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**Conference Paper**

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Beiträge zur Jahrestagung des Vereins für Socialpolitik 2021: Climate Economics

**Provided in Cooperation with:**

Verein für Socialpolitik / German Economic Association

*Suggested Citation:* Xu, Yuanwei (2021) : Paying for the Selected Son: Sex Imbalance and Marriage Payments in China, Beiträge zur Jahrestagung des Vereins für Socialpolitik 2021: Climate Economics, ZBW - Leibniz Information Centre for Economics, Kiel, Hamburg

This Version is available at:

<https://hdl.handle.net/10419/242436>

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# Paying for the Selected Son: Sex Imbalance and Marriage Payments in China

Yuanwei Xu \*

January 27, 2021

## Abstract

This paper shows that the rising male surplus has strengthened marriage distortions in China by causing an increase in brideprice payments. The identification relies on comparison between siblings from the same natal family who are born in different birth years and thus exposed to various demographic structures. I find robust evidence that a rise in male-female sex ratios significantly increases the incidence and value of brideprices, but has no influence on dowries. Such a positive effect on brideprices is found predominantly in natal families characterized by low education, fewer number of children, and with more daughters than sons. Further investigations show that dowries carry a strong intergenerational function for help and care in parents' old age but brideprices do not. In addition, dowries are positively associated with female bargaining power. This paper provides the first empirical evidence showing that demographic imbalance causes marriage distortion with rising brideprices, and suggests that brideprices and dowries carry different significance in the Chinese society.

**JEL-Codes:** J12, J13, J16, P21

**Keywords:** Sex Imbalance; Brideprices; Dowries; Marriage Payments; China

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# 1 Introduction

The skyrocketed brideprices as well as the huge financial burden on the families with unmarried sons documented in China have gathered international attention and concern<sup>1</sup>. Although there have been arguments that the rising male surplus caused the high brideprices, there was no empirical evidence supporting them. In addition, dowries increased along with brideprices. If the sex imbalance contributes to the inflation of brideprices, why there is no deflation of dowries? This paper provides the first empirical evidence documenting the demographic effects on marriage payments, and reveals the different significance of brideprices and dowries in the Chinese society.

There are two types of marriage payments. Brideprices, defined as transfers of goods or money from the family of the groom to the bride's, are highly prevalent in Sub-Saharan Africa. On the other hand, dowries, transfers of the opposite direction, are extensively documented in South Asia. Most of developing countries are dominantly characterized by only one type of marriage payments, but China is a unique setting where both brideprices and dowries are paid out simultaneously. Nevertheless, dowry differs substantially from brideprice in China, with the latter being compulsory while the former being voluntary and financed usually with a return portion of the brideprice (Engel, 1984). China experienced a sharp rise in the male-female sex ratios since the 1980s (Sen, 1992), due to several reforms and technology changes. These include the One Child Policy (Ebenstein, 2010; Bulte, Heerink and Zhang, 2011; Li, Yi and Zhang, 2011), the availability of ultra-sound technology (Chen, Li and Meng, 2013), and the rural land reform (Almond, Li and Zhang, 2019). Previous studies document that male surplus leads to distortions of marriage formation (e.g., Edlund et al., 2013; Huang and Zhou, 2015), but the effect of surging sex ratios on the rise of marriage payments remains neglected. In this paper, I empirically show that the incidence and the value of brideprices would rise in light of such a demographic imbalance, as one adjustment in the marriage market.

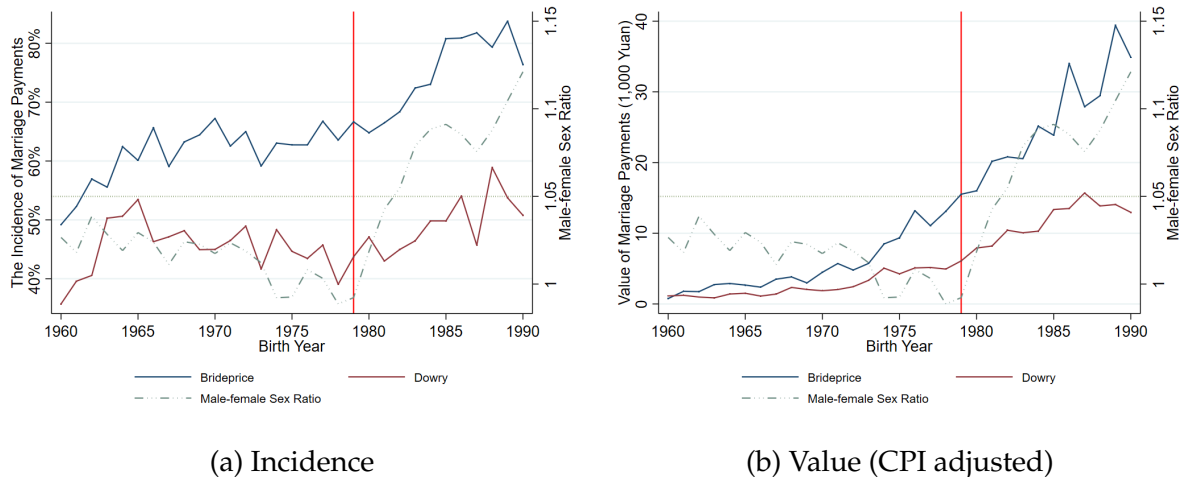
The rise of marriage payments and male surplus in China are well illustrated in Figure 1. The policy changes and technological advancement elevated the sex imbalance since the end of the 1980s. The red line marks the official start of the One Child Policy in 1979. The male-female sex ratio rose from about one among those born in 1980 to 1.13 in 1990.

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<sup>1</sup>For example, see this BBC post: <https://www.bbc.com/news/blogs-trending-35727057> (last accessed on October 27, 2020)

In the meantime, parents with sons born between 1960 and 1980 had about 60 to 70 percent probability of paying brideprices for their marriage, but those with sons born after 1980 had as high as over 80 percent probability of paying brideprices (see Figure 1a). The monetary value, as shown in Figure 1b, increased drastically among those with sons born after 1980 as well. The average value of brideprices amounted to an average of about 40,000 Chinese Yuan (about 5,714 USD) among those born around 1990, which was equivalently six to seven times the rural annual individual disposable income, and about twice that in urban areas in 2010. On the other hand, although the incidence of dowries did not see a clear increase from 1960 to 1990, the value of dowries witnessed an increase among daughters born after 1980 as well, but at a lower speed compared to brideprices.

Figure 1: Sex Imbalance and Marriage Payments: Cohort Born 1960-1990



Data Source: CHARLS (2013) and census data (2000). Author's own calculation.

In this paper, I study two research questions, (i) whether the male surplus contributed to the inflation of marriage payments in China; and (ii) why brideprices and dowries co-existed and co-evolved. I explore the role of the sex imbalance in marriage payments by exploiting the spatial and temporal variation of demographic shifts and linking that with child-level marriage payment information by birth cities and years. Specifically, I use the household-level data containing information on marriage payments by parents collected in the 2013 survey of the China Health and Retirement Longitudinal Study (CHARLS). It is a nationally representative survey interviewing individuals aged over 40, with the primary goal of studying the physical functioning, financial well-being, and intergenerational relationships of the elderly population in China. This dataset has several advantages. First, this is the only nationally representative dataset

systematically collecting detailed information on marriage payments for each child based on self-reports from parents in China. Second, the complete birth history of parents is recorded. This allows for identifying and addressing numerous important family and child characteristics, including family size, birth order and birth interval of each child, which might fundamentally affect the allocation of family resources among children in the form of marriage payments. Third, parent-child pair-wise information on monetary transfers and care-taking is well documented in the dataset. This enables to explore underlying incentives of marriage payments in intergenerational decision-making other than the supply and demand changes in the marriage market. For the main explanatory variable regarding demographic imbalance, I calculate the city and birth year level residential sex ratios projected from the 2000 census.

The identification of a causal link between demographic imbalance and marriage payment relies on the comparison between children who are born in the same natal family but exposed to different sex ratios as they are born in different years. There might be several potential threats in causal inference. To begin with, there is potential endogeneity in residential sex ratios which arises from the gender profile of migration, as females are more likely to leave economically depressed areas than males (Fan and Huang, 1998; Edlund, 2005). Thus, the sex ratios in areas with better economic conditions might be lower. On one hand, I control for natal family fixed effects to adjust for geographic variations in economic condition and development. On the other hand, I additionally control for province-year varying per capita GDP and annual disposable income to capture the income effect as a robustness check. Secondly, the sex ratios could be affected by the time variation in the intensity of family planning policy and technology advancement. For example, children born in years with higher penalty rates of a second birth might be exposed to more skewed sex ratios. I further control for the province-year variation of One Child Policy fine rates as calculated by Ebenstein (2010) and the availability of ultra-sound technology in capital cities by Chen, Li and Meng (2013) as a robustness check. However, the significance and size of the effect remain unchanged. Lastly, there might be the concern that parents might change sex selection in light of the high marriage payments (Bhalotra, Chakravarty and Gulesci, 2020). However, the marriage payments are paid out upon children's marriage, which is about 20 years after the birth. It is highly unlikely in the Chinese context that the brideprices paid out at marriage would change the sex ratios at birth.

