When a Son is Born: The Impact of Fertility Patterns on Family Finance in Rural China*

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Abstract

This paper examines the impact of an observable "shock", the birth of a son, on household finance and investment in rural China. We propose a mechanism that endogenously generates heterogeneity in the levels of financial activities and investments on the basis of a child's gender, assuming parents do not possess discriminatory taste against a daughter. We refer to this mechanism as the "invest via a son" hypothesis compared to the conventional "taste for a son" explanation. Using nationally representative household data collected in 300 rural Chinese villages and econometric models that account for censored financial activities as well as endogenous fertility decisions, especially sex selection, we present strong evidence that having a son increases the amount of gifts and remittances a household receives from friends and relatives, it also increases the amounts that a family loans and gives to others. Moreover, having a son is found to increase household investments in both agricultural activities and family businesses while no type of expenditure increase with the arrival of a son, clearly consistent with our "invest via a son" mechanism. Taken together, these results suggest that social conventions play important roles in household financial decisions that extend beyond the traditional role of budget constraints and consumption shocks.

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1 Introduction

Similar to other East Asian countries, Chinese society maintains a well-known tradition of strongly preferring sons over daughters. While the macroconsequences of this son preference have spawned a voluminous literature in both demography and economics,[1] there has been substantially less attention paid to outcomes at the household level. Most existing research at the household level investigates how parents treat their sons and daughters differently in consumption and human capital investments,[2] but does not address the consequences of how having a son affects household decisions or outcomes as a whole.[3] If families consume and purchase inputs such as education and medical care differently for their sons and their daughters, it is reasonable to expect that families with different offspring gender structures to also vary in their financial activities and physical capital investment decisions. These dimensions of heterogeneity across households are the focus of this paper. Household heterogeneity as such is important to document for two reasons: First, the operating framework within rural finance literature has been representative households receiving different amounts of exogeneous shocks, which makes heterogeneous households the natural next step to investigate. Second, perhaps more important theoretically, having heterogeneous households might endogeneously give rise to informal financial networks without resorting to outside shocks and hence having the potential of offering alternative explanations of their functioning.

The core of this paper is to empirically investigate if in rural China a specific form of household heterogeneity, whether the household has a male heir, influences household financial activities and

[1] For example, Edlund (1999) and Guo and Deng (2000) discuss how son preferences can affect marrriage patterns in China. Son preferences have also been shown to influence savings behavior (Wei and Zhang, 2009) and criminal activity (see e.g. Edlund et al., 2008; Hudson and Boer, 2002).

[2] Human capital investments (Knight and Song, 1993; Song, 2000), consumption expenditures (Lee, 2008), expenditures on health care (Burgess and Wang, 1995), the intake of nutrients (Park and Rukumnuaykit, 2004) and health status (Yu and Sarri, 1997) are areas that have drawn the attention of researchers on gender inequality in China. More generally, gender bias in household expenditures has been extensively examined with data from other developing countries, e.g. see Jacoby 1994; Behrman, 1998; Rose, 2000; Das Gupta 1987; Kishor 1993; among others.

[3] A clear exception is Knight and Li (2008), which shows that having a son increases parents' labor supply and hench household income.

investment decision making in multiple domains. Our empirical investigation is informed by a specific mechanism that we propose, which in the style of statistical discrimination, elucidates on how the arrival of a son changes how a family invests. In rural China, social security and community-based old-age care systems remain scarce, and children are viewed by many parents as the most important contributors to their old-age care. However, like in many developing and developed countries, not all children are equal when it comes to old-age care (Astone et al., 1999). Cultural norms dictate that male adult children are primarily responsible for the care of their elderly parents while female adult children are mainly responsible for the care of their elderly in-laws.[4] In conjunction with the common belief that female laborers are less productive than their male counterparts in agricultural production, these conventions provide powerful economic incentives for parents to favor sons over daughters. Thus parents who value the expected old-age support are now incentivized to invest more in their sons' future earnings, which leads to deeper engagement in borrowing, lending and investing activities by households who have young male heir(s) even in the absence of an explicit "taste" against daughters.

