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by

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Is a Daughter Really Like Water Spilled on the Ground?

Adult Children's Gender, Filial Support, and Parental Mortality in Rural China

Eiji Mangyo*

Abstract

Long-standing patrilocal traditions hold that sons in rural China reside with their parents after marrying, whereas daughters join their husbands' families. Knowing they will rely on their adult children for support when they are old, rural Chinese parents might prefer to bear sons rather than daughters. Using longitudinal data [2002, 2005, and 2008/2009] of the elderly from 22 rural Chinese provinces, this study examines whether evidence endorses such a preference. Evidence shows no correlation between the gender of adult children and mortality of their elderly parents. Although evidence reveals that sons are somewhat more likely than daughters to support their elderly birth parents financially, physically, and emotionally, it also reveals that many daughters do so, countering the perception that married daughters become part of husbands' families.

JEL classification: J14, J16

Keywords: parental mortality, child gender, filial support

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1. Introduction

Traditionally and today in rural China, where pensions are rare and non-familial assistance is limited, the elderly rely on their children for daily financial, physical, and emotional support. In that regard, the Chinese have a saying that captures the patrilocal tradition of daughters' abandoning their birth families and joining their husbands' families upon marriage: "A daughter is like water spilled on the ground." Given this combination of tradition and elderly necessity, Chinese parents might have an incentive to bear and raise boys rather than girls.

This paper examines if there is any factual basis for such a preference by examining how the gender of adult children relates to the welfare of the elderly in rural China. It first examines whether the existence of and the number of sons are related to parental longevity and finds no systematic difference in mortality between elderly parents of sons and daughters. Next, it examines whether the gender of adult offspring correlates with systematic differences in filial support of elderly parents. Evidence indicates that sons may be more likely than daughters to support their birth parents financially, physically, and emotionally. However, the evidence also shows that many married daughters do not forsake their birth parents and provide support after marriage. Evidence further shows that differences between sons' and daughters' support are in

some cases statistically and economically indistinguishable.

This paper is organized as follows. The section Background describes the male centeredness of traditional Chinese culture as the basis for the hypothesis studied in this paper: elderly parents with sons enjoy greater longevity and welfare than those with daughters. This section also reviews previous literature in this field. The section Data and Research Methodology discusses the indicated topics. The section Results presents research results. The final section concludes.

2. Background

China traditionally has been a patrilocal, patrilineal, and patriarchal culture. Following a field survey in a rural Central China, Junhong (2001) noted that the birth of a son was celebrated more than that of a daughter and elevated the mother's position among family and neighbors. The family line is preserved through the male linage, and social and cultural customs prompt preferential household treatment of sons over daughters. Sons are raised as successors, future breadwinners, and future heads of families. After marrying, a son (typically the eldest) is expected to reside with his wife in his parent's household. In contrast, daughters are reared as temporary residents of their parents' household because they are expected to join their husbands' families after marriage. A woman is expected to obey her father in youth, her husband after marriage, and her son in old age (Arnold & Zhaoxiang, 1986).

Alongside socio-cultural and economic incentives for couples to prefer sons, introduction of China's one-child policy in 1979 triggered a rise in the ratio of male to female births (Ebenstein, 2010). According to the World Bank (2006), the ratio of male births per 100 female births was stable around 106 until 1979 and rose to 107 in 1982, to 115 in 1990, and to nearly 120 in 2000. Micro-level studies provide further evidence of preference for sons. Using data from fertility surveys in China, Johansson and Nygren (1991) showed that the ratio of male births rose with parity during the 1980s. Using Chinese census data, Ebenstein (2010) found that intervals between births were longer for boys than for girls. Using the 1990 Chinese census, Yi et al. (1993) documented that the ratio of male births was higher among couples who had only daughters or who had more daughters than sons. Findings from Johansson and Nygren (1991), Ebenstein (2010), and Yi et al. (1993) endorse the conjecture that Chinese parents have been seeking gender-selective abortions. This conjecture is further supported by Junhong's (2001) survey of second pregnancies in rural central China: he found that none of 157 male fetuses was aborted, whereas 46% of 123 female fetuses was aborted after an ultrasound B-scan.