The empirical results show several interesting findings. To begin with, I find robust

evidence that higher male-female sex ratios lead to higher prevalence and value of brideprices, however, dowries are not affected by sex imbalance. This suggests that brideprices have implications in the marriage market but dowries not. Second, the positive demographic effect on brideprices is only observed among males with low socio-economic status, which confirms that the brideprice payment in China carries the function as a status good in the marriage competition. In addition, the family structure matters. The effect is found dominantly on sons from natal families with fewer children and with more daughters than sons. Finally, I further examine the role of marriage payments in intergenerational relations as well as intra-household bargaining power. Dowries are paid out as an intergenerational transfer as the exchange for future help and care in the old age, but brideprices not. Lastly, higher dowry values are associated with higher female welfare.

This paper is related to several strands of literature. First, this work directly adds to the literature on determinants and interpretation of marriage payments. As summarized in Anderson (2007a), the direction and magnitude of marriage payments depend on certain social and family characteristics. However, a vast majority of the studies are cross-country analyses, and provide anecdotal and qualitative evidence but no causal inference. A standard theoretical model was developed in Becker (1991), where brideprices and dowries were assumed to be the same in nature and vary with productivity, social inequality, and socio-economic status. However, the co-existence of brideprices and dowries in China suggests that such an assumption might not be valid, and the findings in this paper show that marriage payments have other implications than being merely marriage market clearance prices. A new interpretation of dowries as pre-mortem inheritance was brought up in the theoretical models developed by Zhang and Chan (1999) and Botticini and Siow (2003), where dowries could increase a bride's control over household resources, rather than being a price for grooms. This paper is the first study which provides empirical evidence using individual-level data showing that brideprices would change in response to demographic imbalance. Moreover, it suggests that brideprices feature a status good in marriage market competition, and dowries involve intergenerational decision-making in China. The differences in their interpretation and function are important in explaining the co-existence in the context of China.

Second, this paper contributes to an emerging strand of literature studying the socio-economic consequences of sex imbalance and unintended consequences of family

planning policies in China. For instance, high sex ratios associate to higher crime rates (Edlund et al., 2013), increased unmarried rate of males (Huang and Zhou, 2015), a boost in entrepreneurship and economic development (Wei and Zhang, 2011*b*), and elevated savings rate (Wei and Zhang, 2011*a*). It is well documented that the One Child Policy is one important cause of surging sex imbalance in China (Ebenstein, 2010; Bulte, Heerink and Zhang, 2011; Li, Yi and Zhang, 2011). Moreover, high One Child Policy fines lead to birth mis-reporting (Merli and Raftery, 2000; Huang, Lei and Zhao, 2016), child abandonment and abduction (Bao et al., 2019). There has been theoretical evidence that the skewed sex ratios would cause marriage squeeze (Ebenstein and Sharygin, 2009). This paper is one of the first to empirically investigate the causal effects of sex imbalance and marriage distortions in China, and provide an additional perspective by shedding light on the rise in brideprice payments.

Last, this paper fits within the broad body of research on marriage formation and marriage markets. There are several adjustments in the marriage market induced by shocks of demographic imbalance, including marriage payments (Rao, 1993; Botticini and Siow, 2003), marriage sorting (Abramitzky, Delavande and Vasconcelos, 2011), and timing of the marriage entry (Anderson, 2007*b*; Corno, Hildebrandt and Voena, 2016). Using gold prices as exogeneous variation for dowry value, higher dowry value is found to lead to girl mortality (Bhalotra, Chakravarty and Gulesci, 2020) but higher female bargaining power in the new household (Menon, 2020) in India. The findings in this paper provide consistent evidence from China, where there is limited empirical research on marriage payments.

The remainder of this paper is organized as follows. Section 2 provides a description of the various datasets used in this paper, before Section 3 discusses the empirical approach. Section 4 presents empirical results on the demographic effect of marriage payments based on the CHARLS data, including the main results, robustness checks, as well as heterogeneity analyses. Section 5 discusses the intergenerational and intra-household roles of marriage payments. Finally, Section 6 concludes.

## 2 Data

This analysis combines data from two main sources: (i) demographic imbalance at the city level, proxied by the male-female sex ratios in each birth year among residents, as calculated using census data in 2000; and (ii) the individual child-level marriage payment information, as measured in the 2013 survey of the CHARLS. In robustness checks, several province and year varying confounders are extracted from various issues of the *China Statistics Yearbook*. Lastly, I additionally control for measurements of One Child Policy intensity and availability of ultra-sound technology, which are calculated by Ebenstein (2010) and Chen, Li and Meng (2013) respectively. The rest of this section describes each of the datasets in more detail.

For the main explanatory variable regarding demographic imbalance, I construct a panel of the male-to-female sex ratios among residents in each birth year and city using the census data collected in 2000. Specifically, I assume a spousal age gap of two years<sup>2</sup> and a five-year age window for the spouse matching<sup>3</sup>. In the CHARLS sample, the distribution of age at marriage does not differ substantially between males and females, except that males enter marriage at an older age compared to females (see Figure A.3 in the appendix). The 2000 census contains information on the city of residence at the time of enumeration and the province of birth. Thus, the 2000 census can be used to calculate two sex ratios, which are the residential sex ratio by city and the birth sex ratio by birth province. The ideal demographic structure should be proxied by the residential sex ratios in the marriage year and city using the natality data. However, there is no nationally representative data on vital registration of births, deaths, or marriages (Yang et al., 2005). Thus, I could only rely on projections from the decennial population censuses. The residential sex ratios are preferred over birth sex ratios because it measures the demographic structure taking into account not only local natives but also internal migrants. On the contrary, the birth sex ratios do not consider in- and out-migrants. Using birth sex ratios might induce measurement errors in cities where migration outflow or inflow is gender-specific. It is well noted in Fan and Huang (1998) and Edlund (2005) that females, relative to males, are more likely to leave

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<sup>2</sup>According to the 2000 census, males are on average two years older than their female partners among all married couples.

<sup>3</sup>For example, the 1980-born sex ratio for males is the same as the 1982-born sex ratio for females, which is calculated as the number of males born between 1978 and 1982 over the number of females born between 1980 and 1984 within the same city. Please see Figure A.2 in the appendix as an example



economically depressed areas. Thus, the residential sex ratio is better able to precisely represent demographic imbalance than the birth sex ratio. Empirically, it tracks the birth sex ratio by birth province quite closely because internal migration is not pervasive in China. According to the CHARLS data, 75 percent of the children reside in the village of birth after marriage. According to another nationally representative micro dataset, the China Family Panel Study (CFPS) (Institute of Social Science Survey, 2015), less than five percent of the population migrate out of the birth province. Alternatively, city level residential sex ratios could be calculated using the 1990 census. Unlike the 2000 census where both birth province and current residential location are recorded, the 1990 census only collected current city and province of residence. However, internal migration was more restricted in 1990 than in 2000, and thus the residential sex ratio calculated using the 1990 census might not precisely reflect the marriage squeeze faced by younger cohorts who get married after 1990. However, from the CHARLS data, 83 percent of the children whose parents reported their year of marriage were married after 1990. In conclusion, I use the city-level residential sex ratio calculated using the 2000 census as the main measure for local sex imbalance, while the province-level birth sex ratio as well as the residential sex ratio projected from the 1990 census are used as alternative measurements in robustness checks.

The data on marriage payments as well as the socio-economic information come from the 2013 wave of the CHARLS (Zhao, Strauss and Yang, 2015). This dataset records detailed information on physical and mental health, relationship with children, as well as care-taking status of individuals aged over 40 in China. CHARLS 2013 covered 28 provinces and used probability proportional to size sampling as a method to be nationally representative. Moreover, both individual and household weights are available for most of the respondents in the data. The dataset collects detailed socio-economic information of parents and each of their children, as well as parent-child pairwise information on intergenerational transfers and care giving. Specifically, the CHARLS 2013 survey records whether and how much parents have paid brideprices or dowries when each child got married. Moreover, the geographic location of the respondents are made available at the city level, and this allows me to match with the variation of demographic shift intensity, which is proxied by sex ratios. CHARLS 2013 also tracks the migration history in detail, and I only include parent-child pairs where parents have no migration record after the child's birth. The marriage payment information was assessed in 2013, however, only very few born after 1990 were married before 2013. In addition, the dataset includes only a few parent-child pairs where

children are born before 1960. This is perhaps because the parents with children born prior to 1960 are usually from pre-1940 birth cohorts, and many of them might have already passed away in 2013. Thus, I restrict the analysis to the parent-child pairs where the child was born between 1960 and 1990.

The final sample includes 13,927 parent-child pairwise information where children were married before 2013 and have at least one sibling in the natal family. Table A.1 in the appendix presents descriptive statistics of the key variables. The average residential sex ratio is 1.05, that is, 105 males per 100 females. 56 percent of the children's parents have paid marriage payments, with an average value of 9,291 Yuan (approximately 1,327 USD using current exchange rate).<sup>4</sup> On average, 51 percent of the records are parent-son pairs, and the rest are parent-daughter records. 83 percent of the children have at least primary school education, but 43 percent of the parents have not finished primary school. 98 percent of the children are biological children. 30 percent of the parents currently live in urban area, and they have on average 3.76 children.