It is important to state from the outset that this may not be the only mechanism at play. For instance, non-pecuniary incentives including cultural and social reasons may prompt parents to invest more in a son even when he is not expected to deliver additional monetary benefits to parents when compared to a daughter. It is neither our intention nor critical for establishing our results to rule out alternative mechanisms. The purpose of our paper is to establish household finance heterogeneity along offspring gender line. Our focus on expected old-age support from sons as the mechanism for heterogeneous household finance decisions in rural China results from it being more capable of producing empirically testable predictions than non-pecuniary motivations. It will be argued later in the paper that both the acceptance and rejection of these predictions are more informative than those from non-pecunairy mechanisms. Moreover, the evidence we will present is clearly more consistent with our "invest via a son" hypothesis.

[4] Cameron and Cobb-Clark (2001) and Das Gupta et al. (2003) both note that the persistence of son preference is driven by greater anticipated old-age support from sons relative to daughters and the absence of formal financial mechanisms for families to save for retirement.

The predictions from this specific mechanism are tested using nationally representative data of households in rural China, regions where the cultural and institutional features generate distinctively different expectations and incentives for parents from the birth of a son instead of a daughter. Our main empirical challenges arise when we must account for censored financial activities as well as endogenous fertility decisions including sex selection. Accounting for endogenous fertility decisions remains one of the major empirical challenges facing researchers investigating data from rural China.[5] After all, the strong son preference in rural China is not only manifested in discriminating investments in children of different genders but more prominently results in sex selective fertility decisions. Many families choose to abort female fetus.[6] Many families are believed to practice boy stopping rule (Zhang, 1994; Maureen et al., 1998). It is important to note that in these rural areas, the one-child policy generally allows for a second child after five years.[7] The son preference, however, is not necessarily monotonically increasing with the number of sons parents have. Conditional on having a son, the arrival of a daughter brings at least two pecuniary benefits to rural Chinese families besides her assistance on housework and sibling care: 1) the bride price that families receive when their daughter marries, which usually helps to finance the bride price that families have to pay towards the marriage of their son and, 2) some of the wage income generated by the daughter before she is married helps the family to feed, cloth and educate her younger siblings, usually a son

[5]Data from both the 2000 and 2005 Chinese census indicate that there are five provinces with more than 125 male births for every 100 female births, with the odds-ratio peaking at 135 in Hainan (e.g. Das Gupta et al. (2009) and Guilmoto (2009)). As such, we became uncomfortable treating the gender of the first born child as random in the analysis. Further, Hausman tests with our data rejected the hypothesis that the gender of the first child is exogenous, and the degree to which this hypothesis was rejected was particularly high when we focused solely on the subsample of villages situated in provinces that the census reports as having highly unbalanced sex ratios.

[6]There is a rich literature in demography documenting sex selection in developing countries, especially in East Asia. Sen (1990, 1992) are well-cited references that document the high ratios of males to females in India and China and the concerns this ratio generates. Chu 2001; Hull, 1990; Banister 2004; Kim 2005; Murphy 2003; Yi et al. 1993; and Johnson 1996 provide evidence of sex selection in China.

[7]The policy is underpinned by a system of rewards and penalties, which are largely meted out at the discretion of local officials and hence vary widely. In this study we will use spatial variation in these incentives to identify the impacts of household heterogeneity.

(Greenhalgh 1994; Lin 1993; Parish and Willis 1993; Tatyana and Vaithianathan 2008). Thus, although the preference of the first son over any daughter is dominant, conditional on already having a son, it is possible that a daughter is preferred to an additional son in some situations.

More generally, incorporating household heterogeneity measured at the offspring gender structure level has the potential to augment our understanding of rural finance in a significant way. The prevailing consensus in the rural finance literature (surveyed in Cox and Fafchamps (2008)) is that informal network-based loans and transfers provide insurance against negative shocks in consumption, production and health.[8] While this line of research has completed a satisfying sequence of explanations from the demand side on the role of informal network-based finance,[9] the empirical results of this study suggest that a factor which is missing from this literature is household heterogeneity. Specifically, households with different offspring structure might have differing demand for loans and transfers when faced with the same shock and budget constraints since their incentives and channels (via son) to invest differ. Symmetrically, these households are likely to provide different supply of loans and transfers under similar circumstances. The interactions of these heterogeneous households may generate network-based lending and borrowing in the absence of negative shocks, thus holds the potential to offer additional explanations of why informal financial networks exist and sustain.

In this paper, we present strong evidence that having a son increases both the amount a family transfer to friends and relatives and the amount they receive from these sources. While having an

[8] Most empirical testing of this theoretical consensus has shown that such insurance is only partially achieved (e.g. Fafchamps and Lund 2003; De Weerdt and Dercon 2006). The mechanisms and costs required to enforce the informal contracts might be responsible for the limited scales observed in order to sustain the networks (Murgai et al. 2002).

