26995	5530	146518
Housing Price (yuan/square meter)	5170	5175	6433	1911	103114

Note: (1) Household Heads are determined by whether they are in charge of household finances or not. (2) Socio-economic status is the subjective rating compared with others in the local area.

3.5.3. Baseline Regression Results

Results from the Binomial Logistic regression are reported in Table 3.3. For the convenience of interpretation, the average marginal effects are displayed instead of coefficients. The results from the full sample are shown in Column 1 and the results from the urban sample are shown in Column 2. It can be observed that, although both the coefficients of Sex Ratio*Post in Column 1 and Column 2 are positive, only the coefficient of Sex Ratio*Post in Column 2 is statistically significant. The results demonstrate that counties with higher female/male sex ratios have a higher probability of a change of names on the house ownership certificate after the implementation of the new marriage law.

Regarding the controlling variables, most of the results are consistent with previous studies. Having a male household head could significantly decrease the probability of changing house ownership. The education level of the wife is positively correlated to the probability of a change in house ownership, indicating the influence of a stronger bargaining position of the wife within the family. However, having a job instead of no job for the wives has a significant negative impact on the probability of a change in house ownership, which is consistent with our hypothesis that the property right could serve as an incentive for the wife's devotion to intra-household affairs. In addition, as expected, the length of marriage has a significant negative effect on the probability of changing house ownership.

3.5.4. Placebo Test

The reason that the coefficient of Sex Ratio*Post shows insignificance in the full sample may be caused by rural samples. In the rural areas of China, married couples without the legal registration of marriage are common (Yu & Xie, 2015). For these couples, the division of family property after divorce is mostly underpinned by the traditional rules of

clan power (Fei, 1992). Even if the rural couples are legally registered, the property division upon divorce may still be based on a negotiation between both families, with little involvement of legal forces. Hence, we assume rural couples are less sensitive to the shock from the new marriage law, compared to their urban counterparts.

Moreover, using a rural sample to analyse the impact of the new marriage law also serves as a placebo check. If no significant impact of the implementation of the new marriage law is found in rural samples, then we could say that the change of house ownership is caused by the legal change in the marriage law, and not by other factors. Column 3 in Table 3.3 shows the results from rural samples. We can observe a negative and insignificant effect of Sex Ratio*Post, which demonstrates that there is no relationship between the implementation of the new marriage law and the couple's behaviour in relation to changing house ownership in rural areas. The comparison between the results from urban samples and rural samples further validates our hypothesis.

Table 3.3: Baseline Results, Logit Marginal Effect (Change of Ownership)

	(1)	(2)	(3)
VARIABLES	Full	Urban	Rural
Dependent Variable: Ownership Change			
Sex Ratio*Post	0.269	0.449**	-0.087
	[0.213]	[0.190]	[0.400]
Sex Ratio	-0.259	-0.269	-0.112
	[0.210]	[0.203]	[0.396]
Household Head's Gender (Ref.=Female)			
Male	-0.088***	-0.093***	-0.104***
	[0.020]	[0.028]	[0.031]
Wife's Information:			
Age	0.014	-0.006	0.036
	[0.014]	[0.013]	[0.026]
Age2	-0.015	0.008	-0.043
	[0.017]	[0.016]	[0.031]
Non-agricultural hukou (Ref.=No)			
Yes	-0.075***	-0.013	-0.090***
	[0.020]	[0.027]	[0.029]
Have a job (Ref.=No)			
Yes	-0.005	-0.025*	0.017
	[0.013]	[0.014]	[0.025]

SES (Ref. = Low)			
Middle	0.001	0.004	0.000
	[0.011]	[0.012]	[0.021]
High	0.012	0.007	0.027
	[0.016]	[0.014]	[0.033]
Year of Education	0.006***	0.004*	0.008*
	[0.002]	[0.002]	[0.004]
Difference in Years of Education from Husband	0.002	0.002	0.003
	[0.002]	[0.002]	[0.004]
Household Information:			
Length of Marriage (year)	-0.003*	-0.003***	-0.001
	[0.001]	[0.001]	[0.003]
Disposable Household Income (logged)	0.000	-0.000	0.002
	[0.004]	[0.004]	[0.008]
Family Size	-0.008	-0.001	-0.014
	[0.005]	[0.005]	[0.012]
County-level Variables:			
Female Labour Force Participation Rate	-0.003	0.014	-0.156
	[0.113]	[0.126]	[0.211]
Per capita GDP (Logged)	0.023	0.011	0.044
	[0.018]	[0.020]	[0.037]
Housing Price (Logged)	-0.024	-0.026	-0.065
	[0.024]	[0.039]	[0.041]
Year FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Observations	4,423	2,530	1,843
Pseudo R^2	0.142	0.140	0.110

