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ABSTRACT

Daughters, Savings and Household Finances

We explore the link between child gender and household financial decisions within a cultural environment that strongly favours having a son. Using data from the China Household Finance Survey (CHFS), we find that the presence of a daughter is associated with a lower saving rate. This is consistent with the hypothesis that such families, facing a less competitive marriage market thanks to the relative under-supply of unmarried women, have lower incentives to raise their female heirs' marital prospects by accumulating bigger asset pools. The negative correlation becomes more pronounced as the daughter approaches marriageable age. This study expands existing research by examining the impact of child gender on financial decisions while controlling for unobserved time-invariant heterogeneity thanks to the panel nature of the CHFS.

JEL Classification: D14, D10, J12, J16
Keywords: daughter, household savings, marriage market

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1 Introduction

The preference for a son, which is common in Asian countries (Choi and Hwang, 2015) as well as parts of Africa (Gangadharan and Maitra, 2003, Milazzo, 2014, Rossi and Rouanet, 2015) and Europe (Hank and Kohler, 2000, Mills and Begall, 2010), arises from an established custom to view males as primary earners and carriers of the family name (Pitt et al., 2012, Asadullah et al., 2021). Daughters who marry typically 'lose' their original surname, contributing to a negative bias towards them (Anukriti et al., 2022, Choi and Hwang, 2015, Kaul, 2018, Azam and Kingdon, 2013). It is observed that male children typically enjoy more and better-quality childbearing and education than comparable females in the infant and educational stages (Barcellos et al., 2014, Asadullah et al., 2021).

As children reach adulthood, parental support takes additional forms than investments in education: parents may provide financial transfers that can give their offspring a substantive advantage in the quest to find a high-quality partner and help overcome the initial living costs of the new couple.[1] In such circumstances, however, if the preference for sons has caused an environment in which the birth ratio is unbalanced in favour of males, the competition for a suitable partner in the marriage market opens up different financial incentives for parents – incentives that differ according to the child's gender. Large cohorts of sons will inevitably raise the bar (and any gift or asset transfer) to enhance their boy's marital attractiveness and prospects (Wei and Zhang, 2011).[2] Parents of male offspring may have prepared for such events over the years by accumulating savings in excess of families with daughters, whose relative 'scarcity' actually benefits from higher competitive fever among unmarried males. Is this the case?

[1] Wright (2023) suggests that daughters receive less financial support from their parents in purchasing real estate and face more pressure to repay mortgages than sons.

[2] Son preference contributes to gender imbalances in populations, leading to a relative scarcity of women in certain regions, often referred to as the 'marriage-squeeze' effect.

We aim to answer this question, as existing research is relatively silent about the topic, notwithstanding a large amount of literature analysing household financial choices and the broad marriage market. Studies on the influence of a child's gender on his/her household's savings and investment choice are not only scarce (e.g. Wei and Zhang (2011) and Li et al. (2022)), but also rely on cross-sectional data that produce estimates potentially affected by omitted variable bias. As the link between a child's gender and a household's financial choices likely influences the flow of savings and the demand for investments – for example, by constraining consumption and skewing investment demand towards 'consumable' assets for the newlywed, such as real estate, whose risk profile may not be optimal for national growth targets or price inflation[3] – extensive and careful estimation is essential for informed analyses, policy considerations, and possible targeted interventions.

We complement existing research by addressing whether families with a daughter save less than those with a boy. Our analysis uses China as a case and the China Household Finance Survey (CHFS) – a longitudinal survey – as the data source. We find that households with a daughter, whether one-child or multi-child families, tend to save less compared to families with a son. Importantly, the child gender effect varies across different child age brackets. It is strongest when the child reaches the marriageable age, but it does not extend to stock market participation regardless of gender and number of children in the family, implying that families with daughters save less but do not take more/less risk in their investments than similar families with a son. These findings support the hypothesis that competitive pressures in the marriage market have wide-spread implications for financial markets and the broader economy, and

[3] According to data from the National Bureau of Statistics of China spanning from 1999 to 2008, the household savings rate in China exceeds 25 per cent (Yao et al., 2011). Despite such a high saving rate, Chinese household participation in the stock market was only 8.67 per cent in 2011 (Liang and Guo, 2015).

identify areas for possible targeted intervention: examples include legislative and cultural/normative revisions about the inter-generational transmission of surnames, and educational programs, or new legislative guidelines, about alternative models of shared responsibilities towards the economic and financial wellbeing of the new household.

With reference to existing work, our study extends Wei and Zhang (2011) and Li et al. (2022) to measure the effects of a child's gender on household savings and investments using panel data, which control for time-invariant individual heterogeneity. It also quantifies this effect's intensity as the child's age changes, which is novel to existing work.

2 Background and literature review

After the Great Leap Forward of 1958-59, fertility rates soared as they were encouraged by the government (White, 2006), reaching an average of six births per woman in the 1960s (Banister, 1987).[4] This trend was halted in the 1970s with the "*wan* (later), *xi* (longer), *shao* (fewer)" campaign, which advocated for delayed marriage and childbearing, wider birth space, and fewer offspring.[5] Persistently high population growth rates led to the introduction in 1979 of a family planning program enforcing a one-child policy. This was implemented with varying stringency across regions.[6] The policy was adjusted in 1984 to allow rural families with firstborn girls or ethnic minorities to have a second child. Policy violations faced repercussions, including job loss and fines. The policy had severe unintended consequences as the option of having only one child combined with strong cultural preferences for a male heir led to a surge

[4] The Great Leap Forward was a plan aimed at China's fast industrialisation by switching workforce away from agriculture (Li et al., 2005, Meng et al., 2015).
[5] The campaign stipulated that men should not marry before 25 years of age and women should not marry before reaching 23 years (Ge et al., 2018).
[6] For example, the penalties for above-quota births differed in rural areas, urban areas, and provinces. *Hukou* system played an important role in implementing the child policy, as the birth quotas and penalties reflected the *hukou* status.

in the use of technologies to anticipate the sex of the child (Ebenstein, 2010, Keysers, 1991), abortions, often under questionable medical practice, and other forms of violence such as forced sterilisation (Edlund, 1999, Li et al., 2022, Modigliani and Cao, 2004, Wei and Zhang, 2011, Shrestha and Jung, 2023). These aberrations led to smaller cohorts of newborns and a skewed sex ratio in the new cohorts. New legislation prohibiting birth sex selection was eventually introduced in 1987.

