Daughters and Sons' Remittances in Rural China:

Findings from a National Survey

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ABSTRACT

In China, it has historically been the responsibility of sons rather than daughters to provide economic support to older parents. This study used a sample of 12,389 non-coresident children to analyze whether such gender differences persist in contemporary rural China and how they can be explained. A two-part model showed that daughters were somewhat more likely to remit to parents, although sons provided higher amounts. The support of parents by both daughters and sons was found to be strongly related to out-migration and the receipt of grandchild care, but the negative effect of marriage was stronger for daughters. These findings imply a weakening of the traditional gendered division of intergenerational support. The increased importance of daughters as a source of economic security in later life is likely to reduce parents' preference for sons.

Key words: China, gender, intergenerational relations, remittances, China Health and Retirement Longitudinal Study (CHARLS)

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"While his parents are alive, a son should not dare to consider his wealth his own nor hold it for his own use only." (Confucius, *The Book of Rites*, Bk. 17 - 30)

Introduction

The economic support of parents by their children is an ancient tradition and a core aspect of the social contract in rural China. The provision of support to parents is both a means of demonstrating *filial piety* and a way of redistributing income within the family. Traditionally, such support was mainly provided by sons, hence the saying "raising a son is insurance for old age" (Yan, 2003). In Confucian societies such as China, sons are morally obliged to provide for their natural parents, whereas daughters are not. After a daughter marries into her husband's family she directs her allegiance to her parents-in-law (Whyte, 2003).

In recent decades however, these traditional norms and customs have been challenged by the rapid socio-economic, demographic and cultural changes that have taken place in rural China. Women have nearly closed the educational gap and are increasingly likely to seek wage employment, often in urban areas (Chiang, Hannum, & Kao, 2015). Against this background, a number of ethnographic studies have indicated that the traditional division of labor in the provision of parental support is changing, and that parents increasingly receive economic transfers from daughters as well as sons (e.g. Miller, 2004; Shi, 2009; H. Zhang, 2005).

The present study analyses to what extent these developments are reflected in the actual amount of economic support (remittances) parents received from each of their non-coresident adult children. Whereas most literature on intergenerational support in China focuses on the parent's perspective, this study takes the individual child as the unit of analysis. In addition to comparing overall economic support by gender, it assesses how child-level factors such as

marriage, migration status and grandchild care received from parents moderate support by daughters and sons. It employs a two-part model that takes into account both the propensity to remit and the actual amount provided. The data have been derived from the nationally representative 2011 China Health and Retirement Survey (CHARLS), which includes extensive information on both parents and children.

I extend previous work by Xie and Zhu (2009) and Zhu (2016) in looking at rural rather than urban China, and by Cong and Silverstein (2011) in considering daughters as well as sons. The focus on rural China is important because rural elders suffer disproportionately from poverty and are much less likely to receive pensions and other types of formal support than their urban counterparts. The virtual absence of a public safety net implies that more than half of them rely on economic support from children as their primary source of subsistence (Giles, Wang, & Zhao, 2010). Changes in the intergenerational support system are therefore of particular importance for this population segment.

The study contributes to our understanding of intergenerational support in China by demonstrating that 1) daughters provide substantial economic transfers to parents, 2) unmarried sons and daughters provide similar levels of support and 3) both sons' and daughters' support is at least partially a compensation for grandparents taking care of grandchildren. Based on these findings, which run counter to traditional practices, I suggest that the classical interpretation of filial piety (Greenhalgh, 1985) is no longer an adequate framework for understanding intergenerational transfers in rural China and I discuss alternative accounts based on the 'renegotiated' intergenerational contract (Croll, 2006).

The Chinese Family: Past and Present

The literature on intergenerational support in China typically refers to the *traditional Chinese family model* as a heuristic for understanding the particularities of family relations in the Chinese context. Although it has been noted that even in ancient times the traditional model was not always adhered to in practice, its fundamental principles and institutions have guided Chinese family life for more than two millennia and still hold considerable sway in contemporary China (Hu & Scott, 2016; Whyte, 2003). In the following section, I provide a short overview of the traditional Chinese family model and the ways in which it has been challenged by China's socio-economic transformation in the past decades. I then proceed to develop a number of research questions and hypotheses.

Chinese family values have been strongly influenced by the teachings of Confucius, which can be characterized as patriarchal and highly hierarchical. Primary amongst them is the norm of filial piety, which governs intergenerational relations. The doctrine of filial piety is strongly gendered, and primarily refers to the relationship between parents and sons (Hu & Scott, 2016). Chinese parents and their sons are often described as 'corporate groups' in which tasks and resources are distributed according to need and capacity (Lee, Parish, & Willis, 1994; Sun, 2002). In the typical case, one married son would share a household with parents and provide them with food and physical care (a task normally carried out by his wife), while the non-coresident sons would be expected to share a substantial part of their income (Whyte, 2003). The custom of patrilineality, another core aspect of the traditional Chinese family, implies that daughters were excluded from this arrangement: they transitioned to their husband's family after marriage. Except in special instances, a married daughter would typically not maintain an intensive support relationship with her natural parents (hence the Chinese saying that refers to a married daughter as "spilled water") (Shi, 2009; Yang, 1996).

In a highly influential article, Greenhalgh (1985) described a gendered division of labor in which supportive relations between parents and sons "were higher-flow contracts that approximated generalized exchange, while contracts between parents and daughters were lower-flow contracts that more fit closely the balanced mode" (p. 269). Because married daughters are no longer part of the family line, their support is seen as optional: "a bonus, which is not an earned right" (Xu, 2001, p. 311). The importance of sons as a provider of security in later life has contributed to a strong preference for male children and a lack of investment in daughters' education (Murphy, Tao, & Lu, 2011). A particularly undesirable side-effect of son preference is the prevalence of sex-selective abortions, which is reflected in China's unbalanced sex ratio: in some provinces, more than 130 boys were born for every 100 girls born in the year 2000 (Lai, 2005).