The cited studies indicate that rural couples have sought to control the gender of their offspring as well as their fertility since the introduction of China's one-child

policy in 1979 and especially following wider rural access to ultrasound diagnosis in the 1990s. Even before ultrasound was widely available, Chinese couples exercised imperfect control over the gender composition of their families by reproducing, until they delivered a boy (Junhong, 2001). In short, evidence has accumulated that rural Chinese couples have sought to bear sons rather than daughters. As evidence suggests they discriminate against daughters in allocation of household resources (Brown & Park, 2002; Jianghong Li, 2004; Song & Appleton, 2006).

These findings present an issue for statistical research. Unless properly controlled for, couples' economic condition produces a downward bias in the potential protective effect of sons on mortality of elderly parents. More generally, parents' preference for sons—which is unobservable by researchers—may engender statistical bias by correlating both with the gender of adult offspring and the welfare of elderly parents. However, Lee (2008) and Ebenstein (2010) found that the gender ratio among first borns approximated the natural male–female ratio (1.05) in Korea and China. Lee (2008) used the gender of first-born children as the instrument for sibling size to examine its effect on investment in child education in Korea. Li and Wu (2011) used the gender of the first-born child as the instrument for the existence of sons in examining the effect of having a son on women's bargaining power inside households and women's

nutrition and health in rural China.

Literature concerning the relation between parents' mortality and the gender of their children is sparse. Drawing data from rural Bangladesh, Rahman (1999) showed that after controlling the number of kin residing within the same and adjacent households, living with two or more sons was negatively correlated with the mortality of elderly fathers and mothers, whereas the number of co-resident daughters had no correlation. Analyzing the same data, Rahman (2000) further stated that the beneficial effect of co-resident sons on parental mortality was stronger for elderly mothers than for fathers and did not differ with household wealth. Hurt, Ronsmans, and Quigley (2006) found that mortality for both mothers and fathers negatively correlated with the number of surviving sons using data from a poor rural area in Matlab, Bangladesh. Using data from Taiwan and China, Pham-Kanter and Goldman (2012) found no correlations between parental mortality and several measures of gender of adult children.[1]

Literature concerning the relation between child gender and filial support is also limited, especially for mainland China. Lee, Parish, and Willis (1994) and Lin et al. (2003) found that in Taiwan, most adult children, both sons and daughters, financially

[1] For China, Pham-Kanter and Goldman (2012) used the same data source as this study (the Chinese Longitudinal Healthy Longevity Survey). However, this study uses the follow-up window to the 2008 survey, whereas theirs used the follow-up window to the 2005 survey.

supported their parents, with sons being the main contributors. Using data from a Chinese township, Yang (1996) stated that adult children's financial support to husbands' parents was made in appreciation of parents' previously raising and caring for them, whereas financial support to wives' parents was in appreciation for their current contribution to housework and child rearing. To all appearances, previous studies of relations between children's gender and filial support used adult children as the unit of analysis. No previous studies analyzed the relation between the availability or amount of filial support and child gender using elderly parents as the unit of analysis.

3. Data and Research Methodology

3.1 Data

The Chinese Longitudinal Healthy Longevity Survey (CLHLS) was started in 1998 to study the determinants of healthy longevity of human beings. It initially sampled 8,959 persons aged 80 or older throughout 22 Chinese provinces.[2] In 2000, CLHLS resurveyed its original sample and recorded health, family, and living conditions of deceased and surviving individuals. CLHLS interviewed 4,824 new elders, bringing the combined sample size for the 2000 survey to 11,161 (surviving) respondents aged 80 or older. Besides following up on elderly respondents from the

[2] The 22 provinces are Anhui, Beijing, Chongqing, Fujian, Guangdong, Guangxi, Hebei, Henan, Helongjiang, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shangdong, Shanghai, Shanxi, Sichuan, Tianjian, and Zhejiang.

2000 survey, CLHLS in 2002 interviewed 4,894 new individuals aged 65–79 and 4,920 new individuals aged 80 or older. The sample for the 2002 survey was 16,057 (surviving) respondents aged 65 or older. CLHLS conducted follow-up surveys in 2005 and 2008–2009. Both recorded the health, family, and living conditions of deceased and surviving respondents.