The result of these measures was a progressive decrease in the size of new cohorts: while this was a welcome short-term outcome on China's limited resources, it seeded new problems for the medium and long term, as the shrinking population meant that fewer people in working age could produce and generate income and wealth to sustain the cost and needs of rising shares of older generations. In the 2010s, the government relaxed its population control measures to prop up declining fertility rates, workforce shrinkage, and an aging population (Ge et al., 2018). The birth limit increased to two children per couple in 2015 and three in 2021, accompanied by extended maternity leave and financial incentives. It will, however, take decades to restore a sex-balanced population with the sole reliance on natural population growth.

Despite these policy changes, the preference for sons remains strong, and so are the many complex inter-generational consequences that such preference has on households' welfare and the distribution of wealth (Anderson, 2007). In theory, cultural practices surrounding the marriage, such as dowry and traditional obligations or gifts, influence households' pre-marital savings and investment decisions differently according to their child's gender (Botticini and Siow, 2003, Grossbard-Shechtman, 2003, Platteau and Gaspart, 2007).[7] This bias, combined

[7] Usually, bride premiums are relatively constant and transferred from the groom's parents to the bride or the bride's parents, while the dowry is at the willingness of the bride's parents (Anderson, 2007).

with a skewed sex ratio in favour of males, underpins the rise of a 'marriage-squeezing' effect (Edlund, 2000, Klinger-Vartabedian and Wispe, 1989), whereby fierce competition among unmarried males in the local marriage market is compounded by their families' varying level of material support (Edlund, 2000, Wei and Zhang, 2011, Li et al., 2022). Higher asset transfers in favour of boys generate a gendered-bias transfer of wealth and contribute to gender inequality across generations, especially if the gender of a newborn can somewhat be pre-determined.

In practice, it is challenging to identify with precision each factor influencing household financial decisions, as they accumulate over several layers and time. Existing research has identified variables such as children's characteristics (Love, 2010), the gender of the household head (Fonseca et al., 2012), family size and occupation (Bannier and Schwarz, 2018), the level of education (Grinblatt et al., 2011), the existence of a family business (Amran and Ahmad, 2010, Ji et al., 2021), and home ownership (Vestman, 2019, Wei and Zhang, 2011, Wei et al., 2012) to name a few.[8] But it is unlikely that each influencing variable is captured. Quantifying the influence of son preference on household-related financial choices is especially challenging when only cross-sectional data are available because it is not possible to control all sources of individual unobserved heterogeneity that may be at play. The likely result is a biased estimate that may over or under-represent the actual effect of interest and mislead the suggestion for, or type of, intervention. CHFS data enable us to partly address this problem, as panel data estimation techniques can remove unobserved albeit time-invariant influences. In particular, we present estimates obtained from both cross-sectional, for comparison with existing work, and panel data – our preferred approach.

[8] Affected financial decisions included savings (De Laiglesia and Morrisson, 2008, Curtis et al., 2015, Wei and Zhang, 2011), income and consumption (Morduch, 1995), retirement schemes (Anderson et al., 2017, Lusardi and Mitchell, 2011, Van Rooij et al., 2012), stock market participation (Almenberg and Dreber, 2015, Bogan, 2009, Van Rooij et al., 2011, Zou and Deng, 2019), and investment decisions (Sharif et al., 2020).

3 Data

3.1 The China Household Finance Survey

The CHFS is a high-quality, large and nationally representative longitudinal survey that collects comprehensive information at the individual, household, and community levels. It is publicly available in five waves: 2011, 2013, 2015, 2017, and 2019.[9] The sample size and coverage expanded over the waves, with the 2011 wave covering 25 provinces, 82 counties, 320 communities, and 8,438 households. Subsequent waves included more provinces, counties, communities, and households, with the wave in 2019 covering 343 counties, 1,360 communities, and 34,643 households.

CHFS contains detailed data on financial information, such as income, assets, savings and stock market participation, as well as financial knowledge,[10] and each household member's demographic and socio-economic characteristics, such as age, gender, employment status, education, and marital status.

We limit our analysis to households with unmarried children aged 1 to 35 to mitigate any potential confounding effects of a married child's existing marriage and to capture the offspring's life cycle before and after their marriageable age (typically early to late 20s). Additionally, we restrict our sample to household heads aged 25 to 65. We combine cross-sectional data for 2013, 2015, 2017, and 2019 in a pooled dataset for comparison with existing

[9] For further details and access to the CHFS datasets, please refer to the official website at https://chfs.swufe.edu.cn/dczx.htm.

[10] The 2011 wave does not include information on financial literacy. It is an essential factor in understanding financial behaviours (Almenberg and Dreber, 2015, Anderson et al., 2017, Bianchi, 2018, Lusardi and Mitchell, 2011, Lusardi and Mitchell, 2017). Additionally, the financial literacy questions in 2017 were answered only by new respondents who were not interviewed in the previous waves. Furthermore, in the 2019 wave, one financial literacy question was collected exclusively in urban areas.

estimates. Our preferred approach, however, can only be implemented on the 2013 and 2015 waves, which are linked to generate an unbalanced panel. After excluding outliers, we are left with 27,926 observations (households) in the pooled cross-sectional sample and 13,806 observations (households) in the unbalanced panel dataset.