In recent decades, however, traditional Chinese family norms and customs have been challenged by a number of socio-economic, demographic and cultural changes. Rising inequality between rural and urban regions has led to a massive outflow of workers from the countryside to the cities. As a result, the number of older people living with an adult child declined from about 70 percent in 1991 to just over 40 percent in 2006 (Cai, Giles, O'Keefe, & Wang, 2012, p. 48), and almost half of all older rural Chinese now live alone or with a spouse only: a situation referred to as "empty nest" in the Chinese public discourse (Zhao, Park, et al., 2013). Patriarchal family norms and practices have been challenged by women's economic empowerment, which has increased the economic value of daughters and affected the intra-household division of labour (Shu, Zhu, & Zhang, 2012). Women also tend marry later and are increasingly likely to leave the parental household before marriage, for example to pursue higher education or wage labor (Hannum, 2005; Ji & Yeung, 2014). A further challenge to the traditional family model has been provided by the fertility reduction policy,

introduced in 1979. Although colloquially known as the 'one-child policy', it allowed most rural parents to have up to two children. Reduced fertility rates result in younger parent cohorts having fewer or even no sons to rely on, challenging the gendered division of labor in intergenerational support (Deutsch, 2006).

Against this background, ethnographic evidence suggests that major changes have occurred in the nature of the intergenerational support system as well as in the distribution of such support among children. Based on a meta-analysis of a large number of case studies from across East-Asia, Croll (2006) suggested that families have 'renegotiated' the intergenerational contract and adapted it to the new social reality. The renegotiated intergenerational contract emphasizes egalitarian values of caring and mutual reciprocity rather than hierarchical norms of filial 'duty' and 'obligation'. As part of this new intergenerational contract, parents have intensified their contributions towards younger generations, for example by investing in children's education and housing and by providing grandchild care. As a result, intergenerational resource flows are now "more balanced and symmetric, with both generations, simultaneously or in shortened cycles, giving and receiving" (2006, p. 484). The increased emphasis on emotion and reciprocity in parent-child relationships has particularly strengthened support relations with daughters (see also Shi, 2009; W. Zhang, 2009). According to Croll *"there is an emerging consensus, especially in Asia's cities, that daughters constitute a largely untapped potential for support that is increasingly appreciated as fertility declines, there are fewer sons and parents require more physical care with greater longevity"* (2006, p. 481).

Research Questions and Hypotheses

The literature reviewed in the previous section suggests that traditional norms and gender roles in rural China have been subject to change. The objective of this paper is to assess how this has affected the gendered division of intergenerational support. The first research question is therefore:

Question 1: Does the likelihood and level of economic support to parents differ between daughters and sons?

The traditional Chinese family model suggests that parents invest in sons as a means of securing their support in old age. This long-term reciprocal relationship is maintained by social expectations and the gendered norm of filial piety. Daughters are excluded from this arrangement, and would thus be expected to provide much lower support (Greenhalgh, 1985). Older studies provide evidence for this view. In a classic study of intergenerational support in Taiwan, Lee et al. conclude that *"daughters' support still remains very much supplementary. Although 'ceremonial' financial support remains almost as pervasive as among sons, the average amounts are much smaller, rising to significant levels only among a small minority"* (1994, p. 1035). On the other hand, recent case studies have shown that parents increasingly rely on (economic) support from daughters as well as sons (Li, Feldman, & Jin, 2004; Miller, 2004; Whyte, 2004; Xu, 2001; H. Zhang, 2007). These findings were typically explained by a combination of reduced family sizes and women's economic empowerment, which is in turn related to an increased demand for female (migrant) labor in China's growing economy. For example, Zhang suggested that "the filial role of daughters is greatly facilitated by new cash-earning opportunities and new paths of economic mobility for rural youths" (H. Zhang, 2007, p. 694).

Thus far these observations have not been tested in nationally representative studies, which mostly looked at the total amount of support received by parents rather than its distribution across sons and daughters (e.g. Cai, Giles, & Meng, 2006; Lee & Xiao, 1998). An exception is Xie and Zhu's study (2009), which looked at gender differences in economic support in three large Chinese cities. Surprisingly, they found that daughters tend to provide more support than sons. They explained that in urban China economic support from children has become largely symbolic, because most parents have incomes or pensions that enable an adequate standard of living. Daughters were more likely than sons to provide such symbolic support as a way of maintaining and strengthening kinship ties.

There are a number of reasons to believe that the situation in rural China, which is the focus of this study, is not comparable to that in the large metropolises. First, living standards in rural areas are much lower and most parents do not receive adequate pensions, so that support from children is a necessary source of subsistence rather than an optional benefaction. Moreover, in spite of increased female labor participation and educational attainment in recent decades, gender inequality in employment and wages continues to limit rural daughters' opportunities to economically support their natural parents (Hannum, 2005). Finally, traditional norms and values are considered to exert a stronger influence in rural China (Miller, 2004). Lei Lei (2013) found substantial rural-urban differences in the frequency of various types of intergenerational transfers, with rural areas conforming more closely to the traditional model. I therefore expect rural sons' remittances to exceed those of daughters, firstly because of gender differences in factors that affect children's *ability* to provide support (particularly education and income) (H1a), and secondly because of gendered *expectations* regarding the provision of intergenerational support (H1b).

In order to more fully understand gender dynamics in the provision of economic support, we should also take into account the gender differences in the determinants of remittances. Previous studies have suggested that the drivers of intergenerational support in China may be different for daughters and sons (Greenhalgh, 1985; Lee et al., 1994; Song, Li, & Feldman, 2012; Yang, 1996). The second research question is therefore:

Question 2: How do the determinants of economic support vary between daughters and sons?

Following the aforementioned studies, I assume that we can assess the lingering impact of gendered norms and expectations by looking at the impact of marital status, migration and grandchild care on the likelihood and level of economic support from daughters and sons.

In the traditional perspective, marriage is expected to be negatively related to daughters' remittances, since married daughters are supposed to support their husband's family. Young, unmarried women on the other hand are expected to contribute to the parental household, particularly when they engage in migrant labor (Greenhalgh, 1985; H. Zhang, 2007). Marriage reduces their (financial) independence, and therewith their ability to support their natural parents. For sons on the other hand there is no expectation that support will decline with marriage. If there is indeed still a gendered division of intergenerational support, we would expect a negative effect of marriage on support from daughters.