The sample of elderly individuals surveyed in 2002 and subsequently surveyed is used for analysis in this study. Only those in rural locales are examined because China's male-centric culture may have faded in urban areas. After excluding the urban elderly, the sample size is 8,670. In addition, 521 respondents reported having no children throughout their lives, reducing the sample to 8,149. Because observations are missing for some variables, sample size differs in different analyses.[3]

Table 1 shows descriptive statistics of this study's main variables. The sample size for most variables is 8,136. Table 1 lists sample sizes only for variables with sample sizes differing from 8,136. The sample contains more females (58%) than males (41.8%). The oldest elder was born in 1885 and the youngest in 1939. Years of schooling ranged from 0 to 25, but the distribution is skewed leftward, as illustrated by the sample mean (1.368). Residency is scattered across the 22 provinces, with the

[3] The sample size for analyzing elderly mortality is in most cases 7,269, and the sample size for analyzing child support to parents ranges from 7,709 to 8,136.

largest percentage (15.2%) living in Guangxi and the smallest (0.7%) living in Tianjian.

The children of elderly respondents were born between 1907 and 1983. The one-child policy initiated in 1979 likely did not affect birth rates, as the youngest elder in the sample was 40 in 1979 and probably past the procreative phase of life. The number of reported children (including deceased children) averaged 4.6, and the number of surviving children averaged 3.6 in 2002. The ratio of males among first births is 0.58, far higher than the natural ratio at birth. This finding may illustrate male bias in Chinese culture. In the 2002 round of CLHLS, elderly respondents could report up to 11 children, but respondents may have been less likely to report daughters than sons.

Less than 7% of the sampled elders received pensions. Approximately 66% died before the 2008 survey. In 2002, 62% did not reside with children, and on an average, they had received 1,034 RMB from their children during the previous year (2001). Approximately 5%, 16%, and 7% of the sampled elders had no family member to care for them, share their feelings or opinions, or ask for help when they had difficulties, respectively.[4] Among 2,259 sampled elders who acknowledged difficulties with activities of daily living (ADL), 8% had no family to help with basic activities such as bathing, dressing, toileting, transferring or moving, continence, and feeding.

[4] "Family members" are the sampled elders' spouse, son, son's wife, daughter, daughter's husband, grandchildren, and grandchildren's spouses.

3.2 Research methodology

This section discusses methods used to analyze relations between the gender of adult children and welfare of their elderly parents. It first describes the analysis of the relation between adult children's gender and elderly parents' mortality. Second, it analyzes the relation between gender and support to elderly parents.

I used the Cox proportional hazard model to examine whether adult children's gender correlates with parental mortality. The date of the 2002 interview is the entry date, and the date of death is the exit date for the hazard model of elders who died before the 2008 survey. Right censoring occurred at the interview date of the 2008 survey for sampled elders who survived through that day.[5]

The parametric part of the Cox proportional hazard model is

$$g(c, x, n, x, z) = \exp(\beta_0 + \beta_1 c + \beta_2 n + \beta_3 x + \beta_4 z + \varepsilon), \qquad (1)$$

where c is one among several indicators of adult children's gender indicated below and n is the total number of children.[6] In addition, x is a vector of control variables, including the elder's age in 2002 divided by 10, its square, and elder's years of schooling. Finally, z is a vector of 21 province dummies with Beijing as the reference

[5] Because the date of death displays a greater frequency of missing observations than the month of death, longevity is measured in months (monthly data) in the hazard model.

[6] I used either the total of reported children or the total of surviving children (until the 2002 survey) for different regressions.

category.[7] Indicators of adult children's gender (c) are one of the following: number of reported sons (living and deceased), number of surviving sons (until the 2002 survey), at least one reported son, at least one surviving son, and a boy as the first-born child. The number of children (n) is the number of reported children or the number of surviving children. I separately estimated the hazard model for fathers and mothers to accommodate differential baseline hazards and the differential effects of independent variables between parents' genders.

This study cannot establish causality between children's gender and parents' mortality because children's gender (c) and number of children (n) would be endogenous in determining parental mortality. As noted, before ultrasound became widely available and before introduction of the one-child policy, rural Chinese couples generally assured that they sired at least one son, by having babies until a son was born (Junhong, 2001). The most recent childbirth in the CLHLS data occurred in 1983, when ultrasound was generally unavailable in rural China for the sampled elders. This implies that the probability of having another baby was higher if the ratio of boys to total number of living children for the couple was lower.

Appendix Table 1 confirms endogeneity of number of children (n) and

[7] Footnote 2 names the 22 provinces.

children's gender (c) by regressing a dummy for the existence of the next child on the ratio of boys to the existing number of children with control variables (parental age in 2002 divided by 10, its square, years of schooling, and 21 provincial dummies with Beijing as the reference province). The linear probability model shows that the probability of having the next child is higher when the ratio of boys to the number of existing children is lower for the second through the seventh births, and that the correlations are statistically significant for the second to sixth births. This finding is consistent with previous studies (Johansson & Nygren, 1991; Ebenstein, 2010; Yi et al., 1993).