3.2 Measures of household saving rate and financial market participation

Drawing on Modigliani and Cao (2004) and Wei and Zhang (2011), we measure household saving rate by the formula: (income – expenditure)/income. In instances where households have negative savings, implying expenditure exceeds income or possibly missing data, we attribute a value of zero. We employ a binary variable to measure stock market participation, which takes a value of one if the household holds stock accounts on the survey date and zero otherwise.

[Table 1 here]

The summary statistics are reported in Table 1. The households in the working sample save, on average, nearly a quarter of their income (23.8 per cent), and their average stock market participation is a relatively low 14.2 per cent. These findings are consistent with previous studies on Chinese household finances (Wei and Zhang, 2011, Li et al., 2022).

Columns 2 and 3 of Table 1 report summary statistics for families with and without at least one daughter. We observe significant differences in savings rates (4.1 per cent) and stock market participation (2.1 per cent) between these two groups. Specifically, families with at least one daughter have lower saving rates and stock market participation than comparable families with only sons.

3.3 Measures of independent variables and control variables

We use the share of daughters to measure the children's gender composition in the family. For one-child households, this measure equals 1 if a daughter exists and 0 if not. In multi-child households, it represents the proportion of daughters among children who are alive. In these working samples, 52.8 per cent of the families surveyed have at least one daughter.

As parental investments vary with children's stages (Wang et al., 2022), we generate five age cohorts according to children's age.[11] Children in Cohort 1, aged 1-12, are in the kindergarten or primary school phase, a stage unlikely to majorly impact household savings or future marriage-related decisions. The children in cohort 2, aged 13-17, might influence household savings as parents plan for their adolescents' needs and future prospects as candidates for marriage. The children in cohort 3 are aged 18-22, where parental savings are needed for marriage or studies. The children in cohort 4, aged 23-26, are the most common age to get married in China. The children in cohort 5, aged 27-35, are becoming financially independent, making it less likely to require large parental resources. In our working sample, the average age of the (oldest) daughter is about 15.963 years old.

Table 2 presents the unconditional means of the independent variables. We use a self-reported 5-point Likert scale of risk attitudes, where a high score indicates a greater willingness to take risks, to control for the respondent's risk appetite.[12] The average risk attitude is 2.186 out of 5, which suggests a prudent investment strategy.

[11] In one-child families, this variable is the child's age, while in multi-child households, it is the oldest daughter's age.

[12] The risk attitudes question in the questionnaire is "Which of the choice below do you want to invest most if you have adequate money? a. project with high-risk and high-return; b. project with slightly high-risk and slightly high-return; c. project with average risk and return; d. project with slight risk and return; e. unwilling to carry any

[Table 2 here]

Households in the working sample have relatively low levels of education. About 75.4 per cent of household heads have only primary or secondary degrees, and (78.7 per cent) are typically employed. Their level of financial literacy is low, averaging 1.034 out of 3. Household heads are classified into four age cohorts; the majority (40.1 per cent) are 36 to 45 years old. A large proportion of household heads (50.8 per cent), defined as those who make major household finance decisions, are females. Most families (95.3 per cent) are composed of married couples. The average household income and assets are 95.241 thousand yuan and 1,181.691 thousand yuan (about 12 times annual income – a substantive amount), respectively.

We generate a variable with four categories to capture the residential place and *hukou* status: namely, an urban resident with non-agricultural *hukou* (50.2 per cent), an urban resident with agricultural *hukou* (24.5 per cent), a rural resident with non-agricultural *hukou* (1.3 per cent), and a rural resident with agricultural *hukou* (24 per cent).

4 Empirical framework and identification strategy

We estimate the 'daughter' effect and whether its intensity varies with the progression of the daughter's age using the following specification:

$$y_{it} = \gamma_0 + \gamma_1 SOD_{it} + \gamma_2 AC_{it} + \gamma_3 SOD_{it} \times AC_{it} + \sum_{i=4}^{j} \Gamma_j X_i + \mu_{it} + \omega_i$$

risk". To facilitate the interpretation, we reversed the measurement scale, such that 1 represents unwillingness to carry any risk, 2 represents a project with slight risk and return, 3 represents a project with average risk and return, 4 represents a project with slightly high-risk and slightly high-return, and 5 represents a project with high-risk and high-return.

where the dependent variable, y_{it}, measures the saving rate or stock market participation of household *i* at time *t*. SOD_{it} is the share of daughters in children in a household at the time of the survey. AC_{it} is a categorical variable that captures the age cohort of the (oldest) daughter in each household.[13] It is interacted with the share of daughters to allow the effect of having a daughter to vary with her age.

The parameters of interest are γ_1 and γ_3, as they help delineate gender-specific effects within different child age cohorts. In particular, γ_1 captures the daughter's influence on the household saving rate and stock market participation, while γ_3 captures the variation in this effect across different child age groups. Together, these parameters enable us to analyse the changing impact of daughters on household finances as they progress through time.

In one-child households, the variable SOD_{it} is effectively a dummy for the child's gender, categorised as 0 for a son and 1 for a daughter. In multi-child households, the interpretation is different as SOD_{it} becomes a continuous variable (the share of daughters among all children), and AC_{it} identifies the age group of the eldest daughter. As a result, the analysis focuses on the effects associated with the oldest daughter's age.