The increasing time trend of marriage payments coincides with that of economic development. After several successful reforms and market-oriented liberalization, China has witnessed drastic economic growth since the 1980s. The rise of marriage payments might simply be an income effect if the trend of demographic shifts correlates with that of economic growth. I collect province-level data on per capita Gross Domestic Product and disposable income from the issues of the *China Statistical Yearbook* from 1960 to 2010. I match the province-level income data using the marriage year if the children's marriage year is reported by parents<sup>5</sup>. Otherwise, I assume that males get married at 23 years old and females at 21 years old, and I match the province income record in the year when they turn 23 or 21.

Lastly, the sex ratios might be endogeneous due to spatial and temporal variations in policies which might directly affect sex selection at birth, including family planning policies and ultra-sound technologies. I extract the fine rates of the One Child Policy measured in years of family income calculated by Ebenstein (2010) and the rollout data of ultra-sound technology by Chen, Li and Meng (2013). These data are used as additional confounders to check the robustness of the demographic effect on marriage payments.

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<sup>4</sup>The value of marriage payments takes a missing value if parents reported not having paid marriage payments when a child got married.

<sup>5</sup>In the sample, 77.23 percent of the children's marriage year was reported by parents.

### 3 Empirical Strategy

To investigate whether the rise in marriage payments could be explained by male surplus, I link child-level marriage payment information from the CHARLS 2013 dataset with city and birth year level sex ratios. Specifically, I consider the following model:

$$Payment_{ihct} = \alpha + \beta Sex Ratio_{ct} + \lambda \mathbf{X}_i + \mu_h + \zeta_t + \epsilon_{ihct} \quad (1)$$

On the left hand side, the outcome of interest is either a dummy indicating whether the parents  $h$  of child  $i$ , who is born in city  $c$  and year  $t$ , have paid marriage payments for him or her, or the payment value after adjusting for inflation using Consumer Price Index (CPI). In cases that the outcome variable is the incidence of marriage payments, I use a linear probability model for the estimation. The marriage payment takes the form of brideprices for sons and dowries for daughters.

On the right hand side,  $\alpha$  is a constant and  $Sex Ratio_{ct}$  is the male-female sex ratio in city  $c$  and birth year  $t$ . The coefficient estimate of interest,  $\beta$ , therefore measures the average impact of demographic imbalance on child-level marriage payments.  $\mathbf{X}_i$  is a vector of child-level characteristics within the natal family that may represent their relative importance or preference from parents among all the siblings, which as a result might affect his or her marriage payments from parents. These include, for example, the birth order. As displayed in Figure A.1 in the appendix, parents have a lower probability of paying marriage payments to the second-born child within the same sex relative to the first one. If their parents paid either brideprices or dowries, the value is generally lower than for the first-borns as well. Specifically, these controls include sex, educational attainment, birth order, birth order within the same sex, years of birth spacing<sup>6</sup>, age difference from parents<sup>7</sup>, and biological child dummy. The parents' decision on child's marriage payments might also depend on their own characteristics. I control for the parent or natal family fixed effects,  $\mu_{h,t}$ , to absorb all observable

<sup>6</sup>For unique child and first child, birth spacing takes the value zero.

<sup>7</sup>I calculate the maximum age difference from both parents if both parents are identifiable, or the age difference from one if only one parent could be identified. In the sample, I was able to identify information of both parents among 75 percent of the children.

and unobservable heterogeneities regarding marriage formation and practices across different natal families. As such, the identification of the demographic effect originates from within-family variations in marriage payments across siblings who are exposed to different demographic structures as they are born in different years. Notice that the parent fixed effect also captures all time-invariant characteristics that might affect marriage payments at the city-level and province-level. At the time horizon, the birth year fixed effects,  $\zeta_t$ , take into account all macro shocks to all children who are born in the same year. Lastly,  $\epsilon_{ihct}$  is the error term. Standard errors are clustered at the city level to allow for potential correlations between individuals within cities.

## 4 The Effect of Sex Imbalance on Marriage Payments

### 4.1 Main Results

To begin with, I examine whether sex imbalance leads to higher incidence of marriage payments using a linear probability model as specified by Equation (1). Since brideprices and dowries are likely to differ substantially in nature, I specify three main outcomes: marriage payments overall, brideprices among sons, and dowries among daughters. The baseline OLS regression results are set out in Table 1.

Columns (1), (3) and (5) report the results by controlling for parent fixed effects and birth year fixed effects, and columns (2), (4) and (6) further control for child characteristics. Parents are more likely to pay marriage payments for the children who are exposed to a higher male-female sex ratio, compared to those exposed to lower sex ratios, when children get married. The coefficient in column (4) suggests that parents have a higher probability of paying brideprices for those sons who are faced with more skewed male surplus. However, the incidence of dowry payment among daughters from the same natal family does not vary with the demographic structure (column (6)). The coefficients presented in Panel B are adjusted for survey weights, and we observe a similar effect as shown in Panel A. However, about 300 child-parent records in the sample were not assigned survey weights. Thus, I rely on specifications without weight adjustments in the following heterogeneity analysis and robustness checks.

Specifically, as indicated in column (4), when the male-female sex ratio increases by

Table 1: Sex Imbalance and the Incidence of Marriage Payments

	All		Brideprice		Dowry	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A: Without Survey Weights</i>						
Residential Sex Ratio	0.098*	0.142***	0.261***	0.258***	0.010	0.009
	(0.055)	(0.051)	(0.093)	(0.091)	(0.083)	(0.081)
Observations	13,927	13,927	5,053	5,053	4,798	4,798
$R^2$	0.647	0.677	0.803	0.806	0.814	0.816
<i>Panel B: With Survey Weights</i>						
Residential Sex Ratio	0.099*	0.138***	0.262***	0.267***	0.034	0.026
	(0.058)	(0.052)	(0.091)	(0.088)	(0.087)	(0.086)
Observations	13,660	13,660	4,947	4,947	4,717	4,717
$R^2$	0.655	0.682	0.802	0.806	0.817	0.819
Child Controls		✓		✓		✓
Parent FE	✓	✓	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓	✓	✓

*Notes:* The table reports the OLS estimation results of Equation (1) using a linear probability model. The dependent variable is a dummy, taking the value one if parent paid marriage payment when child was married, otherwise zero. Panel A does not take into account survey weights, and panel B adjusts for survey weights. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents. Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

0.01, that is, when there is one additional male for every 100 females, the incidence of brideprices is increased by 0.26 percentage points on average. The evidence suggests two interesting implications. On one hand, the overall sex ratio increased from about one to 1.13 from the cohorts born in 1960 to those born in 1990, implying that the male surplus contributes to an increase in the incidence of brideprices of 3.4 percentage points. In contrast, the overall prevalence of brideprices rose by around 10 percentage points (see Figure 1a), and the sex imbalance explains about a third of the total increase in brideprices. On the other hand, if brideprices and dowries were similar in nature, an increase in sex ratios should have a negative effect on the incidence of dowry payment. However, this is not observed according to the estimate presented in column (6). The coefficient is positive, but insignificant. This further suggests that dowries might differ substantially in nature from brideprices in China, and could not be regarded as marriage market clearance prices as assumed in Becker (1991). I will further discuss the role of marriage payments in detail in Section 5.

As a second step, I further investigate whether sex imbalance contributes to the rise in marriage payment value as well, and the estimation results are set out in Table 2.

Table 2: Sex Imbalance and the Value of Marriage Payments

	Amount		ln Amount		% Disp Income	
	(1)	(2)	(3)	(4)	(5)	(6)
Residential Sex Ratio	3499.351 (2957.174)	2549.428 (2812.796)	0.209 (0.232)	0.124 (0.230)	0.063 (0.774)	0.413 (0.785)
Residential Sex Ratio $\times$ Son	5581.281** (2744.369)	6015.441** (2737.763)	-0.331 (0.250)	-0.293 (0.250)	0.382 (0.735)	0.295 (0.722)
Son	1157.791 (2788.982)	188.378 (2751.455)	1.122*** (0.266)	1.036*** (0.265)	1.052 (0.783)	1.333* (0.771)
ln GDP p.c.		3862.130*** (616.362)		0.343*** (0.037)		-1.380*** (0.240)
Observations	6,194	6,194	6,194	6,194	6,160	6,160
$R^2$	0.744	0.750	0.785	0.790	0.601	0.612
Child Controls	✓	✓	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓	✓	✓

*Notes:* The table reports the OLS estimation results of Equation (1) without survey weight adjustment. The dependent variable is the absolute monetary value of marriage payment a parent has paid for child's marriage adjusted by province-year varying consumer price index in all specifications. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents. Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

From columns (1) and (2) it is observable that an increase in sex imbalance does not have any effect on the value of dowry payments, but it leads to higher values of brideprices. Specifically, if there is one additional male per 100 females, then the value of brideprices would increase by about 60 Yuan (8.6 USD) on average. However, such a positive effect is not observed if I specify the natural logarithm of the value or its share of disposable income as the outcome variable. Moreover, when comparing children with siblings of the same sex within the same natal family, there is no significant effect of the male surplus on the value of brideprices (or dowries) paid by parents, as shown in Table A.2 in the Appendix.

Overall, the baseline results indicate that the sex imbalance in China could increase the incidence and value of brideprices, but has no effect on dowries. The results here suggest that only brideprices respond to shocks in the marriage market, and thus

brideprices have a function in the marriage competition but dowries seem not.