To examine the path from children's gender to parental mortality, the relation between children's gender and forms of filial support to parents was analyzed. Following is the linear probability model used:

$$ns = \beta_0 + \beta_1 c + \beta_2 n + \beta_3 x' + \beta_4 z + \varepsilon, \quad (2)$$

where ns is one of the indicators of filial support to birth parents, and the independent variables are the same as in Equation (1). For the outcome variable, I use five dummy variables indicating filial physical and emotional support to parents: no co-residence with children, no family member to care for sick parents, no family member to share feelings and opinions, no family member to ask for help when the parent has difficulties,

and no family member to help with ADL.[8] There is one measure of financial support: the amount of money received from children during 2001. For this outcome variable, I also used OLS.

I constructed the six outcome measures using the 2002 survey data. The independent variables are the same as in Equation (1) except x', which includes a dummy for elders currently residing with spouses in addition to the original control variables x (elder's age in 2002 divided by 10, its square, and elder's years of schooling). Equation (2) is separately estimated for fathers and mothers to reveal potential differential effects of the right-hand side (RHS) variables between parental genders.

Children's gender (c) and number of children (n) are also endogenous in Equation (2). Unobserved determinants of parents' preference for sons would correlate with both gender of adult children (c) and number of children (n) as RHS variables and filial support to birth parents as the outcome variable. Again, this study cannot establish causality from children's gender to filial support.

4. Results

Table 2 presents the coefficient estimates (not odds ratios) from analyzing

[8] ADL measures in the 2002 CLHLS are bathing, dressing, toileting, transferring (moving), continence, and feeding.

parental mortality. Columns in Table 2 use different measures of children's gender. The initial two columns use the number of reported sons after controlling the number of reported children. The next two use the number of surviving sons after controlling the number of surviving children. Results show that number of reported or surviving sons has no strong correlation with the probability of death for both elderly fathers and mothers.

Columns (5) and (6) use "at least one reported son" and "at least one reported daughter" as measures of adult children's gender. Among fathers, "at least one reported daughter" is associated with lower mortality at the 10% significance level, whereas "at least one reported son" has no relation with mortality. However, the difference in association between the two is not statistically discernible at conventional levels of confidence. Among mothers, "at least one reported son" is correlated with higher mortality at the 10% significance level, whereas "at least one reported daughter" has no correlation with mortality. The difference between the two coefficients is not statistically significant at conventional levels of significance.

Columns (7) and (8) use "at least one surviving son" and "at least one surviving daughter" as measures of adult children's gender and find that "at least one surviving daughter" negatively correlates with maternal mortality at the 10%

significance level. No other correlations are statistically significant with respect to paternal and maternal mortalities. Finally, Columns (9) and (10) find that “first-born son” has no correlation with mortality for fathers or mothers.

Overall, no systematic correlation appears between adult children’s gender and parental mortality for fathers and mothers. The existence of one daughter negatively correlates in some cases with parental mortality, and the existence of one son positively correlates with maternal mortality in one case. This finding contradicts the hypothesis that sons are axiomatically associated with a higher level of welfare among elderly parents.

For control variables, mortality risk non-linearly increases with age for fathers and mothers. Years of schooling are unrelated to mortality risk for the elderly in this sample. Four provinces (Henan, Guangxi, Shaanxi, and Shangdong) have lower mortality risks than Beijing (the base province in Equation (1)) only for mothers. There are no statistically significant differences in mortality risk across provinces for fathers (Table 2 does not report coefficient estimates of province dummies).

I repeated the estimation with stiffer controls for initial health status and childhood socioeconomic status (SES), but results concerning parental mortality remain robust after including them (results not reported). Specifically, I standardized responses

to 14 questions about ADL and instrumental activities of daily living (IADL) across elders sampled in 2002 and calculated the individual average over 14 responses. I used this individual average of ADL and IADL responses as the measure of initial health in 2002. Furthermore, I created five dummies from self-reported health in the 2002 survey (one is the reference category in the regressions). For childhood SES, a dummy indicates whether respondents' primary water source during childhood was tap water or a well versus a river, lake, spring, pond, or pool. Another measure for childhood SES is a set of three dummies indicating the father's primary occupation before the age of 60.[9] One additional measure of childhood SES is number of siblings. Although initial health in 2002 strongly correlates with the subsequent mortality of sampled elders, controlling initial health and childhood SES does not affect the correlation between parental mortality and children's gender.[10]

[9] One dummy indicates employment in agriculture, fisheries, forestry, or animal husbandry. The second dummy indicates whether respondents' fathers were professional, technical, governmental, institutional, or managerial personnel, staff/service workers, industrial workers, self-employed, or military personnel. The third dummy indicates employment at home, unemployed, other, or missing. Overwhelmingly (88%), respondents reported farming as their father's main job before the age of 60.