Family-level clustered robust standard errors in brackets
Average marginal effects reported
*** p<0.01, ** p<0.05, * p<0.1
Source: CFPS 2010 2012 2014 2016

3.5.5. Robustness Check

In this paper, we employ the sex ratio of the birth place to capture the characteristics of the marriage market. However, some respondents reported that their locations of residence are different from their places of birth or their places of household registration (hukou), which could lead to measurement bias. For example, the residential place of individual i is A, while his or her birth place or hukou location is not A but B. Clearly, using the sex ratio of B to indicate the characteristics of marriage market in A is not appropriate. To mitigate the estimation bias, we exclude the samples whose residential place, birth place or hukou

location are not consistent. Table 3.4 show the results from different sample restriction criteria. As the implementation of the new marriage law only shows a significant impact in urban areas, the robustness check is conducted for the urban samples instead of the full sample. For the convenience of interpretation, the marginal effects are reported instead of coefficients. Column 1 shows the results after excluding the respondents whose birth places and residential places are not the same. Column 2 shows the results after excluding the respondents whose hukou locations and residential places are not the same. Column 3 shows the results from the respondents whose birth places, residential places and hukou locations are all the same. It can be seen that the impacts of the implementation of the new marriage law in three columns are all shown as significantly positive, which is consistent with the baseline findings.

Table 3.4: Robustness Check by Excluding Migrants (House Ownership)

VARIABLES	(1) Birth =Residence	(2) Hukou =Residence	(3) Birth=Hukou =Residence
Dependent Variable: Ownership Change			
Sex Ratio*Post	0.440**	0.444**	0.458**
	[0.189]	[0.194]	[0.192]
Sex Ratio	-0.264	-0.299	-0.308
	[0.205]	[0.201]	[0.202]
Household Head's Information	Yes	Yes	Yes
Household Information	Yes	Yes	Yes
County-level Information	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Observations	2,389	2,493	2,373
Pseudo R^2	0.138	0.141	0.143

Family-level clustered robust standard errors in brackets
Average marginal effects reported
*** p<0.01, ** p<0.05, * p<0.1
Source: CFPS 2010 2012 2014 2016

3.6. House Investment

3.6.1. Model Specification

In this section, we examine the impact of the new marriage law on couple's investment in houses. The dependent variable is the number of houses owned by the couple. It should be noted that besides the three categories of ownership in Section 3.5, houses jointly owned by the husband and his parents, and houses jointly owned by wife and her parents, are also taken into account. Employing a fuzzy DID method, our strategy of policy identification is exactly the same as that in Section 3.5. Although the number of houses is a count variable, we still employ an OLS estimation for the ease of interpretation, and a Poisson regression will be employed in the robust check. Following is the estimating equation:

$$NHouse_{j,i,t} = \beta_0 + \beta_1 SR_j \times Post_t + \beta_2 SR_j + \beta_3 Control_{j,i,t} + \gamma_t + \tau_j + \epsilon_{j,i,t}$$

where i indexes couples, j indexes counties, and t indexes year. SR_j denotes the 5-14 female/male sex ratio at the county-level in 2000. β_1 is the main coefficient we focus on. $\epsilon_{j,i,t}$ denotes the error term. $Control_{j,i,t}$ is a set of controlling variables, including the information of the household heads, household-level characteristics and county-level characteristics.

The decision about whether or not an investment in more houses occurs is highly dependent on the financial capacity of the couple, which is by and large determined by the characteristics of the household head. Hence, unlike Section 3.5 controlling the information about wives, we control the information about the household head in this section, such as his/her age and age square, his/her hukou status, whether he/she has a job,

his/her self-reported socio-economic status and his/her years of education.

Besides the information about the household head, we also controlled the characteristics of the household, such as the location of the household (rural or urban), family size and disposable household income. Furthermore, we controlled the Child Dependency Rate (CDR) and the Elderly Dependency Rate (EDR) at the household-level to indicate the demographic burden of the family, which is believed to affect the housing behaviour (Lindh & Malmberg, 2008).