Migration is another important driver of remittances in China, which currently counts over 236 million internal migrants (National Bureau of Statistics of China, 2013). Most of these are rural citizens moving to urban areas in search of better-paid jobs. In line with the corporate group model of family behavior, they are expected to share part of their income gains with the

(extended) family (Cong & Silverstein, 2011; Sun, 2002). I expect rural-to-urban migration to result in higher economic support from sons, but not necessarily from daughters. Sons' migration is often the result of a family strategy to maximize and diversify income sources (Fan & Wang, 2002). Parents may invest substantial amounts in sons' initial relocation, which they expect to recoup in the form of remittances (Cong & Silverstein, 2011). Moreover, it has been observed that migrant sons provide increased financial transfers in order to free themselves from their traditional obligation of sharing a household with parents (Lee et al., 1994; Xie & Zhu, 2009). Migration by daughters, on the other hand, is often the result of patrilocal residence after marriage, which does not necessarily lead to increased transfers (Guo, Chi, & Silverstein, 2009). It must be remembered, however, that labor migration by rural women has increased strongly since the mid-1990s. It is likely that this has reduced gender differences in economic support to parents (Chiang et al., 2015).

Finally, economic support to parents may be provided in compensation for services that parents provide to their adult children. Because of the limited availability of formal childcare facilities, it is common for grandparents to care for grandchildren in rural China. In some cases young children grow up with their grandparent while the middle generation works elsewhere: the so-called 'skipped household' (Silverstein, Cong, & Li, 2006). Greenhalgh (1985) suggested that daughters are more likely to 'reward' their parents for such services, a finding that has been confirmed by other studies (Song et al., 2012; Yang, 1996). Although parents provide care for their sons' children as well, there is no expectation of immediate reciprocation: the service is "rendered invisible by its taken-for-grantedness" (Ashwin, Tartakovskaya, Ilyina, & Lytkina, 2013, p. 415).

In summary, the traditional Chinese family model suggests that support from daughters will be negatively affected by marriage (H2a) and positively affected by the receipt of grandchild care (H2b), while migration should have a particularly positive impact on support from sons (H2c).

Methods

Data and Sample

All analyses were based on data derived from the first wave of CHARLS, which was conducted in 2011-2012 and became publicly available in 2013. CHARLS is part of a (largely) harmonized family of surveys modeled on the American Health and Retirement Study (HRS). This set of surveys also includes, amongst others, the Survey of Health, Ageing, and Retirement in Europe (SHARE) and the Japanese Study on Aging and Retirement (JSTAR). Data were collected using computer-assisted face-to-face interviews, with extensive quality checks and follow-ups. The rural response rate was 94.15 percent (Zhao, Strauss, et al., 2013). The Gateway to Global Aging Data created a harmonized version of CHARLS, which is comparable to the RAND HRS and other harmonized datasets. Wherever possible, I used the harmonized variables in this analysis.

CHARLS provides a unique opportunity to study intergenerational support between older parents and their adult children. It provides a representative sample of individuals aged 45 and above, who were asked for information on topics such as family situation, health status, employment and income. Demographic information on the respondents' children was provided by the 'family respondent', who could either be an interviewee or another knowledgeable household member. Moreover, CHARLS contains detailed information on

economic transfers between respondents and each of their children. Because this study focuses on child-level determinants of economic support, I restructured the dataset so as to make the children the unit of analysis.

The analytical sample only includes adult, non-coresident children whose parents lived in a rural area at the time of the survey (for more details, see Table 1). Most sampled children were born before the fertility reduction policy (their average age was 38 years), and more than half of them have three or more siblings. Parents were aged between 45 and 100, with a mean of 66 and a standard deviation of 9.8[2].

I removed 64 children that reported unusually high remittances, which may have been related to the purchase of assets or housing rather than income support. A sensitivity analysis (presented in Appendix B Table 2) showed that running the full model including the extreme values would not affect the direction or significance of the results. The total analytical sample consisted of 12,389 adult children, who were linked to 4,687 parental households.

A number of variables contained missing or unknown values, the highest being child income category (21.3 percent) and child age (4.2 percent). I therefore applied multiple imputation using chained equations. Findings based on complete case analysis (available upon request) were highly similar to the ones presented here, suggesting that imputation did not have a substantial impact on the results.

[2] If both parents were alive, this is based on the age of the oldest parent.

Measures and Descriptives

The dependent variable was the economic support (remittance) that a child provided to the parental household in the year prior to the survey. CHARLS provides detailed information on the amount of money and in-kind support (in Chinese Yuan (CNY)) parents received from each non-coresident child, either on special occasions such as festivals or at regular intervals. These figures were combined to compute the total value of economic support each child provided in the previous year. In addition to the remittance amount, a dichotomous variable "propensity to remit" was computed, which equaled 1 if any support was provided and 0 otherwise. Descriptive statistics (see Table 1) show that the average amount of support per child was CNY 492, which equals current USD 52 or 20 percent of the official rural poverty line at the time of the survey.

The key variables of interest were marriage status, migration status and receipt of grandchild care. Marriage status was represented by a dummy variable comparing married children to those that were never married, widowed or divorced. The large majority (90.3 percent) were married (see Table 1). Migrant children were children that lived in an urban area at the time of the survey. Table 1 shows that sons were more likely than daughters to become rural-to urban migrants (40.3% versus 30.8%). Receipt of grandchild care was represented by a dummy variable indicating whether the parent(s) provided care for one or more of the child's minor children in the past year. Sons were much more likely to receive this type of assistance from their parents than daughters.

Table 1. Descriptive statistics for the analytical sample, by gender

	Daughters Mean / %	Sons Mean / %	Total Mean / %	N	*p*-value
Propensity to remit					
No remittance in prev. year	54.0	54.6	54.3	6,716	.940
Any remittance in prev. year	46.0	45.4	45.7	5,673	
Remittance amount (CNY)	412	588	492	12,389	.000
Child marital status					
Not married	6.9	12.9	9.7	1,186	.000
Married	93.1	87.1	90.3	11,203	
Child migration status					
Non-migrant	69.2	56.6	63.4	7,744	.000
Migrant	30.8	43.4	36.6	4,645	
Receives grandchild care					
No grandchild care	96.3	85	91.1	11,242	.000
Receives grandchild care	3.7	15	8.9	1,147	
Child highest education					
Up to primary school	60.3	44.3	53.0	6,567	
Middle school or higher	35.3	48.6	41.4	5,138	.000
College or higher	4.4	7.1	5.6	684	
Child and spouse income level					
Very low	29.1	27.7	28.5	3,404	
Low	34.4	35.6	34.9	4,444	.153
Medium	29.7	29.2	29.5	3,708	
High	6.8	7.5	7.1	833	
Child's number of siblings					
No siblings	1.4	2.8	2.0	243	
One sibling	16.7	18.7	17.7	2,185	.000
Two siblings	23.9	24.6	24.2	3,043	
Three or more siblings	58.0	53.9	56.1	6,918	
Older brother					
Has no older brother	56.5	55.4	56	6,981	.089
Has older brother	43.5	44.6	44	5,408	
Parent(s) living arrangement					
Independent	52.0	71.2	60.8	7,514	.000
Coreside with other child	48.0	28.8	39.2	4,875	
Parent(s) marital status					
Couple	71.5	70.6	71.1	8,915	
Single father	8.7	8.9	8.8	1,061	.576
Single mother	19.8	20.5	20.1	2,413	