## **4.2 Robustness Checks**

In this section, I check the robustness of the positive effect on the incidence and value of brideprices driven by demographic imbalance. Specifically, I check whether the finding is sensitive to alternative measurements of sex imbalance and to including additional controls for various confounders. Further, I perform falsification tests to check whether a pre-sample time trend exists.

### **4.2.1 Alternative Measurements**

The main results in Table 1 are estimated based on the residential sex ratios as the measure of sex imbalance. In this section, I consider the two alternative sex ratios as alternative measurements, including the birth sex ratios and the residential sex ratios projected from a previous census.

The results set out in Table 3 confirm the positive impact of male surplus on the incidence of brideprice payment (see columns (2) and (5)). The effect sizes are similar to the results in Table 1 and they are both significant at the one percent level.

### **4.2.2 Economic Development as Confounders**

China has witnessed drastic economic growth since the 1980s. Both demographic imbalance and economic boom take the same increasing time trend. Thereby, the question arises whether the effect on brideprices could simply be an income effect. To this end, I further control for the province-level per capita GDP and disposable income varying with years, as recorded in various issues of the *China Statistical Yearbook* from 1960 to 2010. I match the income measures with the children's year of marriage.

The estimation results with income as additional control are set out in Table 4. The coefficient estimates in columns (2) and (5) suggest that a 0.01 increase in sex ratio is associated with about a 0.26-0.27 percentage points increase in the incidence of

Table 3: Sex Imbalance and the Incidence of Marriage Payments - Alternative Measurements

	All	Brideprice	Dowry	All	Brideprice	Dowry
	(1)	(2)	(3)	(4)	(5)	(6)
Residential Sex Ratio (1990)	0.125*** (0.036)	0.208*** (0.070)	0.054 (0.063)			
Birth Sex Ratio				0.145*** (0.047)	0.247*** (0.086)	0.016 (0.074)
Observations	13,927	5,053	4,798	13,927	5,053	4,798
$R^2$	0.678	0.807	0.816	0.678	0.806	0.816
Child Controls	✓	✓	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓	✓	✓

*Notes:* The table reports the OLS estimation results of Equation (1) using a linear probability model without survey weight adjustment. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents. Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

brideprices, and the coefficients are both significant at the one percent level. According to the estimates in columns (3) and (6), sex imbalance does not affect the incidence of dowry payment. Overall, the results with economic growth as confounders confirm the baseline results as shown in Table 1. In addition, it seems that economic growth is negatively associated with marriage payments in China. This is in line with the anecdotal evidence summarized in Anderson (2007a), that marriage payments seem to disappear with industrialization and modernization.

### 4.2.3 Additional Robustness Checks

In the sample, 73 percent of the children reside outside of the birth village at the time of interview. However, it could not be inferred from the data whether the change of residence took place before or after the marriage. Thus, those 27 percent of the children might get married after the migration and thus might be exposed to a different demographic structure. In particular, there would be measurement errors with the sex imbalance if they migrate out of the birth city. I restrict the sample to the children who did not migrate out of the current village and check the robustness of the effect.



Table 4: Sex Imbalance and the Incidence of Marriage Payments - Economic Development as Confounders

	All	Brideprice	Dowry	All	Brideprice	Dowry
	(1)	(2)	(3)	(4)	(5)	(6)
Residential Sex Ratio	0.147*** (0.051)	0.272*** (0.092)	0.020 (0.080)	0.142*** (0.052)	0.261*** (0.091)	0.020 (0.081)
ln GDP p.c.	-0.025** (0.009)	-0.027* (0.014)	-0.038** (0.015)			
ln Disposable Income p.c.				-0.033*** (0.012)	-0.028* (0.017)	-0.049** (0.020)
Observations	13,921	5,049	4,798	13,856	5,014	4,773
$R^2$	0.678	0.807	0.816	0.678	0.807	0.816
Child Controls	✓	✓	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓	✓	✓

*Notes:* The table reports the OLS estimation results of Equation (1) using a linear probability model without survey weight adjustment. The dependent variable is a dummy, taking the value one if parent paid marriage payment when child was married, otherwise zero. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents. Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

The results are presented Table A.3 in the appendix. I find a similar effect size of demographic shifts on the incidence of brideprices and no effect on dowries. The results indicate that the baseline effect is not driven by children who migrated out of the birth village and might be exposed to another demographic structure.

In addition, it is well documented that rising male surplus is driven by the family planning policy (Ebenstein, 2010) and the availability of ultra-sound technology (Chen, Li and Meng, 2013; Almond, Li and Zhang, 2019). It is likely that areas exposed to different policy intensity and technological advancement might have underlying characteristics that correlate with the development of marriage payments directly. For example, the availability of ultra-sound technology might be a sign of local wealthiness and openness, and thus the local residents might have more resource to pay marriage payments. I further control for the fine rates of the One Child Policy as calculated in Ebenstein (2010) and the availability of ultra-sound technology (Chen, Li and Meng, 2013) in the birth year and province as additional confounders, respectively. If the temporal variation of city-level sex ratios is driven by such policy exposures, then the

effect size or significance should be reduced once the measures of policy exposure are controlled for. However, according to the results set out in Table 5, the effect of sex ratios on the incidence of brideprices remains the same in size and significance as the baseline results in Table 1. The evidence indicates that the demographic effect on marriage payments are not threatened by potential endogeneity driven by policy exposure and technological advancement.

Table 5: Sex Imbalance and the Incidence of Marriage Payments - Family Planning Policies and Availability of Ultra-sound Technology as Confounders

	One Child Policy			Ultra-sound Technology		
	All	Brideprice	Dowry	All	Brideprice	Dowry
	(1)	(2)	(3)	(4)	(5)	(6)
Residential Sex Ratio	0.142*** (0.051)	0.256*** (0.091)	0.012 (0.081)	0.153*** (0.054)	0.276*** (0.097)	-0.049 (0.090)
Fine in years of income	0.002 (0.026)	-0.029 (0.054)	0.033 (0.039)			
Ultra-sound tech available				-0.024 (0.017)	0.011 (0.026)	-0.054* (0.028)
Child Controls	✓	✓	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓	✓	✓
Observations	13,927	5,053	4,798	11,867	4,336	4,042
$R^2$	0.677	0.806	0.816	0.673	0.806	0.811

*Notes:* The table reports the OLS estimation results of Equation (1) using a linear probability model. The dependent variable is a dummy, taking the value one if parent paid marriage payment when child was married, otherwise zero. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents. Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

Finally, the tradition of marriage formation might as well depend on the timing of the marriage. I additionally control for the marriage year fixed effects and the estimation results are set out in Table 6. The demographic effect on the incidence of brideprices (in column (2)) is of a larger size is significant at 1 percent level after partialing out the marriage year characteristics. In column (6) where I additionally adjust the economic development, One Child Policy intensity, marriage year, and two-year age group fixed effects, we could still observe the positive demographic effect on brideprices, as in Table 1.

Table 6: Sex Imbalance and the Incidence of Marriage Payments - Additional Marriage Year Fixed Effects

	All	Brideprice	Dowry	All	Brideprice	Dowry
	(1)	(2)	(3)	(4)	(5)	(6)
Residential Sex Ratio	0.145** (0.066)	0.318*** (0.112)	-0.033 (0.108)	0.131** (0.065)	0.312*** (0.110)	-0.048 (0.109)
ln GDP p.c.				0.076** (0.035)	0.032 (0.056)	0.064 (0.058)
Fine in years of income				-0.001 (0.026)	0.025 (0.063)	0.021 (0.051)
Observations	10,059	3,602	3,133	10,057	3,600	3,133
$R^2$	0.682	0.812	0.812	0.682	0.812	0.812
Child Controls	✓	✓	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓	✓	✓
Marriage Year FE	✓	✓	✓	✓	✓	✓

*Notes:* The table reports the estimation results of Equation (1) using logistic models and the estimated marginal effects without survey weight adjustment. The dependent variable is a dummy, taking the value one if parent paid marriage payment when child was married, otherwise zero. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents. Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

#### 4.2.4 Robustness of Demographic Effect on Marriage Payment Value

In addition, I check the robustness of the demographic effect on the value of marriage payments, and the results are set out in Table A.4 in the appendix. The positive effect of male surplus on the value of brideprices is robust to controlling for economic development, intensity of One Child Policy, availability of ultra-sound technology, and marriage year fixed effects. However, such an effect is not observed when restricting the sample to those children who did not migrate out of the birth village.

#### 4.2.5 Falsification Test

Finally, I conduct a falsification test to check whether the effect of demographic imbalance on brideprices is driven by pre-sample time trends. This would happen if individuals in cities where sex imbalance worsened were more likely to receive

marriage payments from parents even before the shift took place. To this end, I match the marriage payment record of those born between 1960 and 1990 with sex ratios in 1970-2000, and in 1965-1995, respectively, that is, ten and five years following the birth. The demographic imbalance of future cohorts should not be correlated with the marriage payment of current ones unless there were some long-run common trends. The results are reported in Table 7. The estimated coefficients are all insignificant with very large standard errors in all specifications, suggesting that there is no relationship between the marriage payments of current cohorts and future demographic shifts. This demonstrates that the positive relationship between sex imbalance and the incidence of brideprice payment identified earlier is not driven by long-run trends.