As our measurement of the intensity of the treatment is at the county-level, controlling county-level characteristics is required. Besides GDP per capita, we also controlled the level of population and housing price to capture the demand and supply in the real estate market. The female labour force participation rate is not controlled in this section.

Any remaining unobserved systematic variation across provinces and years are captured by province fixed effect γ_t and year fixed effects τ_j. Given that there may be correlations across four waves for the same couple, standard errors are clustered by the couple's ID. Table 3.5 presents the descriptive statistics.

Table 3.5: Descriptive Statistics (House Investment)

Variable	Obs	Mean	Std.Dev	Min	Max
Dependent Variable:					
Number of Houses	10663	1.173	0.433	1	6
Key Independent Variable:					
Female/Male Sex Ratio	10324	0.910	0.0509	0.667	1.027
Controlling Variables:					
Household Head's Information:					
Gender					
Female	10663	0.158	0.365	0	1
Male	10663	0.842	0.365	0	1
Age	10663	42.96	6.213	21	55
Non-agricultural Hukou					
Yes	10593	0.742	0.437	0	1
No	10593	0.258	0.437	0	1
Whether Has a Job					
Yes	10544	0.815	0.388	0	1
No	10544	0.185	0.388	0	1
Socio-economic status (SES)					
Low	10390	0.307	0.461	0	1
Middle	10390	0.525	0.499	0	1
High	10390	0.168	0.374	0	1
Health Status					
Bad	10661	0.195	0.397	0	1
Fair	10661	0.268	0.443	0	1
Good	10661	0.537	0.499	0	1
Year of Education	10259	6.916	4.530	0	19
Household Information:					
Disposable Household Income (yuan)	10501	46651	44172	0	255251
Family Size	10663	4.044	1.292	1	17
Child-age dependency rate (CDR)	10642	0.142	0.277	0	3
Elderly dependency rate (EDR)	10642	0.137	0.333	0	3
Living in Rural or Urban area					
Rural	10632	0.452	0.498	0	1
Urban	10632	0.548	0.498	0	1
County-level Variables:					
Per capita GDP (yuan)	10663	40999	26910	5530	146518
Population (Million)	10663	5.638	3.95	0.912	33.92
Housing Price (yuan/square meter)	10663	5380	6903	1911	103114

Note: (1) Household Heads are determined by whether they are in charge of household finances or not. (2) Socio-economic status is the subjective rating compared with others in the local area. (3) Child dependency rate: children aged 0-14/working-age population aged 16-60 (4) Elderly dependency rate: elderly aged 60 and above/working-age population aged 16-60

3.6.2. Baseline Results

After removing data with missing values, the analysis in this section obtained a valid sample size of 10324 in the regression. Table 3.6 provides the baseline results for various models. The robust positive effects of Sex Ratio*Post on a couple's investment in houses are observed in the OLS regressions. Column 1 shows the effect of the implementation of the new marriage law on the couple's housing investment, while only controlling for the fixed effect of years. The results show that there is a significant positive correlation between the implementation of the new marriage law and the investment in houses. In column 2, we control for a set of information about the head of household and the household's characteristics. In column 3, we control for a set of county-level characteristics. In column 4, we further control the fixed effect of provinces. It can be seen that the magnitude and the significance level are nearly the same across the four models with different controlling variables, which suggest that there is indeed a significant positive impact of the implementation of the new marriage law upon the couple's investment in houses.

Regarding the controlling variables, most of the results are consistent with previous studies. The household head's socio-economic attributes, such as hukou status, employment status, self-reported socio-economic status and years of education, all show a positive effect on the investment in houses. In terms of the information about the household, high household income and big family size could significantly increase the investment in houses. As indicators of the burden of the family, both the Child Dependency Rate (CDR) and the Elderly Dependency Rate (EDR) show a significant negative effect on housing investment. Moreover, per capita GDP and the size of population are significantly positively related to housing investment, although the effects turn to insignificance after controlling for the fixed effect of provinces.