[10] Preferably, childhood health and childhood SES should be controlled. Because measures of childhood health are unavailable in the CLHLS, I used health measures in 2002 as indicators of initial health. However, health status in 2002 may be endogenous in examining the relation between parental mortality and child gender. For example, couples who have only daughters may work more to save for old age, and greater work effort might affect health in 2002 and subsequent mortality. If children's gender does affect parents' mortality, it might gradually affect parents' health since the time when they have babies. For this reason, I prefer the results without controlling for initial health in 2002. Moreover, most measures of childhood SES are not statistically

I also controlled for "male main occupation before the age of 60" as a proxy of household wealth among the sampled elderly. Specifically, own occupation is used for male elders, and spouse's occupation is used for female elders except for those who remained unmarried throughout life, where own occupation is used even for female elders. Four dummies indicate "male's main occupation before the age of 60."[11] This additional set of controls does not meaningfully change the results (results not reported).

Table 3 presents the results from analyzing the relation between children's gender and filial support to birth parents. As measures of children's gender, number of surviving sons, at least one surviving son, at least one surviving daughter, and first-born son are used. Table 3 does not report estimates of coefficients of the control variables (elder's age in 2002 divided by 10, its square, elder's years of schooling, and a dummy for living with spouse). For each dependent variable, three regressions are separately estimated for fathers and mothers. The first row uses the number of surviving sons, the second row using "at least one surviving son" and "at least one surviving daughter," and the last row using "first-born male" as measures of adult children's gender after

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significant in the mortality regressions.

[11] One dummy indicates employment in agriculture, fisheries, forestry, or animal husbandry. The second dummy indicates whether respondents (or spouses) were professional, technical, governmental, institutional, or managerial personnel. The third dummy indicates whether respondents (or spouses) were staff/service workers, industrial workers, self-employed, or military personnel. The fourth dummy indicates employment at home, unemployed, other, or missing.

controlling for the number of surviving children.

In Column (1), the probability that mothers reside without children declines as the number of surviving sons rises (after controlling the number of surviving children). In addition, fathers and mothers with “at least one surviving son” are less likely to live without children, whereas “at least one surviving daughter” is uncorrelated to living with adult children. Equality of estimated coefficients of “at least one surviving son” and “at least one surviving daughter” is strongly rejected with a p-value of near 0 for both fathers and mothers. The gender of the first-born child is unrelated to the probability of not residing with children for both fathers and mothers. This finding is consistent with the traditional patrilocal nature of living arrangements among China’s rural elderly, who are “supposed” to live with a son. However, the gender of the first born seems irrelevant to parental co-residence with children.

Column (2) shows that the amount of money received from adult children correlates with none of the measures of children’s gender after controlling for the number of surviving children. In Panel 2, the difference between coefficients of “at least one surviving son” and “at least one surviving daughter” also is not statistically significant at conventional levels.

Results in Column (3) indicate that number of surviving sons does not affect

the availability of family care for sick elderly parents, but “at least one surviving son” and “at least one surviving daughter” correlate with providing care for sick parents. However, the effect of “at least one surviving son” exceeds that of “at least one surviving daughter,” with the equality of the coefficient estimates rejected at 9% for fathers and at nearly 0% for mothers.

Results in Columns (4) (emotional support) and (5) (general support) indicate that the existence of both sons and daughters is correlated with the availability of filial support for mothers, but that only the existence of sons is correlated with filial support at conventional levels for fathers. For both fathers and mothers, the effect of sons is stronger than that of daughters with the equality of the coefficient estimates rejected at conventional levels.