Table 7: Falsification Test

	<i>Without Survey Weights</i>			<i>With Survey Weights</i>		
	All	Bride Price	Dowry	All	Bride Price	Dowry
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A: Linked with sex ratios with a 10-year lead</i>						
Residential Sex Ratio (1970-2000)	-0.002 (0.091)	0.080 (0.104)	0.102 (0.129)	0.030 (0.091)	0.150 (0.114)	0.090 (0.134)
Observations	6,681	2,112	2,061	6,570	2,062	2,039
$R^2$	0.715	0.845	0.825	0.728	0.853	0.838
<i>Panel B: Linked with sex ratios with a 5-year lead</i>						
Residential Sex Ratio (1965-1995)	-0.112 (0.073)	-0.151 (0.097)	0.052 (0.119)	-0.119 (0.080)	-0.152 (0.126)	0.105 (0.122)
Observations	10,491	3,574	3,518	10,303	3,494	3,472
$R^2$	0.698	0.816	0.818	0.706	0.815	0.822
Child Controls	✓	✓	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓	✓	✓

*Notes:* The table reports the OLS estimation results of Equation (1) using a linear probability model without survey weight adjustment. The dependent variable is a dummy, taking the value one if parent paid marriage payment when child was married, otherwise zero. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents. Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

### 4.3 Heterogeneity

From the previous sections, we learned that brideprices respond to the demographic shocks in the marriage market but dowries do not. These findings indicate that brideprices might be paid out to improve the male status in the marriage competition, but dowries might not have a function in the marriage market. If that is the case, then the demographic effect should be stronger among males with low attractiveness. Moreover, since the marriage payments are usually paid out by parents, the family structure might have an interplay in the allocation of family resources as well. In this section, I utilize natal family characteristics, including socio-economic status, and family structures, to investigate from which sub-groups is the demographic effect of marriage payments driven. I use a full set of controls as specified in equation (1) as well as an income measure proxied by logarithm of per capita GDP to rule out the income effect in all specifications.

#### 4.3.1 Socio-economic Status - Marriage Payments as Status Good

It is well documented in the assortative matching literature that both males and females have an incentive of marrying “up” the socio-economic ladder (Abramitzky, Delavande and Vasconcelos, 2011). In the Chinese case, female scarcity is of disproportional disadvantage for males with or born in relatively low levels of socio-economic status. It is also noted in Huang and Zhou (2015) that male surplus leads to a higher unmarried rate for those with low socio-economic status. If we consider one of the functions of brideprices to be a status good to increase male attractiveness in the marriage market, we should expect that the demographic effect on brideprices is more pronounced among males with lower socio-economic status at the time of marriage.

Educational attainments and wealth are the usual measures for the individual socio-economic status. Unfortunately, it is difficult to trace down the wealth of males at the time of their marriage using the cross-sectional data collected in 2013. However, educational attainment usually remains unchanged after the marriage formation. Thus, I use the highest educational attainment of the parents and that of the children to study how the effect changes among those from families characterized by or with different levels of educational attainments. Parents (or children) of relatively low education are defined as those with lower than median educational attainments among parents

with children (or children) within the same ten-year age cohort. Compulsory schooling laws came into effect in China in the 1980s (Fang et al., 2012), and there is a huge expansion of educational institutions since the late 1990s. Thus, the availability of educational resource is uncomparable among those born in different decades from 1960 to 1990. If low educational attainment is defined as having no or primary schooling, then most of those born between 1960 to 1980 would fall into that category. Thus, the heterogeneity here would simply be due to differences of birth cohorts, instead of the relative educational attainment among all the potential competitors.

Table 8: Sex Imbalance and the Incidence of Marriage Payments - The Role of Socio-economic Status

	Parent Education				Child Education			
	Brideprice		Dowry		Brideprice		Dowry	
	Low (1)	High (2)	Low (3)	High (4)	Low (5)	High (6)	Low (7)	High (8)
Residential Sex Ratio	0.352*** (0.119)	-0.044 (0.171)	0.055 (0.096)	-0.150 (0.153)	0.338*** (0.118)	0.174 (0.195)	0.030 (0.084)	-0.055 (0.193)
ln GDP p.c.	-0.031* (0.016)	-0.031 (0.022)	-0.027 (0.018)	-0.054** (0.026)	-0.021 (0.016)	-0.060* (0.036)	-0.046** (0.019)	-0.044 (0.040)
Observations	3,128	1,652	2,981	1,615	3,001	976	3,336	688
$R^2$	0.818	0.804	0.824	0.822	0.829	0.822	0.826	0.836
Child Controls	✓	✓	✓	✓	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓	✓	✓	✓	✓

*Notes:* The table reports the OLS estimation results of Equation (1) using a linear probability model without survey weight adjustment. The dependent variable is a dummy, taking the value one if parent paid marriage payment when child was married, otherwise zero. Parents with high education means that parents' education level is above the median education level attained among all parents with children born in the same ten-year cohort (1960-1969, 1970-1979, and 1980-1990). Similarly, child with high education means that his or her education level is above the median education level attained among all the children born in the same ten-year cohort. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents. Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

The estimation results are set out in Table 8. Columns (1)-(4) present the heterogeneous effects according to parents' educational attainments and columns (5)-(8) according to children's. From columns (1)-(2) and (5)-(6) it could be seen clearly that male surplus only causes higher incidence of brideprices among males with relatively low levels of education or born to parents with low education, but not those with a high educational background. The coefficient estimates from columns (3)-(4) and (7)-(8) indicate that

dowry payment seems not to be affected by demographic shifts regardless of the socio-economic background.

### 4.3.2 Family Structure

The structure of the natal family could have a vital influence on the allocation of family resources among children. For example, big families might be financially more constraint, and hence those parents are less likely to adjust the marriage payments according to marriage market dynamics. Moreover, in families with many sons, parents might not respond to sex imbalance either. On the one hand, they might be financially less flexible, since they would need to prepare brideprices for many sons. On the other hand, sons with many brothers are more homogeneous among siblings, and thus their parents might be less likely to allocate more resources to one specific son in light of a marriage market shock.

I first examine whether parents with different family sizes would respond to sex ratios faced by children differently. In columns (1)-(2) and (5)-(6) in Table 9, I classify natal families into big and small sizes according to the total number of children. Families with a higher than median headcount are classified as big size, and others are classified as small size. The empirical results show that a rise in male surplus increases the incidence of brideprices only among sons from natal families of small size. This suggests that parents with many children would hardly adjust resources allocated to sons when they face a marriage squeeze.

I then check the potential heterogeneity by whether daughters exhibit a majority among the natal family than sons. The results in columns (3)-(4) show that such a positive demographic effect on the incidence of brideprices only exists in families with more daughters than sons.

Similarly, the coefficients in Table A.5 in the appendix indicate that parents characterized by low education, a big family size, and having a majority of daughters would increase the value of brideprices when there is a rise in male surplus faced by sons. No significant effect on the value of dowries is observed across all specifications.

Table 9: Sex Imbalance and the Incidence of Marriage Payments - Family Structure

	Brideprice				Dowry			
	Family Size		Majority Daughters		Family Size		Majority Daughters	
	Small (1)	Big (2)	Yes (3)	No (4)	Small (5)	Big (6)	Yes (7)	No (8)
Residential Sex Ratio	0.259** (0.126)	0.235 (0.148)	0.542*** (0.160)	0.138 (0.112)	0.017 (0.136)	0.030 (0.089)	-0.001 (0.079)	0.392 (0.533)
ln GDP p.c.	-0.027* (0.016)	-0.022 (0.024)	-0.025 (0.025)	-0.025 (0.015)	-0.059*** (0.016)	-0.003 (0.021)	-0.040*** (0.015)	0.080 (0.064)
Observations	3,507	1,539	1,468	3,581	2,974	1,824	4,585	204
$R^2$	0.816	0.790	0.834	0.798	0.816	0.822	0.816	0.859
Child Controls	✓	✓	✓	✓	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓	✓	✓	✓	✓

*Notes:* The table reports the OLS estimation results of Equation (1) using a linear probability model without survey weight adjustment. The dependent variable is a dummy, taking the value one if parent paid marriage payment when child was married, otherwise zero. Sample is split into big or small family according to the number of children in the natal family until 2013. Sample is also split according to whether more than half of the children are female in the natal family. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents. Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

## 5 Motivations of Marriage Payments in China

Why do we observe an increase in dowries along with the rise of brideprices? In this section, I attempt to study the different functions of marriage payments in the Chinese society. Specifically, I analyze the intergenerational and intra-household role of both kinds of marriage payments.