Table 3.6: Baseline Results (House Investment)

Variables	(1)	(2)	(3)	(4)
Dependent Variable: Number of Houses				
Sex Ratio*Post	0.549***	0.558***	0.582***	0.546***
	[0.158]	[0.163]	[0.164]	[0.163]
Sex Ratio	-0.272*	-0.269*	-0.225	-0.015
	[0.144]	[0.146]	[0.153]	[0.172]
Household Head's Information:				
Gender (Ref.=Female)				
Male		-0.006	-0.001	-0.012
		[0.015]	[0.015]	[0.015]
Age		0.020***	0.020***	0.018**
		[0.008]	[0.008]	[0.007]
Age2		-0.023**	-0.023**	-0.021**
		[0.009]	[0.009]	[0.009]
Non-agricultural hukou (Ref.=No)				
Yes		0.068***	0.058***	0.065***
		[0.016]	[0.016]	[0.015]
Have a job (Ref.=No)				
Yes		0.055***	0.053***	0.043***
		[0.010]	[0.010]	[0.010]
SES (Ref. = Low)				
Middle		0.035***	0.035***	0.030***
		[0.010]	[0.010]	[0.010]
High		0.047***	0.051***	0.052***
		[0.014]	[0.014]	[0.014]
Health Status (Ref.=Bad)				
Fair		-0.003	-0.003	-0.002
		[0.014]	[0.013]	[0.013]
Good		0.006	0.004	0.001
		[0.014]	[0.014]	[0.014]
Year of Education		0.008***	0.007***	0.006***
		[0.002]	[0.002]	[0.002]
Household Information:				
Disposable Household Income (logged)		0.031***	0.028***	0.028***
		[0.003]	[0.003]	[0.008]
Family Size		0.021***	0.025***	0.024***
		[0.004]	[0.005]	[0.005]
CDR		-0.037**	-0.038**	-0.045***
		[0.016]	[0.016]	[0.016]
ODR		-0.032**	-0.035***	-0.027**
		[0.013]	[0.013]	[0.013]
County-level Variables:				
Per capita GDP (Logged)			0.046***	0.013
			[0.011]	[0.014]
Population (Logged)			0.022**	-0.007
			[0.011]	[0.015]

Housing Price (Logged)			-0.011	0.005
			[0.014]	[0.016]
Constant	1.412***	0.443**	-0.085	0.151
	[0.132]	[0.212]	[0.239]	[0.312]
Year FE	Yes	Yes	Yes	Yes
Province FE	No	No	No	Yes
Observations	10,324	9,538	9,538	9,538
R-squared	0.002	0.043	0.047	0.067

Family-level clustered robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Source: CFPS 2010 2012 2014 2016

3.6.3. Tests of Mechanism

As discussed in Section 3.2.3., we propose that the mechanism through which the couple's investment in housing property is affected following the implementation of the new marriage law is that of the husband using a jointly-owned house as a "commitment device" to provide insurance and incentives to his wife, even at a cost to the husband's own income. This mechanism relies on the assumption that the gains from remaining married after the legal shock are higher than that from divorce. In other words, both spouses should feel satisfied with the current marriage, especially the husband. Husbands with low levels of marital satisfaction are not likely to sacrifice their own benefits for a stable marriage.

According to the questions provided by the CFPS, the score for the husband's marital satisfaction[39] is reported on a 5-point scale, ranging from 1 (very low), 2 (low), 3 (fair), 4 (high), 5 (very high). As most of the respondents answered "very high", we divide the sample by treating the categories 1 to 4 as the "relatively low" group, and the category 5 as the "relatively high" group. Column 1 and Column 2 in Table 3.7 present the results from the "relatively low" and "relatively high" marital satisfaction of the husband respectively. It can be seen that the coefficient of Sex Ratio*Post in Column 2 shows a positive effect in the 1% significance level, while the coefficient of Sex Ratio*Post in Column 2

[39] The marital satisfaction of the husband is only reported in the wave of the 2012 dataset.

shows insignificance though the coefficient is positive. These results confirm our hypothesis about the mechanism.

To further validate our argument that a couple's investment in more houses is a reaction to the limited commitment brought about by the implementation of the new marriage law, we use the county-level crude divorce rates to proxy the local hazard of divorce in different regions, and divide the sample by using the mean value as the cut-off point. Counties with the divorce rates higher than the mean value are considered as the group of "relatively high", while counties with the divorce rates lower than the mean value are considered as the group of "relatively low". Column 3 and Column 4 in Table 3.7 present the results from the group of "relatively low" and "relatively high" divorce hazard respectively. It can be seen that both the coefficients of Sex Ratio*Post in Column 3 and Column 4 show a significant positive effect. However, the coefficient of Sex Ratio*Post in Column 4 shows a more sizable and significant effect than that in Column 3. These results demonstrate that, in the areas where the marriage is less stable, the impact of the implementation of the new marriage law on a couple's investment in houses is stronger, which further confirms our hypothesis regarding the mechanism.