X_{it}, a vector of control variables, which includes the characteristics of the household head and the household at large: namely, the household head's age group, gender, education level, risk attitude (Bogan, 2013, Li et al., 2022, Lugauer et al., 2019), financial literacy, employment status, number of children, residential and *hukou* status, and the logarithms of household

[13] In one-child families, the relevant age under consideration is that of the child, whereas in multi-child households, the focus shifts to the age of the oldest daughter.

income and assets (Bogan, 2013, Li et al., 2022, Almenberg and Dreber, 2015, Nguyen and Nguyen, 2020, Van Rooij et al., 2011, Van Rooij et al., 2012). u_{it} is an idiosyncratic error term, and v_i captures time-invariant individual unobserved heterogeneity.

Given the influence of the local area sex ratio on household saving and investment preference, the model includes the province-level sex ratio among control variables. We also use province and year dummy variables to control for fixed effects at the provincial level and over time.

We carry out the empirical analysis along two dimensions. First, we perform regressions on cross-sectional and panel data separately. In particular, the results distinguish between the ordinary least squares (OLS) estimates obtained on pooled cross-sectional data and the random effect (RE) panel estimation covering the years 2013 and 2015.[14] Second, we carry out separate regressions for households with only one child versus those with two or more children.

5 Results

Table 3 and Table 4 present the estimated coefficients from the two regression models (OLS and RE) for one-child households and multi-child households, respectively. In each table, panel A displays the regression results, while panel B provides the linear combination of parameters γ_1 and γ_3. The linear combination provides a comprehensive estimate of the effect of having a daughter (or the oldest daughter) at a set age group relative to having a son on the family's savings rate and probability of having a stock market account for investing.

[Table 3 here]

[14] Given its superior interpretability, we utilise a linear probability model for both OLS and RE regression analyses.

The results suggest that one-child families with a daughter save less than those with only a son (columns 1 and 3 of Table 3), and this effect grows non-linearly with the age of the child until about age 26. The largest effect – the largest reduction in the saving rate in one-child families – occurs when daughters are in peak marriage age (the most common age for a girl to marry in China), around the age of 26 (column 3 of panel A). The difference is about 4.0 per cent relative to a family with a son in the same age group (column 3 of panel B). This result is consistent with the hypothesis that higher competition among unmarried males leads their families to push their sons' attractiveness by raising the assets they can offer to the marriage.

The results from OLS, however, can be biased due to unobserved heterogeneity. We hence re-estimate the model on the panel sample to control for time-invariant unobserved individual factors. The results (column 3) are very close to those found using OLS (column 1), especially with reference to the effect of daughters in the age group 23-26. No effect emerges with reference to stock market participation, implying that households do not vary their risk preferences to access extra earnings (at higher risk). The 'daughter' effect is, therefore, purely restricted to the amount of savings available but does not change the risk profile of how they are invested.

In multiple-child families, similar patterns emerge, as shown in Table 4. Having a higher proportion of daughters reduces the saving rate, especially when the older daughter approaches the marriageable age (23-26), as shown in column 3 of panel A. This aligns with Wei and Zhang (2011), who find that families with sons exhibit a higher saving rate than those with daughters, albeit on cross-sectional data. With reference to stock market participation, the 'daughter' effect does not translate into any statistically discernible influence. Hence, no change in the investment risk profile emerges from such an effect.

[Table 4 here]

Our findings reveal that the presence of a daughter in the family, whether in one-child or multi-child households, correlates with lower savings rates. This trend becomes especially pronounced during her marriage age.[15] Given the asymmetry of assets potentially transferred to the newlywed by the families of origin, this result may reveal an under-researched source of inter-generational wealth inequality by gender, whose consequences are not yet completely understood and explored.

6 Robustness Checks

We conducted three robustness tests. First, we examined the preference for a son and home-buying intentions using specific questions that were asked in CHFS. In 2013 and 2015 CHFS, respondents were asked, 'Is it better to have a boy than a girl?' to gauge their gender-bias preferences. The choices were 'A. Boy is better', 'B. Girl is better', and 'C. The same'. We recoded this variable, so it has a value of 1 for A and zero for B or C. The willingness to purchase a new home is recorded as one if the household intends to buy a new home and zero otherwise. Instead of using the share of daughters, we apply a binary measurement whereby a family with at least one daughter is coded as one, and zero if they have only sons. The results are presented in Table 5.

[Table 5 here]

[15] After removing those observations with zero saving rate, the results are consistent with our findings.

In families with at least one daughter, respondents appear to have a balanced appreciation for the gender of their child, as suggested by the negative correlation between having a daughter and the stated preference for a son (column 1).

Having a daughter also significantly and negatively impacts home purchase intent (column 2), consistently with the hypothesis that families who have sons face stronger financial pressures to secure additional housing to boost their son's marriage prospects.

Second, we apply Oster (2019) test to evaluate whether the estimates obtained are robust to omitted variable bias. The results are in Table 6. Estimates are deemed to be robust to omitted variable bias if the ratio δ of unobserved to observed heterogeneity measured at a set level of the coefficient of determination (R^2_{max} =1.3 R^2) exceeds 1. The δ values for the coefficients of interest found in the test always considerably exceed the threshold, suggesting that the results are indeed robust to unobserved heterogeneity.

[Table 6 here]

As a third robustness test, we exclude from the analysis observations with a saving rate of zero: we do so as lacking precise information, it is not possible to know exactly whether a nil or negative savings rate recorded in CHFS is the result of behaviour or other circumstances such as a missing or unreported data in the original survey. By removing such observations, we effectively restrict the analysis to data points with complete relevant information about one of the key dependent variables. The results in Table 7 align with those reported in Tables 3 and 4.

[Table 7 here]

Overall, the robustness checks results support our general findings.

7 Heterogeneity

We use the 2013 and 2015 CHFS panel to explore possible variations in the results across various subgroups. The results are shown in Table 8.