Parent(s) care need					
No parent has care need	70.7	69.8	70.3	8,633	.273
Any parent has care need	29.3	30.2	29.7	3,756	
Parent(s) pension					
Do not receive pension	85.7	85.4	85.6	10,618	.423
Receive pension	14.3	14.6	14.4	1,771	
Parent(s) currently working					
No parent is working	27.0	29.7	28.2	3,375	.009
Any parent is working	73.0	70.3	71.8	9,014	
Age of oldest parent					
45-60	29.6	24.6	27.3	3,408	.000
60-69	35.5	35.4	35.5	4,421	
70-79	25.5	29.8	27.5	3,356	
80+	9.4	10.3	9.8	1,204	
N (individuals)	54.1	45.9	100.0	12,389	

Note: Based on the imputed sample (m=10). Weighted percentages and means, unweighted N. *p* values refer to a simple logistic regression of the respective variable on gender.

Previous studies have shown that intergenerational support is related to parental need (Guo et al., 2009) as well as socio-economic status and resources of children (Sun, 2002). Each model controlled for the child's education and income level. Income level refers to the annual combined income of the child and his or her spouse (if married), divided into four categories named *very low* (below CNY 10,000 – reference category) *low* (CNY 10,000-20,000), *medium* (CNY 20,000-50,000) and *high* (above CNY 50,000). I also control for the number of siblings, which is expected to exert a negative impact on the amount of support provided by each child (Zimmer & Kwong, 2003). Finally, I include a dummy variable indicating whether the child has an older brother. In line with the traditional perspective we would expect this to reduce the amount of support provided, particularly for daughters.

In addition to the child-level variables, I controlled for a number of characteristics of the parent(s); notably marital status (*couple*, *single mother*, or *single father*), age bracket, whether

the parent(s) coresided with one or more siblings, whether any parent had a care need (e.g. needed permanent help with one or more (Instrumental) Activities of Daily Living), and whether any parent was working or received a pension. The majority of parents (85.6 percent) did not receive any pension, which underlines their reliance on private transfers. Indicators of parental income or wealth were avoided due to concerns about endogeneity: remittances make up a large part of parental income and are likely to reduce incentives to work.

Analytical Approach

The modeling of remittance data is generally complicated by a highly positive skew and a large cluster of observations with a value of zero. Table 1 shows that more than half of the children included in the sample did not provide their parents with any economic support. Simply removing the children with zero remittances from the model is not an option, since we would like to draw inference on the entire population of sons and daughters.

Two-part models (TPMs) have been used extensively in situations where the dependent variable is highly skewed and semi-continuous (Belotti, Deb, Manning, & Norton, 2015; Buntin & Zaslavsky, 2004). Other common ways of dealing with semi-continuous data involve a log+1 transformation of the dependent variable or the Heckman selection model. The log+1 transformation does not resolve the problem with zero-clustering, and is therefore not appropriate. Selection models assume that some units of analysis are excluded from the outcome process, but would otherwise have a positive outcome: they are concerned with potential (e.g. latent) outcomes (Wooldridge, 2002). In this case the outcome of interest is actual rather than potential remittances. Dow and Norton (2003) point out that in modeling actual outcomes (e.g. 'real' zeros), there is no selection problem to address, and therefore the TPM is preferred to the Heckman model. In its typical application, the first part of the TPM

estimates the probability that $y > 0$ (using either a logit or probit specification), while the second part models the distribution of $y \mid y > 0$. The predictions from these two models can then be combined using the rule

$$\hat{y}_i \mid x_i = (\hat{p}_i \mid x_i) * (\hat{y}_i \mid y_i > 0, x_i)$$

where is $\hat{y}_i \mid x_i$ the combined predicted outcome and $\hat{p}_i | x_i$ is the predicted probability that $y_i > 0$ (e.g. of providing any remittance). One of the attractive features of the TPM is its flexibility in modeling each of the two parts (Cameron & Trivedi, 2009). For example, the second part could be estimated using Ordinary Least Squares with a log-transformed dependent variable or using a Generalized Linear Model (GLM) with the appropriate distribution and link function. As log-transformed models are susceptible to bias in the presence of heteroscedasticity (Manning, 1998), the more robust GLM is often preferable in modeling non-normal distributions (Buntin & Zaslavsky, 2004; Wu, 2005). GLMs have the additional advantage that marginal effects and predicted probabilities are calculated in levels rather than in logs, thus eliminating the need for retransformation.

In this study, the first part of the TPM estimates the probability that $y > 0$ (the child provided any support in the past year), while the second part models the distribution of $y \mid y > 0$ (the monetary amount for those that provided a transfer). Inspection of model fit and residuals showed that a Generalized Linear Model (GLM) with a gamma distribution and a log link was the preferred choice for modeling the second part. Compared to log-transformed models, GLMs are generally more robust and have the additional advantage that marginal effects and predicted probabilities are calculated in levels rather than in logs, thus eliminating the need for retransformation (Buntin & Zaslavsky, 2004). In addition to the

results from the two parts, which can be estimated using conventional regression models, average marginal effects (AMEs) were computed representing the average change in $E\ (y \mid x)$ resulting from a unit change in the respective covariates. The AMEs take into account both parts of the model, and can thus be interpreted as the average effect over the full sample. Marginal effects for factor variables are typically referred to as incremental effects, since they reflect the average change relative to the baseline category.

The final model was estimated in three steps. First I looked only at gender differences to assess the overall magnitude of gender differences is remittances. Second, I included the full set of predictors and assess the extent to which they mediate the effect of gender. Finally, I interacted gender with each of the predictors of interest to assess gender differences in the drivers of economic support.