Table 3.7: Mechanism, Sub-samples By Levels of Husband's Marital Satisfaction and Divorce Hazard

Variables	Husband's Marital Satisfaction		Divorce Hazard	
	Low (1)	High (2)	Low (3)	High (4)
Dependent Variable: Number of Houses				
Sex Ratio*Post	0.399	0.676***	0.367*	0.856**
	[0.315]	[0.216]	[0.187]	[0.374]
Sex Ratio	-0.158	-0.007	0.114	-0.411
	[0.360]	[0.233]	[0.198]	[0.353]
Household Head's Information:				
Gender (Ref.=Female)				
Male	-0.056	0.009	-0.014	-0.010
	[0.034]	[0.021]	[0.020]	[0.023]
Age	0.020	0.019*	0.024***	0.009
	[0.018]	[0.010]	[0.009]	[0.012]
Age2	-0.022	-0.022*	-0.029***	-0.008
	[0.021]	[0.012]	[0.011]	[0.015]
Non-agricultural hukou (Ref.=No)				
Yes	0.090**	0.078***	0.062***	0.072***
	[0.035]	[0.020]	[0.021]	[0.022]
Have a job (Ref.=No)				
Yes	0.082***	0.030**	0.050***	0.031*
	[0.021]	[0.014]	[0.013]	[0.017]
SES (Ref. = Low)				
Middle	0.054**	0.023*	0.035***	0.023
	[0.022]	[0.013]	[0.013]	[0.017]
High	0.120***	0.039**	0.060***	0.037
	[0.034]	[0.017]	[0.017]	[0.026]
Health Status (Ref.=Bad)				
Fair	-0.015	0.008	-0.008	0.006
	[0.026]	[0.017]	[0.016]	[0.025]
Good	0.018	0.000	0.008	-0.013
	[0.031]	[0.017]	[0.016]	[0.024]
Year of Education	0.004	0.007***	0.007***	0.005**
	[0.004]	[0.002]	[0.002]	[0.003]
Household Information:				
Disposable Household Income (logged)	0.028***	0.027***	0.025***	0.035***
	[0.006]	[0.004]	[0.004]	[0.005]
Family Size	0.034***	0.022***	0.028***	0.017**
	[0.011]	[0.006]	[0.005]	[0.008]
CDR	-0.070**	-0.027	-0.058***	-0.017
	[0.036]	[0.021]	[0.018]	[0.035]
ODR	-0.039	-0.031*	-0.024	-0.028
	[0.029]	[0.016]	[0.016]	[0.022]

County-level Variables:				
Per capita GDP (Logged)	0.013	0.003	0.008	-0.008
	[0.031]	[0.020]	[0.024]	[0.026]
Population (Logged)	0.008	-0.002	-0.030	0.020
	[0.043]	[0.019]	[0.024]	[0.021]
Housing Price (Logged)	0.009	-0.003	0.005	0.017
	[0.060]	[0.022]	[0.045]	[0.017]
Constant	-0.167	0.310	0.313	0.576
	[0.750]	[0.406]	[0.379]	[0.530]
Year FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Observations	2,143	6,001	5,886	3,652
R-squared	0.094	0.078	0.067	0.075

Family-level clustered robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Source: CFPS 2010 2012 2014 2016

3.6.4. Heterogeneous Effect

Table 3.8 shows the heterogeneous effects of the implementation of the new marriage law by the wife/husband ratio of income and the status of property ownership. As a proxy for women's bargaining power within the family, income ratio is calculated by the husband's income divided by wife's income. We set the sample such that an income ratio larger than the median is the group comprising "relatively high" bargaining power of the wife, otherwise it belongs to the group of "relatively low" bargaining power. Column 1 and Column 2 in Table 3.8 show the results from the "low" and "high" group respectively. It can be seen that the coefficient of Sex Ratio*Post in Column 2 shows a positive effect in the 5% significance level, while the coefficient of Sex Ratio*Post in Column 2 shows insignificance though the coefficient is positive. The relatively high wife/husband income ratio may affect a couple's housing investment in two channels. First, wives with relatively high bargaining power indicate a higher position within the family, which could affect the intra-household decision making more. Second, a higher wife/husband income ratio shows a relatively higher financial contribution of wives to the household, which enables the couple to invest more in property assets.