### 5.1 The Intergenerational Role

Firstly, I investigate the intergenerational role of marriage payments using the following model and the CHARLS 2013 survey data.



$$Y_{iht} = \alpha + \beta \text{Payment}_i + \theta \text{Payment}_i \times \text{Son}_i + \lambda \mathbf{X}_i + \mu_h + \zeta_t + \epsilon_{iht} \quad (2)$$

The dependent variable on the left hand side is the outcome of interest, including intergenerational transfer, help and contact between child  $i$  and parent  $h$ . On the right hand side, the main explanatory variable,  $\text{Payment}_i$  indicates whether the parents of child  $i$  have paid marriage payments or not, or the value of the payment.  $\text{Son}_i$  is a dummy, taking the value one if the child is a son, otherwise zero. The interaction term,  $\text{Payment}_i \times \text{Son}_i$ , is included to identify the differential relative effect of paying brideprices relative to dowries. Thus, the coefficient estimates of interest,  $\beta$  and  $\theta$ , measure the association between dowry and the intergenerational outcome, and the additional association of brideprice on top of dowry respectively. Similar to equation (1),  $\mathbf{X}_i$  contains a set of variables indicating the child characteristics.  $\mu_z$  is the natal family fixed effects,  $\zeta_t$  is the birth year fixed effects. The robust standard error,  $\epsilon_{iht}$ , is clustered within cities.

Marriage payment is likely to be an implicit intergenerational contract if support to elder parents is only observed from those children whose parents have paid brideprices or dowries. The support could either take the form of monetary or goods transfers, or in the form of physical care-giving and contact.

To begin with, I examine whether children with marriage payments would give more resources to parents when they are old. I specify several measures of intergenerational transfer as outcome variables, including transfer amounts from child to parents, from parents to child, and the net amount from child to parents. To reduce recall bias, CHARLS records the transfer amount both in the previous year and regularly during the interview. Both measurements are considered in the analysis. I take the natural logarithm of the monetary values plus one as the outcome variable in all specifications except the net transfer amounts, and use the monetary value adjusted for inflation in the last two specifications where net transfer amount is specified as the outcome variable.

The estimation results are set out in Table 10. Surprisingly, I do not find any evidence that marriage payments are paid out as an exchange for old-age monetary help. On the contrary, those children who have received marriage payments from parents would give parents less (columns (1)-(2)) and receive more from them (columns (3)-(4)), compared

Table 10: Marriage Payments and Inter-generational Monetary Transfers

Dependent Variable:	In Monetary Amounts + 1				Monetary Amounts	
	Received From Children		Given To Children		Net From Children	
	Last Year (1)	Regularly (2)	Last Year (3)	Regularly (4)	Last Year (5)	Regularly (6)
<i>Panel A: The Incidence of Marriage Payment</i>						
Paid Marriage Payment	-0.235** (0.110)	-0.131* (0.077)	0.127* (0.073)	0.026 (0.036)	340.427 (504.267)	445.960 (446.917)
Paid Marriage Payment × Son	-0.086 (0.124)	-0.029 (0.087)	0.007 (0.096)	-0.009 (0.047)	-1587.389** (755.294)	-1123.136* (605.052)
Son	-0.400*** (0.100)	-0.032 (0.066)	0.309*** (0.070)	0.081** (0.033)	61.098 (402.319)	221.443 (225.222)
Observations	10,934	10,917	11,099	11,082	10,901	10,880
R <sup>2</sup>	0.681	0.776	0.649	0.608	0.401	0.219
<i>Panel B: The Value of Marriage Payment</i>						
Payment Value (1,000 Yuan)	0.007 (0.008)	0.004 (0.006)	0.003 (0.008)	-0.007 (0.006)	456.778 (332.958)	403.891 (336.833)
Value × Son	-0.002 (0.007)	-0.004 (0.005)	0.011 (0.008)	0.005 (0.005)	-648.848** (303.820)	-349.504 (291.896)
Son	-0.552*** (0.118)	-0.010 (0.099)	0.177* (0.105)	0.067 (0.056)	2025.255* (1062.040)	-34.833 (579.061)
Observations	4,774	4,769	4,822	4,815	4,757	4,747
R <sup>2</sup>	0.702	0.813	0.686	0.648	0.423	0.221
Child Controls	✓	✓	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓	✓	✓

Notes: The table reports the OLS estimation results of Equation (2) without survey weight adjustment. The dependent variable in columns (1)-(4) is the logarithm of the monetary amount of inter-generational transfer plus one between parents and children recorded in 2013, and the dependent variable in column (5)-(6) is the monetary amount of net transfer from child to parent. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents, and seven fixed effects regarding child residence status (in the same household but economically dependent, in the same household but economically independent, same or adjacent courtyard, another household but in the same neighbourhood, another neighbourhood in the same district, other districts, abroad). Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

to siblings without marriage payments by parents. The coefficients of the interaction terms in columns (5) and (6) suggest that sons who received brideprices, relative to daughters who received dowries, would give smaller amounts to parents in the net monetary exchange. This suggests that brideprices are more often paid out as a transaction price in the marriage market, but are not associated with old age monetary support.

On the other hand, providing physical care and having frequent contact is another perspective of old-age care except giving parents monetary transfers. I examine whether marriage payments are associated with intergenerational care and contact using a linear probability model as specified by equation (2). The outcomes include the incidence of parents getting essential help from the child, whether the child provides help regarding housework and money management respectively, whether parents expect to receive help from the child in the future, and whether they see the child or have contact with the child at least once a month.

Table 11 presents the role of marriage payment in intergenerational care and contact. The incidence of marriage payment is only positively associated with the incidence of getting essential help from children, but not with other care or contact. In addition, a higher value of dowry is positively associated with the incidence of getting help from children regarding money management and expecting future help. Moreover, the coefficients of the interaction term between marriage payments and the son dummy are mostly negatively significant. The net effect of paying brideprices is insignificant or negative, suggesting that dowries carry intergenerational functions, but brideprices do not.

## 5.2 The Intra-household Role

In this section, I further explore the intra-household role of dowries. Although CHARLS 2013 recorded detailed parent-child pairwise information, one of the biggest drawbacks of the dataset is that there is no information collected regarding characteristics of the child's partner, post-marriage perception or status in the new household. If dowries could improve the daughter's welfare in the new family, parents might be incentivized to allocate more resource to daughters upon marriage. To check the intra-household motivation of marriage payments, I use an alternative household dataset, the 2014 wave of the CFPS, which includes dowry values paid by female's parents upon her marriage and allows for identification of partner's socio-economic characteristics. CFPS is conducted by the Institute of Social Science Survey at Peking University biannually since 2010. It is available for four years, and the 2014 wave covers a total of 29 provinces and municipalities. Dowry payment information is available in the waves conducted in 2014 and 2016, but only the 2014 wave includes the identifier of the partner. This allows me to study the role of dowries in intra-household bargaining power. Unfortunately,

Table 11: Marriage Payments and Inter-generational Help and Contact

Dependent Variable: The Incidence of Inter-generational Help and Contact						
	Essential Help	Household Chores	Manage Money	Future Help	See Monthly	Contact Monthly
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A: The Incidence of Marriage Payment</i>						
Paid Marriage Payment	0.006** (0.003)	-0.001 (0.006)	0.003 (0.003)	-0.020 (0.013)	0.006 (0.017)	0.007 (0.016)
Paid Marriage Payment × Son	-0.009** (0.004)	-0.014 (0.009)	-0.011** (0.005)	0.017 (0.017)	-0.023 (0.023)	-0.031 (0.024)
Son	0.006* (0.003)	0.031*** (0.007)	0.011*** (0.004)	0.089*** (0.014)	0.014 (0.016)	-0.001 (0.021)
Observations	13,589	13,616	13,616	13,616	10,731	6,207
$R^2$	0.602	0.560	0.404	0.823	0.654	0.711
<i>Panel B: The Value of Marriage Payment</i>						
Payment Value (100,000 Yuan)	0.007 (0.010)	0.044 (0.032)	0.018* (0.010)	0.165** (0.083)	-0.042 (0.114)	0.038 (0.082)
Value × Son	-0.006 (0.009)	-0.080** (0.032)	-0.025** (0.013)	-0.137* (0.079)	0.012 (0.108)	-0.018 (0.093)
Son	-0.001 (0.003)	0.023*** (0.007)	0.003 (0.003)	0.117*** (0.016)	-0.017 (0.018)	-0.059*** (0.020)
Observations	6,092	6,094	6,094	6,094	4,672	2,494
$R^2$	0.660	0.630	0.426	0.840	0.683	0.739
Child Controls	✓	✓	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓	✓	✓

*Notes:* The table reports the OLS estimation results of Equation (2) using a linear probability model without survey weight adjustment. The dependent variable is a dummy, indicating whether parents have received help from children regarding essential needs, household chores, or money management, or whether they expect to get help, or whether they have frequent contact with children in 2013. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents, and seven fixed effects regarding child residence status (in the same household but economically dependent, in the same household but economically independent, same or adjacent courtyard, another household but in the same neighbourhood, another neighbourhood in the same district, other districts, abroad).

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

there are two main drawbacks with CFPS. First, although I could construct female-husband pairwise records with detailed socio-economic information on each side, there is no information on the brideprice payments from the husband side. However, dowries in China are usually financed as a return portion of brideprices and it is hard to study the role of sex imbalance on dowries without the information on brideprices. Second, it is difficult to identify the role of parents' socio-economic status on dowry payments,

because the data only tracks down very few parents who still reside with daughters. Thus, I use the 2014 wave of the CFPS to conduct the correlative analysis and investigate the intra-household role of dowry payments on post-marriage female welfare.