A potential challenge to the validity of the findings is the exclusion of coresident children, who constitute 25.6% of the total population of children aged 18 and above. Because of the well-known difficulties in measuring economic transfers between members of the same household, CHARLS—like many other surveys—measured economic support from non-coresident children only. Compared to their non-coresident peers, coresident children are more likely to be young, male and unmarried, and their exclusion from the sample may introduce selection bias. I therefore applied inverse probability weighting (IPW) to check whether non-random selection into (non-)coresidence affected the results. This procedure weights each observation by the inverse of their probability of being non-coresident, based on a logistic regression of coresidence on the model predictors and a set of auxiliary variables (see Hernan & Robins, Forthcoming, p. 104). The IPW weighted results (presented in Appendix A) were relatively similar to the non-weighted results, suggesting that selection

bias based on observable characteristics was limited. Because selection based on unobserved characteristics may still play a role, however, it is prudent to interpret the findings as applying to non-coresident children only.

Finally, in order to check the robustness of the findings to different model specifications, I conducted additional analyses looking at financial support only, by child age cohort (below 30, 30-44 and 45+) and including additional control variables (sibling gender, parents' living standard, parents' assets, regional fixed effects etc.). The results (available upon request) show the findings relating to the research questions and hypotheses were substantively similar in each of these cases.

Results

As recommended by Wu (2005), I present results from the two-part model as exponentiated coefficients. The exponentiated coefficients for Part I (a logistic regression of providing any support in the past year) can be interpreted as odds ratios, and those for Part II (a GLM for the level of support) as the multiplicative change in the response variable resulting from a one-unit change in the respective predictor. In interpreting the results from the second part, it should be remembered that they apply to children with positive remittances only. In order to interpret the effect on the entire sample, we need to look at the AMEs.

The first research question related to the overall difference in remittances by gender. Table 2 shows the unadjusted gender differences in remittances, while Table 3 shows the results from the full model. By comparing the effect of gender in Table 2 and Table 3, we can assess the extent to which gender differences in remittances are mediated by variables that affect the ability to remit, such as education and income (H1a). The effect of gender that remains after

adjusting for these covariates (Table 2) can be interpreted as the influence of gendered norms and expectations (H1b) (although may also reflects gender differences in unobserved characteristics, such as control over household expenditures).

Table 2. Two-part model predicting remittances to parents: gender only

	Part I: Logistic		Part II: GLM		Av. Marginal Effect	
	OR	*SE*	*Exp. B*	*SE*	*CNY*	*SE*
Son	1.00	0.04	1.48***	0.07	193.67***	26.35
Observations	12,389		5,672		12,389	

Note: OR: Odds Ratio. Exp.: Exponentiated. SE: Standard Error. CNY: Chinese Yuan.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3 shows that overall sons were somewhat less likely to provide support (Part I), but when they did provide support, their contributions exceeded those of daughters (Part II). Combining these two effects, we see that sons gave CNY 194 more on average, on an annual basis. Table 3 shows that gender differences were less pronounced when controlling for various child- and parent-level variables. Sons still provided higher remittances, but the AME is reduced from CNY 194 to 107. This suggests that almost half of the gender difference in economic support is mediated by gender differences in the other covariates.

Furthermore, it can be seen that migration (children living in an urban area) had a strongly positive effect on both the propensity to remit and the amount provided. Unmarried children provided higher amounts than married children, as indicated by the negative AME of CNY 231. Finally, there was a strongly positive relation between the receipt of grandchild care and economic support to parents.

Table 3. Two-part model predicting remittances to parents: full model

	Part I: Logistic		Part II: GLM		Av. Marginal Effect	
	OR	*SE*	*Exp. B*	*SE*	*CNY*	*SE*
Child characteristics:						
Son	0.86**	0.04	1.33***	0.06	107.48***	26.11
Married	1.18*	0.09	0.62***	0.04	-230.88***	58.89
Migrant	1.46***	0.08	1.52***	0.07	311.08***	26.86
Receives grandchild care	1.42***	0.11	1.54***	0.10	382.75***	56.53
Education (ref.: up to primary)						
Middle school or higher	0.94	0.05	1.19***	0.05	71.33**	25.42
College or higher	0.86	0.09	1.45***	0.12	158.07**	58.22
Income level (ref.: very low)						
Low	1.57***	0.10	1.29***	0.08	182.06***	25.90
Medium	2.03***	0.15	1.60***	0.09	368.49***	31.05
High	2.96***	0.35	2.40***	0.20	860.17***	88.73
Siblings (ref.: three or more)						
No siblings	0.56***	0.09	1.57**	0.22	72.97	94.71
One sibling	0.70***	0.06	1.33***	0.09	53.37	41.70
Two siblings	0.85*	0.06	1.14*	0.06	24.50	34.34
Has older brother	1.05	0.05	0.95	0.03	-13.10	21.82
Parents characteristics:						
Coreside with other child	0.81**	0.05	0.99	0.05	-61.35*	30.73
Marital status (ref: couple)						
Single father	1.24	0.15	0.94	0.08	22.98	56.43
Single mother	1.40***	0.13	0.90	0.06	33.08	44.98
Any parent has care need	1.04	0.08	1.02	0.06	20.42	35.86
Receive pension	0.81*	0.08	1.15*	0.08	13.98	45.37
Any parent is working	1.06	0.10	0.92	0.06	-28.57	42.84
Age of oldest parent (ref: 45-60)						
60-69	1.35***	0.11	0.74***	0.05	-71.50	42.21
70-79	1.84***	0.19	0.62***	0.05	-92.40	49.20
80+	2.08***	0.31	0.65***	0.08	-36.05	72.55
Observations	12,389		5,672		12,389	

Note: OR: Odds Ratio. Exp.: Exponentiated. SE: Standard Error. CNY: Chinese Yuan.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The control variables largely had the expected direction, with child income being a particularly strong predictor. The parent-level indicators appeared to play a less important role overall, although it can be seen that parents who coresided with a sibling received slightly less support from non-coresident children. Older parent cohorts were more likely to receive remittances, but received lower amounts on average. Moreover, single parents were more likely to receive support than couples (Part I), particularly if they were single mothers.