The heterogeneous effects by the status of property ownership serve as the placebo test. We look at the house ownership from the wife's perspective. If the names on the house ownership certificate are those of the husband or the husband and his parents, we define the ownership status of the wife as "disadvantaged". If the names on the house ownership certificate are those of the husband and the wife, or solely the wife, or the wife and her parents, we define the ownership status of the wife as "equal or advantaged". Column 3 and Column 4 in Table 3.8 show the results from the "low" and "high" groups respectively. It can be seen that the coefficient of Sex Ratio*Post in Column 3 shows a positive effect in the 1% significance level, while the coefficient of Sex Ratio*Post in Column 4 shows insignificance. If the couple's investment

in houses has no relationship with the implementation of the new marriage law in 2011, then the results from all kinds of ownership status should show consistency. In this analysis, however, there is no significant impact of the implementation of the new marriage law upon families with an "equal or advantaged" ownership status of wives, since they are not affected by the new regulations brought about by the legal change. These results further confirm our hypothesis that married couples employ the strategy of investing in more houses in reaction to the potentially changed distribution of housing property caused by the implementation of the new marriage law.

Table 3.8: Heterogeneity, Subsample By Levels of Income Ratio and Wife's Ownership Status

Variables	Income Ratio(wife/husband)		Wife's ownership status	
	Low	High	Disadvantaged	Equal or Advantaged
	（1）	（2）	（3）	（4）
Dependent Variable: Number of Houses				
Sex Ratio*Post	0.196	0.675**	0.655***	1.404
	[0.298]	[0.339]	[0.237]	[0.984]
Sex Ratio	0.021	-0.045	0.025	-1.538
	[0.262]	[0.266]	[0.254]	[0.961]
Household Head's Information:				
Gender (Ref.=Female)				
Male	-0.013	-0.014	-0.013	-0.001
	[0.025]	[0.025]	[0.025]	[0.045]
Age	0.004	0.021	0.021*	0.015
	[0.012]	[0.014]	[0.012]	[0.044]
Age2	-0.004	-0.025	-0.023	-0.009
	[0.015]	[0.017]	[0.014]	[0.052]
Non-agricultural hukou (Ref.=No)				
Yes	0.044*	0.031	0.110***	0.125**
	[0.026]	[0.023]	[0.024]	[0.061]
Have a job (Ref.=No)				
Yes	0.046***	0.020	0.051***	0.104**
	[0.017]	[0.019]	[0.014]	[0.050]
SES (Ref. = Low)				
Middle	-0.024	0.023	0.040***	0.040
	[0.018]	[0.019]	[0.015]	[0.044]
High	0.033	0.009	0.050***	0.056
	[0.025]	[0.025]	[0.019]	[0.062]

Health Status (Ref.=Bad)				
Fair	-0.032	-0.039	-0.010	-0.024
	[0.026]	[0.031]	[0.019]	[0.052]
Good	-0.021	-0.044	0.002	-0.015
	[0.025]	[0.029]	[0.019]	[0.060]
Year of Education	0.004	0.010***	0.006**	0.004
	[0.002]	[0.002]	[0.002]	[0.006]
Household Information:				
Disposable Household Income (logged)	0.089***	0.102***	0.023***	0.019
	[0.014]	[0.015]	[0.005]	[0.014]
Family Size	0.026***	0.019**	0.027***	0.044*
	[0.008]	[0.008]	[0.006]	[0.023]
CDR	-0.038	-0.076**	-0.051**	0.046
	[0.026]	[0.033]	[0.024]	[0.092]
ODR	-0.021	-0.011	-0.047***	0.020
	[0.024]	[0.024]	[0.017]	[0.068]
County-level Variables:				
Per capita GDP (Logged)	-0.007	-0.019	0.008	-0.021
	[0.021]	[0.027]	[0.023]	[0.075]
Population (Logged)	-0.039	-0.004	-0.007	-0.055
	[0.026]	[0.022]	[0.022]	[0.073]
Housing Price (Logged)	-0.000	0.006	0.010	0.236
	[0.018]	[0.027]	[0.027]	[0.147]
Constant	0.110	-0.275	0.119	-0.205
	[0.472]	[0.506]	[0.510]	[1.583]
Year FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Observations	2,861	2,754	4,380	744
R-squared	0.090	0.093	0.089	0.153