Specifically, the following model is specified for the analysis.

$$Outcome_{ijhp} = \alpha + \beta Dowry_i + \lambda \mathbf{X}_i + \delta \mathbf{Y}_j + \theta \mathbf{Z}_h + \mu_p + \epsilon_{ijhp} \quad (3)$$

The dependent variable includes several measures for intra-household female welfare, for example, the time spent for housework and work, as well as her perception of marriage of female  $i$  married to partner  $j$  residing in household  $h$  and province  $p$ . On the right hand side, the main explanatory variable,  $Dowry_i$ , measures the dowry payment information from her parents. These include the incidence or the value of the dowry payment. The main coefficient of interest,  $\beta$ , thus measures the average effect of dowries on intra-household female status. The female welfare might be affected by her socio-economic status and her husband's. Thus, I control for a set of characteristics, including age, education level, and working status of her ( $\mathbf{X}_i$ ) and her husband ( $\mathbf{Y}_j$ ). At the household level, household per capita net income and the status of house ownership are adjusted ( $\mathbf{Z}_h$ ), as these might affect female labor supply and general perceptions. Province fixed effects,  $\mu_p$ , absorb the aggregated-level observable and unobservable characteristics. Thus the estimation of  $\beta$  exploits within-province variation of dowry payments.

The estimation results are set out in Table 12. In panel A, where the incidence of dowries is the main explanatory variable of interest, we only find significant evidence that females with dowries are less likely to be satisfied with their partner regarding contribution to housework. However, in panel B, where the dowry value is examined, we see clearly that a higher dowry value improves female welfare in the new household. We see this specifically as a higher dowry value is negatively associated with female time allocated on household chores, but positively associated with work time. Similarly, females having a higher dowry value are less likely to be satisfied with their partner's contribution to housework, although they spend less time on housework.

In conclusion, I find evidence that higher dowry is associated with higher female

Table 12: Dowry and Female Bargaining Power - Evidence from CFPS 2014

	Time Use			Marriage Satisfaction (=1)		
	Housework Weekdays (1)	Housework Weekend (2)	Work (3)	Overall (4)	Economic Contribution (5)	Housework Contribution (6)
<i>Panel A</i>						
Incidence of Dowry	0.042 (0.045)	0.042 (0.045)	-0.028 (0.097)	-0.014 (0.012)	-0.013 (0.012)	-0.035*** (0.012)
Observations	9,481	9,481	6,170	9,464	9,461	9,464
$R^2$	0.082	0.082	0.085	0.028	0.030	0.038
<i>Panel B</i>						
Log Dowry Value	-0.035** (0.018)	-0.035** (0.018)	0.075** (0.038)	-0.002 (0.005)	0.002 (0.005)	-0.014*** (0.005)
Observations	6,596	6,596	4,519	6,580	6,579	6,582
$R^2$	0.099	0.099	0.087	0.024	0.026	0.036
Female Controls	✓	✓	✓	✓	✓	✓
Partner Controls	✓	✓	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓	✓	✓
Province FE	✓	✓	✓	✓	✓	✓

*Notes:* The table reports the OLS estimation results. The dependent variable is a continuous measure of hours spent on housework from column (1)-(2) and hours spent on work in column (3). The dependent variable from column (4) to (6) is a dummy, taking the value one if the female respondent reports to be very satisfied with marriage overall, regarding partner's economic contributions, or household contribution, otherwise zero. Female controls and partner controls include age, education level, and working status; household control include household per capita net income and the status of house ownership.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

welfare in the new household, which might be one of the incentives for parents to decide to allocate more resource to daughters upon their marriage.

## 6 Conclusion

In this paper, I investigate whether male surplus contributes to the rising marriage payment phenomenon in China. I calculate sex ratios projected from the census data as a proxy for demographic imbalance, and combine this with individual-level data on marriage payment from the 2013 survey of CHARLS. The empirical strategy exploits the within-family variations.

The results show that male surplus induced a rise in the incidence and value of brideprices, but had no effect on dowries. The effect was found dominantly for males with or from families characterized by low socio-economic status, those with many siblings, and where the natal family has more daughters than sons. Further investigations show that dowries carry strong intergenerational functions for future care or help in the old age, but brideprices do not. In addition, higher dowries are associated with higher female welfare, which might incentivize parents to pay dowries to daughters at time of their marriage. Taken together, these findings suggest that brideprices differ from dowries in China. The former functions as status goods in marriage market formation, while the latter carries strong intergenerational and intra-household implications.

This paper provides the very first empirical evidence showing that the male surplus contributed to the rise of brideprices in China. Son preference still persists in the society, and there is need of social programs based in schools and workplaces where harmful gender norms should be eliminated to prevent further sex discrimination and selection. Moreover, this paper reveals the different significance of brideprices and dowries in the Chinese society, which rationalizes their co-existence from an empirical perspective. The interpretations of the two marriage payments need to be considered in further development of theoretical models.

There are also limitations of the dataset used in this study. It is impossible to identify who receives the marriage payments, and there is no information on whether and how much the child's in-laws have paid. There is need of household data including these missing information to analyze the dynamics and determinants of marriage payments more precisely.

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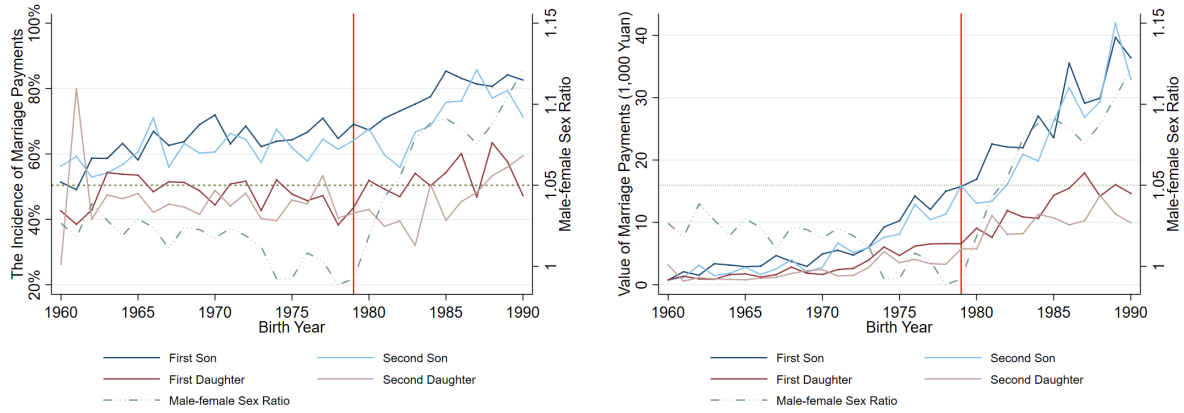


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# Appendix

Figure A.1: Sex Imbalance and Marriage Payments By Birth Order: Cohort Born 1960-1990



(a) Incidence

(b) Value (CPI adjusted)

Data Source: CHARLS (2013) and census data (2000). Author's own calculation.

Figure A.2: An Example of the Construction of Sex Ratios

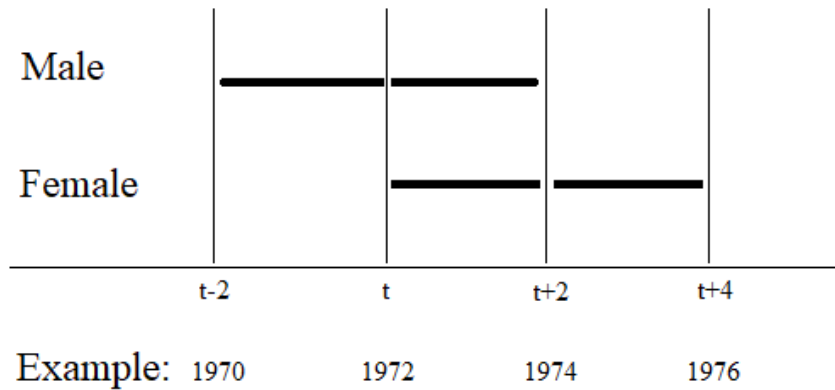
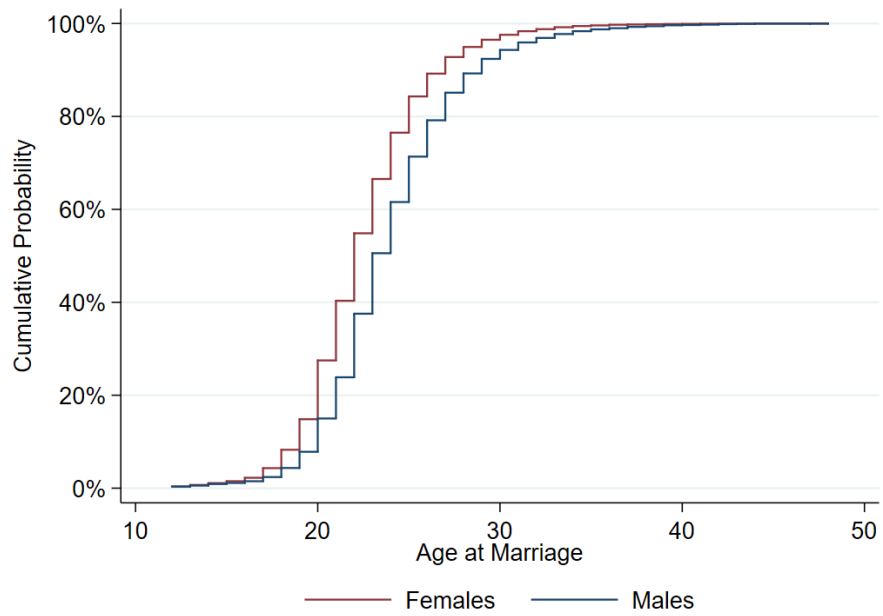


Figure A.3: Cumulative Probability of Age at Marriage among Males and Females



Data Source: CHARLS (2013). Author's own calculation.