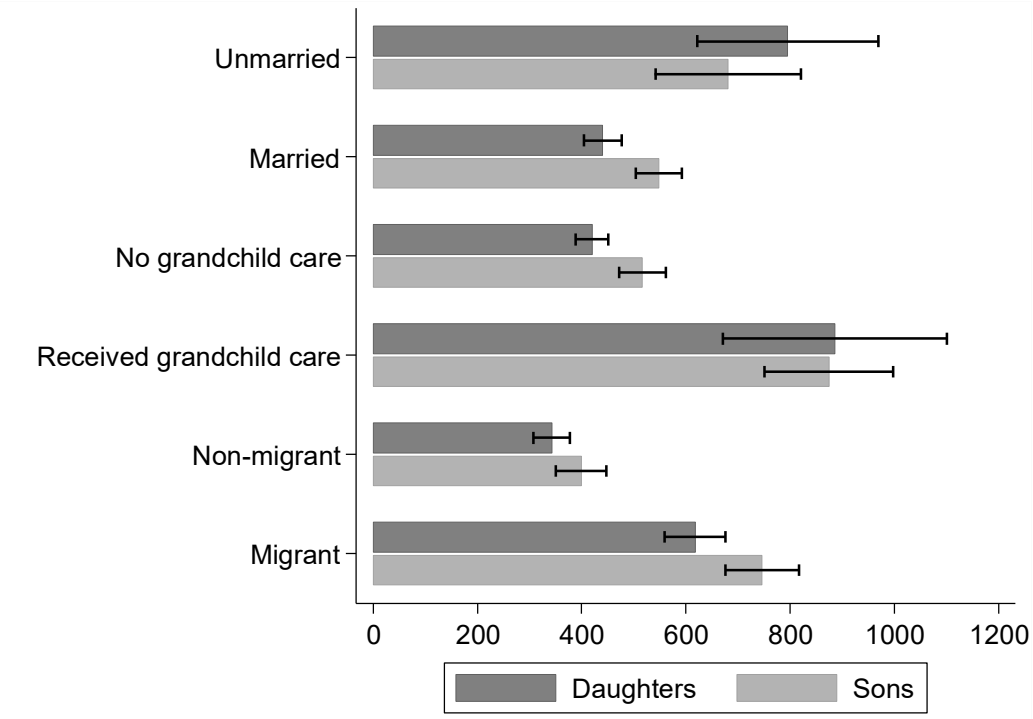
Table 4. Two-part model predicting remittances to parents: gender differences (abbreviated table)

	Part I: Logistic		Part II: GLM	
	OR	*SE*	*Exp. B*	*SE*
Son	0.79	0.12	1.01	0.14
Married	1.14	0.13	0.52***	0.05
Son * Married	1.06	0.15	1.40*	0.18
Migrant	1.38***	0.09	1.53***	0.08
Son * Migrant	1.12	0.10	0.97	0.08
Receives grandchild care	1.52**	0.22	1.74***	0.19
Son * Grandchild care	0.91	0.15	0.83	0.11
Observations	12,389		5,672	

Note: Control variables (same as in Table 2) and standard errors not displayed. For the full results see Supplementary Table 1. OR: Odds Ratio. Exp.: Exponentiated. AME: Combined average marginal effect. CNY: Chinese Yuan. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In order to analyze how the determinants of support vary by gender (Question 2) I included interaction effects between the respective determinants and gender (Table 4). To facilitate the substantive interpretation of results, the combined average predicted remittances resulting from each interaction effect are plotted in Figure 1.

Figure 1. TPM average predicted remittances, by gender (CNY)



Note: Combined average predicted remittances (E (y | x)) from the interaction effects presented in Table 4. Spiked lines represent 95 percent confidence intervals. CNY: Chinese Yuan.

Filial norms were assumed to apply to sons and unmarried daughters, but less so to married daughters, whose labor and support has traditionally gone towards their husband's family. The findings support this hypothesis. While unmarried daughters somewhat higher amounts of support than unmarried sons, married daughters provide significantly less than married sons, confirming Hypothesis 2a (see Figure 1). The difference was driven by lower amounts rather than by a lower likelihood of support (see Table 4). Support from married daughters was far from negligible however, and amounted to about CNY 440 a year on average. The effect of migrating to an urban area was similar for daughters and sons: in both cases it led to higher economic support. With respect to grandchild care, the results are also rather similar for sons and daughters: both gave almost double the amount of support if parents cared for their children in the past year. This suggests that both sons and daughters engaged in short-term

time-for-money exchange with their parents. Hypotheses 2b and 2c, which predicted gender differences in the effect of migration and grandchild care, are thus not supported.

Discussion

This paper looked at gender differences in child-to-parent remittances amongst a nationwide sample of non-coresident Chinese children and their rural parents. The traditional Chinese family model, as described by Greenhalgh (1985) and others, suggests that the provision of financial and material support to parents varies systematically by gender. In line with the age-old tradition of filial piety, sons should provide for their parents materially, not as a matter of reciprocity but as a moral obligation. Support from (married) daughters, on the other hand, is expected to be lower and more likely to be part of a short-term exchange relationship. However, given the profound social changes that have occurred in the past decades, it is doubtful whether this is still the case.

The findings show that that daughters were somewhat more likely to remit to parents, although sons provided higher amounts. Combining these two effects, we see that sons provided more support overall, although a large part of this difference was mediated by gender differences in education, migration and other covariates. The remaining difference is likely to reflect traditional norms and expectations, although part of it could also be due to gender differences in unobservable factors, such as command over household resources. These findings stand in contrast to the situation in urban China, where daughters have been found to provide more support than sons (Xie & Zhu, 2009; Zhu, 2016).

Gender differences in remittances were moderated by marital status, with married women reducing their support more than married men. This suggests that patriarchal traditions that direct women's support to their husbands' family are still prevalent in rural China. The support provided by married women is substantial however, a fact that is not always appreciated in the relevant literature. Contrary to Lei Lei (2013), I found that unmarried children provided higher amounts of support overall, regardless of gender. The fact that married children provided less may reflect the high cost of raising a family in modern China, where the education of children often takes preference over supporting parents (Yan, 2016).

Contrary to the findings of Guo, Chi and Silverstein (2009), I found no gender differences in the effect of migration on intergenerational support. Both daughters and sons provided more support to parents when they had moved to urban areas, even after controlling for their education and income level. This suggests that the long-term exchanges that have been documented between parents and their migrant sons (Cong & Silverstein, 2011) also extend to migrant daughters. Increased support from rural-to-urban migrants may reflect a repayment for parents' practical and financial assistance in securing urban employment, or a compensation for failing to provide other types of support, such as helping out on the family farm.

Previous research also suggested that daughters' support might be more responsive to the receipt of grandchild care. Contrary to Yang (1996) and Song, Li and Feldman (2012), I found no such gender difference in short-term reciprocity: grandparents caring for grandchildren had a strong effect on support provided by both sons and daughters. Particularly in the case of skipped households, this suggests that support provided to parents is at least partially meant to provide for the upbringing of children. It also implies that

intergenerational support by sons is no longer seen as a matter of obligation, but contains a strong element of short-term reciprocity. This is in line with Croll's theory of the renegotiated intergenerational contract, and supports the findings of Cong & Silverstein (2011, 2012), Lei Lei (2013) and others.