[Table 8 here]

We first examine the role of financial literacy, a crucial tool for informed decision-making related to the finance (Lusardi, 2008, Abreu and Mendes, 2010, Grohmann et al., 2018), to study whether better-informed families behave differently from the less informed. We hence split the sample into families with low and high financial literacy scores, respectively, and present the results in Table 8.[16] The estimates suggest that the negative correlation between the 'SOD× [23,26]' and the household's saving rate emerges exclusively in families with low financial literacy. No such daughter effect emerges in the high financial literacy households.

This result supports the possibility that improving financial literacy may raise families' likelihood of making financial decisions based on impartial market information rather than subjective cultural habits and norms. The results also reveal a possible area of target intervention: namely the observed bias in the financial choices (in this case under-savings) of households with daughters (alternatively: over-saving in households with sons).

[16] Respondents who answered all three financial questions correctly are defined as having high financial literacy, while others are classified as low.

As financial literacy is a proxy of education, we re-run the regressions separately by the level of the education of the household, finding similar results (columns 5 – 8): low-education families make savings decisions based on the share of daughters among their children and the oldest daughter's age bracket. This effect is statistically nil among those with higher educational attainment, except in families where the oldest daughter is aged between 27 and 35, which is categorised as the financially independent cohort, as shown by the corresponding coefficients in column 6. This result is relevant, as it restricts the possible treatment to a well-defined subgroup of society: those with below-average education – a possibly vulnerable group, as it has accumulated substantial assets but does not have corresponding financial literacy and formal education to gauge investment risks.

In addition, as gender stereotypes and low income are more prevalent in rural areas than in urban areas (Lin et al., 2021, Wu and Perloff, 2005), we re-run the analysis separately by residential location (columns 9 - 12). The drop effect of the share of daughters in the household savings rate when the oldest daughter is at the marriageable age is prominent in rural areas only. This suggests that the effect found is related to the educational level prevailing in the family as well as the location where it lives. This, in turn, narrows the scope for possible intervention.

8 Conclusion

Our study employs the pooled four waves (2013, 2015, 2017 and 2019) of CHFS, along with a panel dataset generated from the 2013 and 2015 CHFS, to investigate the impact of child gender on the household savings rate and participation in the stock market. Having a daughter consistently reduces households' saving rate, especially as the daughter approaches marriageable age, but does not alter the risk preferences of the household (as proxied by having a stock market account). The possible under-investment and endowments of daughters may

carry undesirable consequences to the development of capital markets because it can negatively influence the supply of savings that would otherwise be available, hence conditioning the financial products that are designed and offered to retail investors.

While cultural norms are difficult to change in a short time, the results open up two alternative avenues for policy analysis and possible intervention. The first is to focus on the legislative environment for the inter-generational transmission of surnames (Qi, 2018, Li et al., 2021). Recent reforms that enable married daughters to keep the right not only to inherit their parent's property but also to adopt the mother's surname for their children have been introduced. Whether or not this defuses focus on over-endowing sons relative to daughters remains an open question that can be answered over time as post-reform data become available.

An alternative area of possible consideration is the promotion of better formal education on financial opportunities and choices as well as gender equity among low-educated households. Notwithstanding gender differences in risk preferences, better formal education and incentives can ensure that savings and investments associated with female and male children start from similar positions and do not become a source of gender inequality.

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Tables

Table 1: Descriptive statistics of dependent variables

	Mean			
	All	Families with at least one daughter	Families without daughters	Difference (H_0: *diff = 0*)
	(1)	(2)	(3)	(4)
Saving rate	0.238	0.219	0.260	-0.041***
	(0.279)	(0.271)	(0.286)	[0.003]
Having a stock account (Yes = 1)	0.142	0.132	0.153	-0.021***
	(0.349)	(0.338)	(0.360)	[0.004]
Observations	27,926	14,731	13,195	

Notes: The data from the 2013, 2015, 2017 and 2019 China Household Finance Survey. Standard deviations are given in parentheses. Standard errors are given in squared parentheses. *p < 0.1, **p < 0.05, ***p < 0.01. Difference = the mean of families with daughters (column 2) – the mean of families without daughters (column 3). A *t*-test is applied.

Table 2: Descriptive statistics of control variables

	Mean			
	All	Families with at least one daughter	Families without daughter	Difference (H_0: *diff = 0*)
	(1)	(2)	(3)	(4)
Residential and hukou status:				
Urban resident with non-agricultural hukou	0.502	0.471	0.536	-0.065***
	(0.500)	(0.499)	(0.499)	[0.009]
Urban resident with agricultural hukou	0.245	0.261	0.228	0.032***
	(0.430)	(0.439)	(0.420)	[0.007]
Rural resident with non-agricultural hukou	0.013	0.012	0.014	-0.002
	(0.114)	(0.111)	(0.118)	[0.002]
Rural resident with agricultural hukou	0.240	0.256	0.221	0.035***
	(0.427)	(0.436)	(0.415)	[0.008]
The number of children	1.384	1.592	1.152	0.440***
	(0.622)	(0.711)	(0.390)	[0.032]
Income (thousand yuan)	95.241	92.888	97.868	-4.980*
	(213.989)	(208.666)	(219.757)	[2.689]
Asset (thousand yuan)	1181.691	1130.494	1238.846	-108.352
	(4914.803)	(2302.243)	(6723.164)	[66.697]
Age group of household head: 25≤age≤35	0.179	0.183	0.174	0.009
	(0.383)	(0.386)	(0.379)	[0.006]
36≤age≤45	0.401	0.428	0.371	0.057***
	(0.490)	(0.495)	(0.483)	[0.008]
46≤age≤55	0.336	0.324	0.350	-0.025***
	(0.472)	(0.468)	(0.477)	[0.008]
56≤age≤65	0.084	0.065	0.105	-0.040***
	(0.277)	(0.246)	(0.307)	[0.004]
Financial literacy score	1.034	1.016	1.054	-0.038**
	(0.920)	(0.921)	(0.918)	[0.017]
Risk attitude	2.186	2.192	2.180	0.012
	(1.207)	(1.202)	(1.212)	[0.018]
Female	0.508	0.506	0.511	-0.005
	(0.500)	(0.500)	(0.500)	[0.007]
Education level: No schooling/primary school	0.188	0.200	0.175	0.025***
	(0.391)	(0.400)	(0.380)	[0.007]
Junior high/senior high school	0.566	0.569	0.563	0.006
	(0.496)	(0.495)	(0.496)	[0.007]
Undergraduate	0.232	0.219	0.246	-0.028***
	(0.422)	(0.413)	(0.431)	[0.007]
Postgraduate	0.014	0.013	0.016	-0.003*
	(0.119)	(0.113)	(0.125)	[0.002]
Marital status (married = 1, unmarried = 0)	0.953	0.960	0.946	0.013***
	(0.211)	(0.197)	(0.225)	[0.003]
Employment status (employed = 1, unemployed = 0)	0.787	0.785	0.789	-0.004
	(0.409)	(0.411)	(0.408)	[0.006]
Observations	27,926	14,731	13,195	