Table A.1: Summary Statistics

	mean	sd	min	max
<b>Sex Imbalance</b>				
Residential Sex Ratio	1.05	0.14	0.66	1.73
Residential Sex Ratio (1990)	1.08	0.15	0.68	1.95
Birth Sex Ratio	1.05	0.15	0.69	1.74
<b>Marriage Payments</b>				
Marriage Payments (=1)	0.56	0.50	0.00	1.00
Value of Marriage Payments (CPI adjusted)	9290.82	17022.40	0.00	283055.22
ln Marriage Payment Value + 1	8.02	1.75	0.00	12.55
Share as Per Capita Annual Disposable Income	2.32	4.16	0.00	149.68
<b>Child Characteristics</b>				
Male (=1)	0.51	0.50	0.00	1.00
Birth Year	1975.17	7.27	1960.00	1990.00
Age	37.83	7.27	23.00	53.00
<i>Educational Attainment</i>				
Less than primary school (=1)	0.17	0.36	0.00	1.00
Primary to middle school (=1)	0.63	0.48	0.00	1.00
High school or vocational education (=1)	0.16	0.37	0.00	1.00
Bachelor or above (=1)	0.04	0.19	0.00	1.00
Biological Child (=1)	0.98	0.13	0.00	1.00
Birth Order	2.36	1.32	1.00	10.00
Birth Order Within the Same Sex	1.65	0.88	1.00	9.00
Birth Interval (years)	2.18	2.30	0.00	18.00
Age Different with Parent (years)	26.62	5.40	16.00	68.00
<b>Parent Characteristics</b>				
Age	63.46	8.33	41.00	91.00
<i>Educational Attainment</i>				
Less than primary school (=1)	0.43	0.63	0.00	1.00
Primary school (=1)	0.27	0.44	0.00	1.00
Some high school (=1)	0.23	0.42	0.00	1.00
Vocational education (=1)	0.07	0.26	0.00	1.00
Bachelor or above (=1)	0.00	0.06	0.00	1.00
<i>Household Wealth Quintile</i>				
1 (poorest)	0.23	0.42	0.00	1.00
2	0.24	0.42	0.00	1.00
3	0.21	0.40	0.00	1.00
4	0.17	0.38	0.00	1.00
5 (richest)	0.15	0.36	0.00	1.00
Urban (=1)	0.30	0.46	0.00	1.00
Number of Children	3.76	1.46	2.00	10.00
<b>Income Measures</b>				
ln GDP p.c.	8.53	1.16	5.16	11.44
ln Annual Disposable Income p.c.	8.03	0.97	4.89	10.30
Observations	13,927			

Table A.2: Sex Imbalance and the Value of Marriage Payments

	Absolute Monetary Amounts					
	All	Brideprice	Dowry	All	Brideprice	Dowry
	(1)	(2)	(3)	(4)	(5)	(6)
Residential Sex Ratio	6082.269** (2806.918)	-4438.697 (5562.292)	-343.596 (2102.235)	5336.309** (2645.614)	-7259.203 (5418.002)	-530.454 (2070.570)
ln GDP Per Capita				3846.445*** (613.573)	4741.393*** (731.060)	657.484* (387.205)
Observations	6,194	2,580	1,737	6,194	2,580	1,737
$R^2$	0.744	0.818	0.813	0.749	0.825	0.813
Child Controls	✓	✓	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓	✓	✓

Notes: The table reports the OLS estimation results of Equation (1) without survey weight adjustment. The dependent variable is the absolute monetary value of marriage payment a parent has paid for child's marriage adjusted by province-year varying consumer price index in all specifications. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents. Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

Table A.3: Sex Imbalance and the Incidence of Marriage Payments - Non-migrant Children Sample

	All	Brideprice	Dowry
	(1)	(2)	(3)
Residential Sex Ratio	0.180*** (0.055)	0.237*** (0.079)	0.074 (0.095)
Child Controls	✓	✓	✓
Parent FE	✓	✓	✓
Birth Year FE	✓	✓	✓
Observations	9,318	3,354	3,050
$R^2$	0.710	0.840	0.849

Notes: The table reports the OLS estimation results of Equation (1) using a linear probability model. The dependent variable is a dummy, taking the value one if parent paid marriage payment when child was married, otherwise zero. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents. Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

Table A.4: Sex Imbalance and the Value of Marriage Payments - Robustness Checks

	(1)	(2)	(3)	(4)	(5)
Residential Sex Ratio	1541.279 (2835.210)	2657.947 (2785.666)	1849.213 (2106.115)	-528.743 (3469.859)	-463.736 (3440.404)
Residential Sex Ratio $\times$ Son	2487.780 (3039.401)	5961.585** (2748.268)	6327.571** (2462.003)	9512.624*** (3242.724)	9492.740*** (3255.793)
Son	3155.456 (3156.335)	235.443 (2760.791)	-892.915 (2507.661)	-2724.945 (3226.428)	-2707.666 (3237.869)
ln GDP p.c.	3872.577*** (591.685)	3849.193*** (616.884)	2784.676*** (391.937)	4860.647*** (1386.007)	4833.989*** (1405.365)
Fine in years of income		1401.743 (1821.359)			634.108 (2163.774)
Ultra-sound Tech Available			-177.212 (744.532)		
Observations	4,225	6,194	5,363	4,836	4,836
$R^2$	0.777	0.750	0.770	0.761	0.761
Child Controls	✓	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓	✓
Marriage Year FE				✓	✓

*Notes:* The table reports the OLS estimation results of Equation (1) without survey weight adjustment. The dependent variable is the absolute monetary value of marriage payment a parent has paid for child's marriage adjusted by province-year varying consumer price index in all specifications. Compared to Table 2, column (1) is estimated based on children who have not migrated out of birth villages, columns (2)-(5) are estimated based on the full sample, with additional controls. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents. Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.

Table A.5: Sex Imbalance and the Value of Marriage Payments - Heterogeneity

	Heterogeneity Variable			
	Family Low Edu (1)	Child Low Edu (2)	Small Family (3)	More Daughters Than Sons (4)
Residential Sex Ratio $\times$ Son $\times$ Var	1.817* (0.981)	0.241 (1.004)	4.699*** (0.810)	3.255*** (0.798)
Residential Sex Ratio $\times$ Var	3.826 (2.718)	-2.729 (2.608)	1.074 (1.992)	2.801 (2.895)
Residential Sex Ratio $\times$ Son	2.477 (3.057)	5.902 (3.758)	4.102 (2.634)	4.963* (2.822)
Residential Sex Ratio	-2.323 (3.972)	6.065 (4.686)	0.868 (2.536)	0.219 (3.388)
Son	1.164 (2.670)	0.000 (3.010)	-1.535 (2.908)	-1.267 (2.817)
ln GDP p.c.	3.886*** (0.611)	3.871*** (0.618)	3.850*** (0.613)	3.812*** (0.612)
Observations	6,194	6,194	6,194	6,194
$R^2$	0.750	0.750	0.752	0.751
Child Controls	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓

*Notes:* The table reports the OLS estimation results of Equation (1) without survey weight adjustment. The dependent variable is the absolute monetary value of marriage payment (unit 1,000 yuan) a parent has paid for child's marriage adjusted by province-year varying consumer price index in all specifications. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents. Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.



Table A.6: Sex Imbalance and the Incidence of Marriage Payments - The Sex of First-borns and Last-borns

	Brideprice				Dowry			
	First Birth		Last Birth		First Birth		Last Birth	
	Son (1)	D. (2)	Son (3)	D. (4)	Son (5)	D. (6)	Son (7)	D. (8)
Residential Sex Ratio	0.243** (0.110)	0.387** (0.174)	0.264** (0.101)	0.317* (0.178)	0.152 (0.208)	-0.015 (0.089)	0.205* (0.123)	-0.059 (0.105)
ln GDP p.c.	-0.022 (0.015)	-0.047* (0.026)	-0.031* (0.016)	-0.016 (0.031)	-0.064* (0.037)	-0.033** (0.016)	-0.046 (0.032)	-0.039** (0.017)
Observations	3,732	1,317	3,867	1,182	1,069	3,729	1,596	3,202
$R^2$	0.799	0.835	0.801	0.839	0.850	0.809	0.822	0.819
Child Controls	✓	✓	✓	✓	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓	✓	✓	✓	✓
Birth Year FE	✓	✓	✓	✓	✓	✓	✓	✓

*Notes:* The table reports the OLS estimation results of Equation (1) using a linear probability model without survey weight adjustment. The dependent variable is a dummy, taking the value one if parent paid marriage payment when child was married, otherwise zero. D. stands for daughter. Child controls include sex, age, education level, order of birth, order of birth among the children with the same sex, birth interval between the child and the next older child (zero if the child is the oldest child), age of parent when the child was born, a dummy indicating whether the child is biological child of the parents. Standard errors are clustered at the city level in all specifications.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors in parentheses.