Family-level clustered robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Source: CFPS 2010 2012 2014 2016

3.6.5. Robustness Check

In the baseline regression, we employ the number of houses as the measurement of housing investment. However, some of the respondents may hide the true number of houses, which leads to measurement error. For this reason, we adopt another question regarding family houses: whether they have property other than the current residential one? If the respondent answered "yes" then we coded "1", and "no" was coded "0". Column 1 in Table 3.9 shows the results after we changed the outcome variable. It can be seen that the coefficient of Sex Ratio*Post shows a significant positive effect, which is consistent with the baseline results.
Since the number of houses is a count variable, using the OLS estimation may cause estimation bias. Column 2 in Table 3.9 shows results employing a Poisson model. For the ease of interpretation, the average marginal effects are reported instead of coefficients. Comparing with the coefficients in the baseline regression, we found the marginal effect of Sex Ratio*Post displays nearly the same magnitude and significance level, which demonstrates that our estimation is robust.

In the main part of this paper, we employ a Fuzzy DID strategy to identify the impact of the implementation of the new marriage law on the couple's housing investment. As a robustness check, we manually generate the experiment group and control group among counties by using the median value of the female/male sex ratio as the cut-off point. Counties with a female/male sex ratio higher than the median value are defined as the "treatment group" or "high shock counties", while counties with a female/male sex ratio lower than the median value are defined as the "control group" or "low shock counties" (Chen, 2017). Column 3 in Table 3.9 shows the results from this standard DID strategy. It can be seen that the coefficient of Sex Ratio*Post shows a significant positive effect, which is consistent with the baseline results.

Moreover, we further consider the issue of the possible estimation caused by migrants. The strategy of restricting samples employed is the same as

that in Section 3.5.3. Table 3.10 show the results from different sample restriction criteria. Column 1 shows the results after excluding the respondents whose birth places and residential places are not the same. Column 2 shows the results after excluding the respondents whose hukou locations and residential places are not the same. Column 3 shows the results from the respondents whose birth places, residential places and hukou locations are all the same. It can be seen that the impacts of the implementation of the new marriage law in three columns are all shown as significantly positive, which is consistent with the baseline findings.

3.7. Conclusion

As the biggest component of family wealth, housing property plays an important role in stabilizing marriage. In the Chinese context, in which most house ownership certificates are under the names of men, the implementation of the new marriage law in 2011 potentially changed the distribution of family wealth between spouses, transferring the wife's part of property ownership to the husband. Due to the disproportionate benefits upon divorce, the wife may feel less secure and reduce her investments in marital-specific goods, thus leading to a problem of limited commitment and a decrease of gains from marriage for both spouses.

Although many studies have demonstrated that limited commitment can induce a reduction of a couple's investment in marriage-specific capital, housing property appears to be an exception due to its function of insurance. In this paper, we propose that the married couple may adopt two strategies to deal with the problem of limited commitment caused by the implementation of the new marriage law. The first strategy is that of changing the status of house ownership, which could directly offset the influence brought about by the legal change. The second strategy is that of investment in more houses, which is based on the model from Lafortune and Low's (2018) work. A married couple could invest in more houses as an additional commitment, as the houses bought after the marriage are jointly owned by the spouses. This may come at a cost to the husband's own income, but benefit both spouses. In this way, houses serve as a "commitment device" for the husband and provide insurance and incentives to his wife.

Following the idea that the implementation of the new marriage law could lead the couple to change house ownership and invest in more houses, this paper adopts a Fuzzy DID strategy to identify the impact of the new marriage law by using the CFPS 2010-2016 dataset. We found that the couple's probability of house ownership changing from solely

owned by the husband to jointly owned or solely owned by the wife is significantly affected by the implementation of the marriage law, with a positive relationship. It is worth noting that this positive effect is only significant in urban areas. The insignificance of the results from rural areas provides a placebo test for our analysis due to the background difference between urban and rural areas.