Notes: The data from 2013, 2015, 2017 and 2019 CHFS. Standard deviations are given in parentheses. Standard errors are given in squared parentheses. *p < 0.1, **p < 0.05, ***p < 0.01. Difference = the mean of families with daughters (column 2) – the mean of families without daughters (column 3). A *t*-test is applied.

Table 3: One-child households

	OLS		RE	
	Saving rate	Having a stock account (Yes =1)	Saving rate	Having a stock account (Yes =1)
	(1)	(2)	(3)	(4)
Panel A: regression results				
Daughter (ref: son)	-0.013	0.010	-0.012	0.019
	(0.008)	(0.009)	(0.008)	(0.016)
Age of child (ref: 0≤age≤12)				
13 ≤age≤ 17	-0.007	0.000	-0.018*	0.006
	(0.007)	(0.012)	(0.009)	(0.017)
18≤age≤ 22	-0.005	-0.019	-0.011	-0.034**
	(0.009)	(0.011)	(0.012)	(0.016)
23 ≤age≤ 26	0.058***	-0.016	0.060***	-0.035**
	(0.010)	(0.013)	(0.013)	(0.016)
27≤age≤ 35	0.104***	-0.022	0.093***	-0.043**
	(0.011)	(0.013)	(0.018)	(0.017)
Daughter × [13, 17]	-0.010	-0.015	0.003	-0.023
	(0.008)	(0.020)	(0.010)	(0.029)
Daughter × [18, 22]	-0.021**	-0.002	-0.023*	-0.013
	(0.009)	(0.014)	(0.013)	(0.017)
Daughter × [23, 26]	-0.026**	-0.009	-0.028*	0.001
	(0.012)	(0.018)	(0.015)	(0.025)
Daughter × [27, 35]	-0.006	0.020	0.000	0.007
	(0.013)	(0.020)	(0.017)	(0.027)
Variables controlled	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	18,836	18,836	8,822	8,822
R-squared	0.246	0.236		
R2 within			0.169	0.023
R2 overall			0.252	0.232
R2 between			0.285	0.279
Panel B: a linear combination of parameters				
Daughter + Daughter × [1, 12]	-0.013	0.010	-0.012	0.019
	(0.008)	(0.009)	(0.008)	(0.016)
Daughter + Daughter × [13, 17]	-0.023***	-0.005	-0.009	-0.004
	(0.006)	(0.015)	(0.007)	(0.023)
Daughter + Daughter × [18, 22]	-0.033***	0.008	-0.035***	0.006
	(0.009)	(0.012)	(0.013)	(0.013)
Daughter + Daughter × [23, 26]	-0.039***	0.000	-0.040***	0.020
	(0.010)	(0.015)	(0.014)	(0.022)
Daughter + Daughter × [27, 35]	-0.019*	0.029	-0.012	0.026
	(0.011)	(0.019)	(0.015)	(0.024)

Notes: robust standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The regressions are clustered at the province level. The control variables are listed in table 2.

Table 4: Multi-child households

	OLS		RE	
	Saving rate	Having a stock account (Yes =1)	Saving rate	Having a stock account (Yes =1)
	(1)	(2)	(3)	(4)
Panel A: regression results				
SOD	0.007	0.048	0.041*	0.004
	(0.022)	(0.035)	(0.024)	(0.030)
The age of oldest daughter (ref: 1 ≤age≤12):				
13 ≤age≤ 17	-0.008	0.004	0.055*	0.008
	(0.021)	(0.023)	(0.033)	(0.018)
18≤age≤ 22	0.004	0.007	0.024	0.013
	(0.025)	(0.019)	(0.029)	(0.024)
23 ≤age≤ 26	0.118***	-0.001	0.153***	-0.005
	(0.026)	(0.025)	(0.029)	(0.022)
27≤age≤ 35	0.099*	0.014	0.085	-0.037
	(0.050)	(0.028)	(0.065)	(0.049)
SOD × [13, 17]	-0.008	-0.047	-0.104**	-0.022
	(0.029)	(0.039)	(0.044)	(0.033)
SOD × [18, 22]	-0.039	-0.038	-0.062	-0.018
	(0.033)	(0.032)	(0.039)	(0.038)
SOD × [23, 26]	-0.133***	-0.043	-0.168***	-0.017
	(0.043)	(0.042)	(0.048)	(0.032)
SOD × [27, 35]	-0.016	-0.068	-0.032	0.031
	(0.069)	(0.044)	(0.092)	(0.081)
Variables controlled	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	7,193	7,193	3981	3981
R-squared	0.212	0.187		
R2 within			0.163	0.002
R2 overall			0.208	0.120
R2 between			0.225	0.143
Panel B: a linear combination of parameters				
SOD + SOD × [1, 12]	0.007	0.048	0.041*	0.004
	(0.022)	(0.035)	(0.024)	(0.030)
SOD + SOD × [13, 17]	-0.001	0.001	-0.063*	-0.018
	(0.025)	(0.024)	(0.038)	(0.027)
SOD + SOD × [18, 22]	-0.032	0.010	-0.022	-0.014
	(0.027)	(0.022)	(0.030)	(0.029)
SOD + SOD × [23, 26]	-0.126***	0.004	-0.127***	-0.013
	(0.038)	(0.019)	(0.042)	(0.014)
SOD + SOD × [27, 35]	-0.008	-0.021	0.009	0.035
	(0.065)	(0.037)	(0.091)	(0.073)