Sample sizes in Column (6) dwindle because responses are available only from sampled elders with at least some ADL difficulties. Incidence of ADL difficulties is more frequent among elderly females than males (Murtagh & Hubert, 2004; Crimmins, Kim, & Solé-Auró, 2011; Gu & Zeng, 2004). Average lifespan is longer for females than for males. Thus, the sample size for mothers (1,571) is more than double than that of fathers (688). Given the smaller sample of fathers, no statistically significant results emerge. Among mothers, both “at least one surviving son” and “at least one surviving

daughter" are associated with a lower probability of no family support for ADL difficulties. The presence of a son has a larger effect than the presence of a daughter, although the difference is not statistically significant at conventional levels.

Correlations between filial support and adult children's gender remain robust after including the additional control for an elder's health in 2002 (results not reported). Because health may be endogenous in determining the relation between filial support and adult children's gender, results without controlling for the elder's health seem preferable.[12]

5. Conclusion

Previous studies have documented the patrilocal, patrilineal, and patriarchal natures of Chinese culture and have found evidence that Chinese couples had made fertility decisions that resulted in an abnormally high birth ratio of boys to girls. Without a doubt, couples' desire for male offspring relates to concerns about their security in old age. It is believed that under patrilocal living arrangements, elderly parents reside with and are financially, physically, and mentally supported by their eldest son and daughter in-law. In contrast, it is believed that a daughter joins her husband's family upon marriage, and therefore birth parents cannot rely on daughters for support in old age.

[12] First, the elder's health and filial support may be determined simultaneously. Second, children's gender may affect the elder's health, which in turn may affect filial support. See footnote 10.

This widely spread image that sons and not daughters provide security for their elderly parents in rural China suggests that the gender of adult children is relevant to the mortality of elderly parents. However, this study finds no correlation between the gender of adult children and the mortality of elderly parents in rural China. It shows that many daughters financially, physically, and emotionally contribute to their elderly birth parents.

The following description of filial support from sons *vis-à-vis* daughters is consistent with this study's findings: the patrilocal custom of living arrangements is prevalent in rural China; therefore, sons are much more likely to live with elderly parents, and daughters' contribution in this regard is minimal. However, daughters' financial contributions are statistically no different from sons'. Sons' contributions to elderly parents' emotional and physical support typically exceed daughters', and sometimes the differences are discernible statistically. Even so, daughters' contributions are not negligible. Findings in this study are consistent with previous studies concerning adult children's support for elderly parents in Taiwan using adult children as the unit of analysis (Lee, Parish, & Willis 1994; Lin et al., 2003).

Findings of this study suggest that the traditional interpretation of son-dominated filial support to parents is overblown. This study suggests a more

realistic position of daughters vis-à-vis sons: Sons are the primary providers of filial support to birth parents, whereas daughters provide supplemental support or primary support if sons cannot take the responsibility. In contravention of conventional wisdom, many daughters remain in contact with birth parents after marriage.

This paper cannot establish causality between the gender of adult children and the mortality of elderly parents or between the gender of adult children and availability of filial support. This is because rural Chinese couples could manipulate somewhat the gender of their offspring before ultrasound became widely available, and couples today can almost perfectly control the gender of their offspring with wider access to ultrasound technology. An innovative study design is necessary to establish causality.

If daughters' contributions to birth parents were traditionally non-existent and have recently arisen as the result of economic development, including improved transportation and communication, this may help to elevate daughters' traditionally lesser status in rural Chinese households. If parents realize that daughters contribute to their old-age security, their motivation to invest in sons rather than daughters could diminish.

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Table 1: Descriptive statistics of elderly individuals

	Mean	Std. dev.	Min	Max	N
Female (dummy)	0.582				
Birth year	1915.244	11.912	1885	1939	
Age in 2002	86.215	11.909	62	116	
Years of schooling	1.368	2.635	0	25	
Province of residence (dummy):					
Beijing	0.008				
Tianjian	0.007				
Hebei	0.013				
Shanxi	0.011				

Liaoning	0.031
Jilin	0.024
Helongjiang	0.013
Shanghai	0.010
Jiangsu	0.129
Zhejiang	0.091
Anhui	0.061
Fujian	0.029
Jiangxi	0.027
Shangdong	0.049
Henan	0.052

Hubei	0.033				
Hunan	0.053				
Guangdong	0.059				
Guangxi	0.152				
Chongqing	0.036				
Sichuan	0.098				
Shaanxi	0.016				
Year of the first birth	1938.961	12.742	1907	1978	7,990
Year of the last birth	1954.033	12.732	1910	1983	7,564
Num. reported sons	2.434	1.534	0	9	
Num. reported daughters	2.194	1.558	0	10	