Overall, findings suggest that the traditional model, centered on the strongly gendered norm of filial piety, is no longer an accurate description of the intergenerational support system in rural China. Although notable gender differences persist, overall economic support from daughters is remarkably similar to that of sons. The reasons for this shift relate to a wider trend of increasing financial independence and empowerment of rural women (Chiang et al., 2015; Shi, 2009). Reduced family sizes also play an important role, since they imply that younger parent cohorts increasingly need to rely on daughters as well as sons. We thus need alternative theoretical frameworks to analyze the current practice of intergenerational support in China. Croll's (2006) description of a renegotiated intergenerational contract based on mutual reciprocity provides a good starting point.

The results should be interpreted in the light of a number of limitations. First, even though the inverse probability weighting adjusts the results for non-random selection into non-coresidence based on observable characteristics, it cannot account for selection on unobservables. For example, it could be the case sons who choose to live with their parents have a higher sense of filial obligation. Most studies suggest, however, that coresidence in contemporary China is largely driven by practical considerations (Ma & Wen, 2016). Second, self-reported remittances may be subject to measurement error. Confirmation bias may have led some parents to over-report support provided by sons or under-report support by daughters, in line with their cultural expectations. Finally, because my analyses were based on

cross-sectional data, they could not fully capture the dynamic nature of intergenerational exchange. As further waves of CHARLS become available, it will be possible to study how intergenerational solidarity develops over the life course.

These limitations notwithstanding, the study advances our understanding of gendered family norms and practices in a context of rapid social change. The results suggest that both sons and daughters are a major source of support for aged parents, contrary to some alarming reports about the breakdown of the intergenerational support system in China. The substantial amount of economic support provided by (married) daughters reflects the loosening of patriarchal norms, changes in gender attitudes and women's increased social and economic autonomy (Chiang et al., 2015; Shu et al., 2012). Under these circumstances, investing in sons rather than daughters may no longer be a rational preference for Chinese parents, particularly since daughters are also more likely to provide emotional support and care (Shi, 2009). In the long run, this is likely to increase gender equality in education and reduce the sex-imbalance at birth. At the same time, it must be kept in mind that most of the parents covered in this study had children before the onset of the 'one-child policy'. It will be important to monitor the economic security of younger parent cohorts—many of whom have only a single child to rely on for support—as they approach retirement.

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Appendix A: Inverse Probability Weighting (IPW)

I used inverse probability weighting (IPW) to adjust for selection bias resulting from the non-measurement of economic support by coresident children. The weighting procedure implies that sampled children with a high probability of non-coresidence receive a low weight in the estimation, and vice versa. The weights are calculated using the formula

$$IPW_i^{c0} = \frac{1}{Pr(C_i = 0 \mid X_i)}$$

where C stands for coresidence. $Pr(C_i = 0 \mid X_i)$, the probability of non-coresidence, is derived from a logistic regression of coresidence on X_i (see Table 1 below). X_i consists of a set of variables that are known to be important predictors of coresiding with parents in China, such as gender, age, income level, number of brothers and sisters, and various indicators of parental need (see e.g. Ma & Wen, 2016; Q. F. Zhang, 2004).

Appendix Table 1.

Inverse Probability Weight Estimates: Logistic Regression (coresidence)

	B	*SE*
Child characteristics:		
Son	0.45***	0.09
Married	-1.96***	0.12
Son * Married	1.80***	0.12
Receives grandchild care	1.98***	0.15
Son * Grandchild care	-1.08***	0.16
Education (ref.: currently in school)		
Up to primary	-0.71***	0.19
Middle school or higher	-0.66***	0.18
College or higher	-1.09***	0.20
Income level (ref.: very low)		
Low	-0.58***	0.06
Medium	-0.71***	0.07
High	-0.99***	0.13
Age	-0.19***	0.02
Age * Age	0.00***	0.00
Number of brothers	-0.48***	0.03
Number of sisters	-0.11***	0.02
Child has children	-1.00***	0.09
Parents characteristics:	-0.21**	0.08
Any parent is working	0.01	0.01
Age of oldest parent		
Marital status (ref: couple)		
Single father	0.23*	0.10
Single mother	0.53***	0.08
Any parent has care need	0.11	0.06
Receive pension	0.01	0.08
Living standard (ref: (rel.) high)		
Average	-0.36	0.19
(Relatively) poor	-0.49*	0.19
Observations	16,741	

Note: Dependent variable is whether the child lives in the parental household (1=yes). OR: Odds Ratio. Exp.: Exponentiated. SE: Standard Error.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 2.

Two-part model predicting remittances to parents: gender only (IP weighted)

	Part I: Logistic		Part II: GLM		Av. Marginal Effect	
	OR	*SE*	*Exp. B*	*SE*	*CNY*	*SE*
Son	0.90*	0.04	1.48***	0.09	177.38***	36.32
Observations	12,389		5,672		12,389	

Note: OR: Odds Ratio. Exp.: Exponentiated. SE: Standard Error. CNY: Chinese Yuan. Weighted for the inverse probability of being a non-coresident child. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Appendix Table 3.

Two-part model predicting remittances to parents: full model (IP weighted)

	Part I: Logistic		Part II: GLM		Av. Marginal Effect	
	OR	*SE*	*Exp. B*	*SE*	*CNY*	*SE*
Child characteristics:						
Son	0.85***	0.04	1.31***	0.06	95.71***	27.05
Married	1.17	0.10	0.57***	0.05	-304.74***	74.97
Migrant	1.48***	0.09	1.54***	0.07	321.83***	29.95
Receives grandchild care	1.50***	0.12	1.51***	0.10	391.40***	58.78
Education (ref.: up to primary)						
Middle school or higher	0.92	0.05	1.16**	0.06	56.14	29.23
College or higher	0.73**	0.09	1.35***	0.12	72.04	58.96
Income level (ref.: very low)						
Low	1.72***	0.12	1.25**	0.09	193.86***	27.58
Medium	2.17***	0.17	1.55***	0.10	375.14***	32.47
High	3.26***	0.40	2.32***	0.19	881.51***	89.86
Siblings (ref.: three or more)						
No siblings	0.57**	0.12	1.71***	0.27	126.63	123.83
One sibling	0.72***	0.07	1.34***	0.10	61.35	47.19
Two siblings	0.87	0.07	1.16*	0.07	40.54	36.39
Has older brother	1.08	0.05	0.92*	0.03	-23.37	23.25
Parents characteristics:						
Coreside with other child	0.83**	0.06	0.97	0.05	-64.29*	31.86
Marital status (ref: couple)						
Single father	1.31*	0.16	0.93	0.09	32.52	58.39
Single mother	1.57***	0.16	0.93	0.08	81.09	54.25
Any parent has care need	1.09	0.08	1.05	0.06	47.41	37.92
Receive pension	0.83*	0.08	1.12	0.08	7.57	44.50
Any parent is working	1.09	0.10	0.94	0.06	-9.57	43.04
Age of oldest parent (ref: 45-60)						
60-69	1.37***	0.12	0.73***	0.05	-77.69	44.94
70-79	1.89***	0.21	0.61***	0.05	-92.96	52.05
80+	2.10***	0.32	0.64***	0.08	-41.31	74.75
Observations	12,389		5,672		12,389	