As for the second strategy, we found that the implementation of the new marriage law significantly increased the couple's investment in houses. Regarding the house's role as a "commitment device", we also tested the mechanism underlying the link between the legal shock in 2011 and married couples' reactions. The implementation of the new marriage law shows a significant effect only on the couples where the marital satisfaction of the husband is relatively high. In regions with relatively high divorce rates, the effect of the legal shock is shown to be more sizable and significant, compared to the regions with relatively low divorce rates. The results show robustness after conducting various analyses of heterogeneity and placebo tests.

Our research makes several contributions. Firstly, although the implementation of the new marriage law has had a broad social impact, there are still few empirical studies investigating the possible consequences of the legal shock to marriage. This paper is the first to empirically examine how married couples will react to the limited commitment brought about by China's new marriage law. Secondly, emphasizing the important role played by housing property, this paper provides empirical evidence from China for Lafortune and Low's (2018) model. Finally, the findings in this paper suggest the change of marriage law may have additional outcomes. The indirect effects should not be ignored by policy makers when designing policies.

Appendix

Table C. 1: Change Measurement and Estimation Method

Variables	(1)	(2)	(3)
Dependent Variable:	Whether have other houses	Number of Houses	
Sex Ratio*Post	0.660***	0.547***	
	[0.148]	[0.162]	
Sex Ratio	-0.292**	-0.019	
	[0.148]	[0.170]	
Treat*Post			0.053***
			[0.017]
Treat			-0.011
			[0.016]
Household Head's Information:			
Gender (Ref.=Female)			
Male	-0.013	-0.012	-0.013
	[0.014]	[0.015]	[0.015]
Age	0.006	0.018**	0.018**
	[0.007]	[0.008]	[0.007]
Age2	-0.009	-0.021**	-0.021**
	[0.009]	[0.009]	[0.009]
Non-agricultural hukou (Ref.=No)			
Yes	0.018	0.063***	0.065***
	[0.013]	[0.015]	[0.015]
Have a job (Ref.=No)			
Yes	0.036***	0.044***	0.045***
	[0.011]	[0.010]	[0.010]
SES (Ref. = Low)			
Middle	0.004	0.029***	0.029***
	[0.009]	[0.010]	[0.010]
High	0.027**	0.051***	0.052***
	[0.013]	[0.014]	[0.014]
Health Status (Ref.=Bad)			
Fair	0.002	-0.002	-0.000
	[0.012]	[0.013]	[0.013]
Good	0.009	0.001	0.002
	[0.012]	[0.014]	[0.014]
Year of Education	0.006***	0.006***	0.006***
	[0.001]	[0.002]	[0.002]
Household Information:			
Disposable Household Income (logged)	0.035***	0.031***	0.028***
	[0.007]	[0.004]	[0.003]
Family Size	0.014***	0.024***	0.024***
	[0.004]	[0.004]	[0.005]
CDR	-0.025	-0.045***	-0.044***
	[0.016]	[0.016]	[0.016]

ODR	-0.032**	-0.027**	-0.027**
	[0.013]	[0.013]	[0.013]
County-level Variables:			
Per capita GDP (Logged)	0.036**	0.014	0.015
	[0.015]	[0.015]	[0.015]
Population (Logged)	-0.019	-0.008	-0.011
	[0.013]	[0.015]	[0.015]
Housing Price (Logged)	0.006	0.004	0.004
	[0.015]	[0.016]	[0.016]
Constant			0.144
			[0.274]
Year FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Observations	9,535	9,538	9,538
R-squared/Pseudo R2	0.0791	0.0049	0.067

Family-level clustered robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Source: CFPS 2010 2012 2014 2016

Table C. 2: Robustness Check by Excluding Migrants (House Investment)

Variables	（1）	（2）	（3）
Dependent Variable:	Birth=Residence	Hukou=Residence	Birth=Hukou=Residence
Sex Ratio*Post	0.421**	0.510***	0.425**
	[0.170]	[0.165]	[0.170]
Sex Ratio	0.063	0.062	0.083
	[0.183]	[0.175]	[0.183]
Household Head's Information	Yes	Yes	Yes
Household Information	Yes	Yes	Yes
County-level Information	Yes	Yes	Yes
Constant	0.355	0.206	0.326
	[0.402]	[0.361]	[0.412]
Year FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Observations	7,755	9,003	7,702
R-squared	0.063	0.068	0.063

Family-level clustered robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Source: CFPS 2010 2012 2014 2016

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