Num. reported children	4.628	2.184	1	11	
Num. surviving sons	1.850	1.381	0	8	
Num. surviving daughters	1.716	1.377	0	8	
Num. surviving children	3.566	1.963	0	10	
First child is boy (dummy)	0.579				8,098
Dead by the 2008 survey (dummy)	0.659				7,269
Have pension (dummy)	0.064				8,130
No co-residence with child (dummy)	0.624				7,709
Amount of money received from children	1034.391	1425.287	0	40000	7,997
No family member to take care when sick (dummy)	0.052				8,123
No family member to share feelings (dummy)	0.161				

No family member to ask for help (dummy)	0.068	
No family member to help ADL difficulties (dummy)	0.084	2,259

1. The sample size is 8,136 elderly individuals, except when another sample size is indicated.

Table 2: Parental mortality (Cox proportional hazard model)

	(1)	(2)	(3)	(4)	(5)	(6)
	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers
Num. reported sons	0.016	0.002				
	(0.022)	(0.018)				
Num. surviving sons			0.005	0.006		
			(0.025)	(0.021)		
At least one reported son					-0.054	0.110*
					(0.075)	(0.062)
At least one reported girl					-0.117*	-0.009
					(0.071)	(0.058)

Num. reported children	0.002	-0.027**			0.026**	-0.033***
	(0.015)	(0.012)			(0.013)	(0.010)
Num. surviving children			-0.009	-0.025*		
			(0.017)	(0.015)		
Age/10	3.190***	3.003***	3.191***	3.018***	3.174***	3.018***
	(0.389)	(0.319)	(0.388)	(0.320)	(0.389)	(0.319)
$(\text{Age}/10)^2$	-0.139***	-0.127***	-0.140***	-0.128***	-0.139***	-0.128***
	(0.022)	(0.018)	(0.022)	(0.018)	(0.022)	(0.018)
Years of schooling	-0.001	0.010	-0.001	0.011	-0.001	0.011
	(0.008)	(0.016)	(0.008)	(0.016)	(0.008)	(0.016)

N	3,085	4,184	3,085	4,184	3,085	4,184

1. Standard errors are in parentheses.
2. *** p < 0.01, ** p < 0.05, * p < 0.1
3. All explanatory variables are measured as of 2002.
4. Twenty-one province dummies are also included as controls, but the coefficient estimates are not reported in the table. (Beijing is the reference province.)

	(7)	(8)	(9)	(10)
	Fathers	Mothers	Fathers	Mothers
At least one surviving son	-0.073	0.033		
	(0.068)	(0.052)		
At least one surviving girl	-0.099	-0.086*		
	(0.066)	(0.052)		
First child boy			-0.069	0.057
			(0.048)	(0.039)
Num. reported children			0.006	-0.028***
			(0.011)	(0.008)

Num. surviving children	0.015	-0.014		
	(0.016)	(0.015)		
Age/10	3.161***	3.036***	3.337***	3.009***
	(0.389)	(0.320)	(0.402)	(0.325)
$(\text{Age}/10)^2$	-0.138***	-0.129***	-0.147***	-0.127***
	(0.022)	(0.018)	(0.023)	(0.018)
Years of schooling	-0.001	0.010	-0.002	0.007
	(0.008)	(0.016)	(0.008)	(0.017)
N	3,085	4,184	2,915	4,025

1. Standard errors are in parentheses.
2. *** p < 0.01, ** p < 0.05, * p < 0.1
3. All explanatory variables are measured as of 2002.

4. Twenty-one province dummies are also included as controls, but estimated coefficient are not reported in the table. (Beijing is the reference province.)

Table 3: Adult children's support to parents (OLS)

	(1)		(2)		(3)	
Dependent variable	No co-residence with children		Amount of money received from children		No family member to take care when sick	
Fathers or mothers?	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers
Num. surviving sons	-0.012	-0.037***	13.213	6.227	-0.001	-0.005
	(0.008)	(0.007)	(22.022)	(21.794)	(0.004)	(0.003)
Num. surviving children	-0.000	-0.006	94.044***	82.723***	-0.014***	-0.013***
	(0.006)	(0.006)	(16.290)	(15.627)	(0.003)	(0.002)
N	3,270	4,439	3,361	4,636	3,398	4,725