Note: OR: Odds Ratio. Exp.: Exponentiated. SE: Standard Error. CNY: Chinese Yuan. Weighted for the inverse probability of being a non-coresident child. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 4.

Two-part model predicting remittances to parents: gender differences (abbreviated table)

(IP weighted)

	Part I: Logistic		Part II: GLM	
	OR	*SE*	*Exp. B*	*SE*
Son	0.87	0.14	1.03	0.16
Married	1.19	0.15	0.46***	0.05
Son * Married	0.98	0.16	1.41*	0.22
Migrant	1.48***	0.10	1.57***	0.08
Son * Migrant	1.00	0.09	0.94	0.08
Receives grandchild care	1.65***	0.25	1.70***	0.19
Son * Grandchild care	0.88	0.15	0.83	0.11
Observations	12,389		5,672	

Note: Control variables (same as in Appendix Table 2) and standard errors not displayed. OR: Odds Ratio. Exp.: Exponentiated. AME: Combined average marginal effect. CNY: Chinese Yuan. Weighted for the inverse probability of being a non-coresident child.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix B: Supplementary Tables

Appendix Table 5.

Two-part model results including extreme remittance values

	Part I: Logistic		Part II: GLM		Av. Marginal Effect	
	OR	*SE*	*Exp. B*	*SE*	*CNY*	*SE*
Child characteristics:						
Son	0.87**	0.04	1.33***	0.06	109.11***	26.40
Married	1.17*	0.09	0.63***	0.05	-231.17***	58.77
Migrant	1.46***	0.08	1.52***	0.07	312.79***	27.22
Receives grandchild care	1.42***	0.11	1.53***	0.09	383.42***	56.48
Education (ref.: up to primary)						
Middle school or higher	0.94	0.05	1.19***	0.05	71.30**	25.49
College or higher	0.86	0.10	1.45***	0.12	158.88**	58.91
Income level (ref.: very low)						
Low	1.57***	0.10	1.29***	0.08	182.65***	26.25
Medium	2.03***	0.15	1.60***	0.09	368.94***	30.92
High	2.96***	0.34	2.40***	0.20	867.02***	89.98
Siblings (ref.: three or more)						
No siblings	0.57***	0.09	1.57**	0.21	77.18	94.14
One sibling	0.70***	0.06	1.32***	0.09	52.17	41.91
Two siblings	0.85*	0.06	1.13*	0.06	23.40	34.56
Has older brother	1.05	0.05	0.95	0.03	-13.67	21.89
Parents characteristics:						
Coreside with sibling	0.82**	0.05	0.99	0.05	-60.99*	30.91
Marital status (ref: couple)						
Single father	1.24	0.15	0.94	0.08	23.40	56.56
Single mother	1.40***	0.13	0.91	0.06	33.41	45.05
Any parent has care need	1.04	0.08	1.02	0.06	20.73	36.01
Receive pension	0.81*	0.08	1.15	0.08	13.85	45.38
Any parent is working	1.06	0.10	0.92	0.06	-28.87	43.00
Age of oldest parent (ref: 45-60)						
60-69	1.35***	0.11	0.74***	0.05	-72.56	42.49
70-79	1.83***	0.19	0.62***	0.05	-94.20	49.27
80+	2.08***	0.31	0.65***	0.07	-38.75	72.58
Observations	12,453		5,748		12,453	

Note: This table replicates the analysis presented in Table 2 including the 64 observations that were otherwise excluded because of extreme values on the dependent variable (remittances).

Appendix Table 6.

Two-part model results with gender interactions (full)

	Part I: Logistic		Part II: GLM	
	OR	*SE*	*Exp. B*	*SE*
Child characteristics:				
Son	0.79	0.12	1.01	0.14
Married	1.14	0.13	0.52***	0.05
Son * Married	1.06	0.15	1.40*	0.18
Migrant	1.38***	0.09	1.53***	0.08
Son * Migrant	1.12	0.10	0.97	0.08
Receives grandchild care	1.52**	0.22	1.74***	0.19
Son * Grandchild care	0.91	0.15	0.83	0.11
Education (ref.: up to primary)				
Middle school or higher	0.95	0.05	1.17***	0.05
College or higher	0.86	0.09	1.43***	0.12
Income level (ref.: very low)				
Low	1.56***	0.10	1.29***	0.08
Medium	2.03***	0.15	1.60***	0.09
High	2.95***	0.35	2.40***	0.20
Siblings (ref.: three or more)				
No siblings	0.56***	0.09	1.56**	0.22
One sibling	0.70***	0.06	1.34***	0.09
Two siblings	0.85*	0.06	1.14*	0.06
Has older brother	1.05	0.05	0.95	0.03
Parents characteristics:				
Coreside with sibling	0.81**	0.05	0.99	0.05
Marital status (ref: couple)				
Single father	1.24+	0.15	0.94	0.08
Single mother	1.40***	0.13	0.90	0.06
Any parent has care need	1.04	0.08	1.01	0.06
Receive pension	0.81*	0.08	1.15*	0.08
Any parent is working	1.06	0.10	0.92	0.06
Age of oldest parent (ref: 45-60)				
60-69	1.35***	0.11	0.74***	0.05
70-79	1.83***	0.19	0.62***	0.05
80+	2.08***	0.31	0.65***	0.07
Observations	12,389		5,672	

Note: OR: Odds Ratio. Exp.: Exponentiated. SE: Standard Error. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.