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The regressions are clustered at the province level. The control variables are listed in Table 2.

Table 5: Mechanism analysis

	Son preference	Intention to buy a new home (Yes = 1)
	(1)	(2)
Family with daughter (ref: family with only son)	-0.044***	-0.064***
	(0.007)	(0.013)
Variable controlled	Yes	Yes
Province FE	Yes	Yes
Year FE	Yes	Yes
Observations	13,441	10,114
R2 within	0.003	0.008
R2 overall	0.021	0.056
R2 between	0.026	0.067

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The control variables are listed in Table 2. The regressions are clustered at the province level.

Table 6: Results from Oster's test

	One-child household		Multi-child household	
	Saving rate	Having a stock account (Yes = 1)	Saving rate	Having a stock account (Yes = 1)
	(1)	(2)	(3)	(4)
Coefficients: SOD	-0.021***	0.013	-0.035*	-0.007
	(0.006)	(0.010)	(0.020)	(0.016)
δ for $\beta = 0$ given $R^2_{max} = 1.3\ R^2$	-17.473	1.297	-14.408	-2.801
"True" β bound (when $R^2_{max} = 1.3\ R^2$, $\delta = 1$)	[-0.022, -0.020]	[0.003, 0.013]	[-0.038, -0.035]	[-0.010, -0.070]

Note*:* Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Using the 2013 and 2015 CHFS datasets for RE regression, OLS regressions are performed without interaction terms, and the results are used to run the '*psacalc*' command from Oster (2019) in Stata. The control variables are listed in Table 2, and the province and year effects are fixed. The regressions are clustered at the province level.

Table 7: A linear combination of parameters for the households with non-zero saving rate

	OLS		RE	
	Saving rate	Having a stock account (Yes =1)	Saving rate	Having a stock account (Yes =1)
	(1)	(2)	(3)	(4)
Panel A: one-child households				
Daughter + Daughter × [1, 12]	-0.004	0.008	0.004	0.017
	(0.006)	(0.014)	(0.008)	(0.022)
Daughter + Daughter × [13, 17]	-0.005	0.009	0.006	0.010
	(0.007)	(0.021)	(0.011)	(0.031)
Daughter + Daughter × [18, 22]	-0.034***	-0.005	-0.037***	-0.009
	(0.010)	(0.016)	(0.013)	(0.018)
Daughter + Daughter × [23, 26]	-0.033***	-0.001	-0.035**	0.010
	(0.010)	(0.019)	(0.014)	(0.024)
Daughter + Daughter × [27, 35]	-0.039***	0.024	-0.039***	0.013
	(0.009)	(0.017)	(0.013)	(0.028)
Observations	10988	10988	5084	5084
Variables controlled	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R square	0.298	0.252		
R2 within			0.334	0.047
R2 overall			0.310	0.247
R2 between			0.310	0.267
Panel B: multi-child households				
SOD + SOD × [1, 12]	-0.020	0.111**	-0.006	0.101
	(0.034)	(0.049)	(0.044)	(0.067)
SOD + SOD × [13, 17]	0.029	0.002	0.006	-0.011
	(0.031)	(0.037)	(0.054)	(0.048)
SOD + SOD × [18, 22]	-0.034	0.054	-0.041	0.026
	(0.049)	(0.032)	(0.072)	(0.058)
SOD + SOD × [23, 26]	-0.038	0.016	-0.063	-0.011
	(0.043)	(0.038)	(0.044)	(0.034)
SOD + SOD × [27, 35]	-0.001	0.004	0.086	0.048
	(0.059)	(0.061)	(0.112)	(0.105)
Observations	3,214	3,214	1703	1703
Variables controlled	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R square	0.301	0.212		
R2 within			0.302	0.001
R2 overall			0.313	0.151
R2 between			0.321	0.163

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The regressions are clustered at the province level. The control variables are listed in Table 2.