At least one surviving son	-0.197***	-0.293***	19.058	33.741	-0.047***	-0.071***
	(0.028)	(0.024)	(72.395)	(62.801)	(0.012)	(0.010)
At least one surviving daughter	0.033	0.001	9.571	-10.502	-0.022**	-0.018*
	(0.026)	(0.022)	(67.167)	(59.324)	(0.011)	(0.009)
Num. surviving children	0.003	-0.004	98.380***	83.675***	-0.008***	-0.006**
	(0.005)	(0.005)	(14.933)	(15.073)	(0.002)	(0.002)
p-val. from test of equality	0.000	0.000	0.915	0.557	0.082	0.000
N	3,270	4,439	3,361	4,636	3,398	4,725
First child boy	0.006	0.002	12.318	-2.587	0.002	-0.004
	(0.016)	(0.015)	(44.950)	(41.826)	(0.007)	(0.007)

Num. surviving children	-0.006	-0.024***	101.361***	86.358***	-0.014***	-0.014***
	(0.005)	(0.004)	(11.947)	(11.522)	(0.002)	(0.002)
N	3,262	4,420	3,352	4,610	3,389	4,696

1. Standard errors are in parentheses.
2. *** p < 0.01, ** p < 0.05, * p < 0.1
3. Age divided by 10, age divided by 10 squared, years of schooling, a dummy of currently living with spouse, and 21 province dummies are included as controls in all regressions. (Beijing is the reference province.)

	(4)		(5)		(6)	
Dependent variable	No family member to share feelings		No family member to ask for help		No family member to help ADL difficulties	
Fathers or mothers?	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers
Num. surviving sons	-0.004	-0.010*	-0.007*	-0.008**	-0.003	-0.001
	(0.006)	(0.006)	(0.004)	(0.004)	(0.011)	(0.008)
Num. surviving children	-0.011**	-0.016***	-0.012***	-0.014***	-0.009	-0.017***
	(0.004)	(0.004)	(0.003)	(0.003)	(0.008)	(0.005)
N	3,404	4,732	3,404	4,732	688	1,571

At least one surviving son	-0.066***	-0.088***	-0.080***	-0.088***	-0.026	-0.079***
	(0.019)	(0.016)	(0.013)	(0.011)	(0.030)	(0.020)
At least one surviving daughter	-0.024	-0.035**	-0.019	-0.028***	-0.027	-0.061***
	(0.018)	(0.015)	(0.012)	(0.010)	(0.030)	(0.019)
Num. surviving children	-0.005	-0.008**	-0.007***	-0.006**	-0.006	0.000
	(0.004)	(0.004)	(0.003)	(0.003)	(0.007)	(0.005)
p-val. from test of equality	0.068	0.005	0.000	0.000	0.980	0.451
N	3,404	4,732	3,404	4,732	688	1,571
First child boy	-0.011	-0.003	-0.015*	-0.008	-0.018	-0.008
	(0.012)	(0.011)	(0.008)	(0.007)	(0.020)	(0.014)

Num. surviving children	-0.013***	-0.020***	-0.016***	-0.017***	-0.011**	-0.018***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.005)	(0.004)
N	3,395	4,703	3,395	4,703	684	1,557

1. Standard errors are in parentheses.
2. *** p < 0.01, ** p < 0.05, * p < 0.1
3. Age divided by 10, age divided by 10 squared, years of schooling, a dummy for currently living with spouse, and 21 province dummies are included as controls in all regressions (Beijing is the reference province).

Appendix

Appendix Table 1: Endogenous nature of gender of adult children (OLS)

	2nd child	3rd child	4th child	5th child	6th child	7th child
Ratio existing boys	-0.037***	-0.049***	-0.074***	-0.099***	-0.080**	-0.064
	(0.006)	(0.010)	(0.016)	(0.024)	(0.033)	(0.045)
Parent age/10	-0.101***	-0.032	0.085	0.040	0.158	0.400***
	(0.039)	(0.049)	(0.064)	(0.082)	(0.104)	(0.135)
$(\text{Parent age}/10)^2$	0.005**	0.001	-0.006	-0.002	-0.009	-0.021***
	(0.002)	(0.003)	(0.004)	(0.005)	(0.006)	(0.008)

Years of schooling	-0.001	-0.003*	-0.005***	-0.002	-0.006*	-0.009**
	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)
N	7,849	7,296	6,521	5,418	3,998	2,682

1. Standard errors are in parentheses.
2. *** p < 0.01, ** p < 0.05, * p < 0.1
3. Twenty-one province dummies are included as controls, but coefficient estimates are not reported (Beijing is the reference province).
4. Parent age in 2002.