Table 8: Heterogeneity

	Saving rate		Having a stock account (Yes = 1)		Saving rate		Having a stock account (Yes = 1)		Saving rate		Having a stock account (Yes = 1)	
	Low financial literacy	High financial literacy	Low financial literacy	High financial literacy	Low education level	High education level	Low education level	High education level	Rural	Urban	Rural	Urban
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
SOD	0.035	-0.011	0.039*	0.073	0.042	-0.072	0.054**	-0.156	0.010	0.028	0.002	0.036
	(0.024)	(0.111)	(0.022)	(0.161)	(0.026)	(0.092)	(0.027)	(0.181)	(0.034)	(0.028)	(0.012)	(0.027)
The age of oldest daughter (ref: 1 ≤age≤12):												
13 ≤age≤ 17	0.029	-0.118	0.006	-0.079	0.042	-0.085	0.011	-0.226	0.002	0.038	0.021	-0.030
	(0.031)	(0.115)	(0.020)	(0.248)	(0.032)	(0.089)	(0.022)	(0.164)	(0.037)	(0.041)	(0.015)	(0.033)
18≤age≤ 22	0.024	0.026	0.019	0.039	0.035	-0.066	0.033*	-0.028	0.008	0.012	0.006	0.030
	(0.032)	(0.108)	(0.021)	(0.228)	(0.032)	(0.145)	(0.018)	(0.209)	(0.041)	(0.037)	(0.006)	(0.036)
23 ≤age≤ 26	0.128***	0.114	-0.040	-0.105	0.142***	-0.042	0.007	-0.555***	0.155***	0.099***	-0.007	-0.071*
	(0.027)	(0.224)	(0.028)	(0.224)	(0.028)	(0.097)	(0.026)	(0.175)	(0.044)	(0.038)	(0.010)	(0.039)
27≤age≤ 35	0.086	-0.205	-0.059	-0.620***	0.099	-0.636***	-0.059	-0.057	0.110	0.027	-0.003	-0.117*
	(0.061)	(0.154)	(0.047)	(0.195)	(0.065)	(0.080)	(0.042)	(0.317)	(0.091)	(0.085)	(0.010)	(0.069)
SOD × [13, 17]	-0.051	0.157	-0.014	0.010	-0.066*	0.075	-0.029	0.226	-0.022	-0.055	-0.019	0.019
	(0.037)	(0.139)	(0.032)	(0.338)	(0.040)	(0.092)	(0.037)	(0.171)	(0.057)	(0.046)	(0.018)	(0.038)
SOD × [18, 22]	-0.052	-0.067	-0.038	-0.145	-0.067*	0.053	-0.054*	-0.030	-0.023	-0.043	-0.010	-0.055
	(0.039)	(0.122)	(0.031)	(0.279)	(0.040)	(0.146)	(0.030)	(0.210)	(0.052)	(0.044)	(0.011)	(0.045)
SOD × [23, 26]	-0.102***	-0.082	0.035	-0.098	-0.120***	0.109	-0.027	0.576***	-0.140**	-0.061	0.009	0.056
	(0.033)	(0.240)	(0.044)	(0.285)	(0.037)	(0.112)	(0.043)	(0.201)	(0.060)	(0.044)	(0.018)	(0.051)
SOD × [27, 35]	0.001	0.196	0.062	0.475	-0.013	0.735***	0.074	-0.051	-0.027	0.064	0.001	0.106
	(0.073)	(0.208)	(0.066)	(0.306)	(0.079)	(0.127)	(0.057)	(0.328)	(0.123)	(0.089)	(0.016)	(0.085)
Variable controlled	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,022	415	7,022	415	6,102	1,335	6,102	1,335	2,505	4,932	2,505	4,932
R2 within	0.158	0.318	0.010	0.000	0.157	0.193	0.006	0.069	0.176	0.154	0.004	0.019
R2 overall	0.228	0.434	0.202	0.359	0.214	0.258	0.143	0.241	0.219	0.249	0.034	0.211
R2 between	0.256	0.436	0.237	0.369	0.239	0.290	0.168	0.291	0.243	0.283	0.046	0.253

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The control variables are listed in Table 2. The regressions are clustered at province level. We also control the number of children in each regression.

Appendix

A.1 2013 Financial knowledge questions

1. Given a 4% interest rate, how much would you have after five years if you had 100 RMB at first? a. Under 120; b. Exactly 120; c. Over 120; d. Cannot figure out

2. With an interest rate of 5% and an inflation rate of 3%, after saving money in the bank for one year, can you buy more or less than last year? a. More than last year; b. The same as last year; c. Less than last year; d. Cannot figure out

3. Do you think stocks have greater risks than equity funds? a. Yes; b. No; c. Never heard of stock; d. Never heard of equity fund; e. Never heard of neither

A.2 2015 Financial knowledge questions

1. Given a 4% interest rate, how much would you have in total after one year if you have 100 yuan deposited? a. Under 104; b. 104; c. Over 104; d. Cannot figure out

2. With an interest rate of 5% and an inflation rate of 3%, the stuff you buy with the money you have saved in the bank for one year is a. More than last year; b. The same as last year; c. Less than last year; d. Cannot figure out

3. Which one do you think is riskier, stock or fund? a. Stock; b. Fund; c. Haven't heard about the stock; d. Haven't heard about fund; e. Neither of them has been heard about

A.3 2017 Financial knowledge questions

1. If the Annual interest rate is 4%. One saves 100 RMB in 1-year time deposit, how much could one withdraw in 1 year? a. Less than 104 RMB; b. Just 104 RMB; c. More than 104 RMB; d. Cannot figure out

2. Suppose the interest rate of a 1-year time deposit is 5%, and the inflation rate is 3%. If one saves 100 RMB as a 1-year time deposit in the bank, how much could one buy with the money withdrawn from the previous 1-year time deposit? a. More than one year ago; b. The same as one year ago; c. Less than one year ago; d. Cannot figure out

3. Compare stock and fund. Which do you think is risker? a. Stock; b. Fund; c. Never heard about stock; d. Never heard about fund; e. Never heard about any of them; f. The same

A.4 2019 Financial knowledge questions

The first two questions are the same as the 2017 questions. The third question is removed from the 2019 questionnaire, so we use a similar one from the questionnaires:

3. Compare Equity fund with Bond fund. Which do you think is risker? a. Equity fund; b. Bond fund; c. Never heard about Equity fund; d. Never heard about Bond fund; e. Never heard about any of them; f. The same