[9] A detailed examination of some informal financial networks reveals that they were largely kinship based and geographically constrained, thus limiting the organizations' ability of risk hedging. See Fafchamps and Gubert (2007) as well as the recent survey by Cox and Fafchamps (2008). This literature has shown that small networks in which members who trust each other and can punish reneging members have been shown theoretically to achieve high levels of insurance (see e.g. Genicot and Ray, 2003; Ambrus et al., 2009; Altonji et al., 1992; Foster and Rosenzweig, 2001; Karlan et al., 2009).

additional child increases the amount of transfers received, if that child is a boy, the family receives a 20% premium. Not only are these families with son more active in transfers and lendings, but they also invest more in agricultural activities and family businesses. In rural China, these are son-specific investments since a son typically takes over the land and family business from his parents while a daughter typically leaves the household upon marriage. Investing in family businesses and land is also substantially more viable than investing in a child's human capital, which is viewed as very expensive and risky by Chinese rural households.[10] The increased investments with the arrival of a son is not accompanied by expenditure increases; In fact, the total expenditure and food expenditure reduced slightly but significantly for families with son. This is clearly more consistent with our "invest via a son" hypothesis than any "taste for a son" hypothesis. Finally, we present strong evidence that the offspring gender structure variables should not be treated as exogeneous in household finance decisions and that the results are highly robust to a number of criteria used for sample construction, accounting for alternative selection biases and model specifications. Taken together, these results suggest that social conventions play important roles in household financial decisions that extend beyond the traditional role of budget constraints and consumption shocks. This has clear implications for policies that aim to address rising sex imbalance amid economic growth and discriminating investment to female children in developing countries.

This paper is organized as follows. Section 2 provides a review of the literature on rural finance and sex selective fertility, as well presents an overview of the prominent culture, institution and fertility history in rural China. The data is described in Section 3. In Section 4, we propose the theoretical mechanism and empirical hypotheses. The empirical results are presented and discussed in Section 5. Section 6 is the concluding section.

[10] This is consistent with evidence from Knight et al. (2008) and recent analyses of data collected by the National Bureau of Statistics suggesting that fewer than 3% of rural children attend tertiary education.

2 The Literature on Rural Finance and Sex Selection and the Background on China's One-Child Policy

This paper relates to branches of demography and the development economics literature that examine formal and informal mechanisms in rural finance, fertility and evidence for sex-selection. Within rural finance, it is well established that rural households often have limited access to formal financial institutions when confronted with negative income or consumption shocks. Informal channels are thus tapped to generate funding from other sources and social networks play a large role in these activities. Not surprisingly, these activities have led to both theoretical and empirical investigation within economics. One main empirical challenge in this area is trying to identify the different kinds of shocks that households face and when they typically occur. Research in this area generally present evidence that members within particular social networks are more likely to obtain loans and transfers, which is then used to smooth consumption.[11] There is also a growing body of evidence indicating that credit, gifts and other economic transactions provide insurance for social network members.[12] Moreover, evidence suggests that these ties between households in social networks provide similar returns to what would have been achieved by purchasing insurance contracts that protect against the consequences of adverse events such as earnings losses and illness (Caldwell et al. 1986; Rosenzweig, 1988; Rosenzweig and Stark 1989). Consequently, these

[11] Using longitudinal household data from rural India, Rosenzweig (1988, 1993) find that inter-household financial transfers play a small but significant role in consumption-smoothing. Using data from northern Nigeria, Udry (1994) reports that within informal credit institutions there is a great deal of activity from individuals on both sides of the credit market. Specifically, within a single year approximately 75% of households made loans, 65% borrowed (50% did both), and 97% of the loans (weighted by value) were between neighbors or relatives. The role of credit as a smoothing device has also long been recognized in the sovereign debt literature (e.g., Eaton and Gersovitz, 1981; Kletzer, 1984; Grossman and Van Huyck, 1988).

[12] Fafchamps (1992) presents evidence that solidarity systems are usually organized around delayed reciprocity contingent upon need and affordability. In other words, solidarity is a form of mutual insurance and can provide protection against many sources of risk. Using detailed data on gifts, loans, and asset sales in the rural Philippines, Fafchamps and Lund (2003) find that income and expenditure shocks have a strong effect on gifts and informal loans, but little effect on sales of livestock and grain.

largely kinship-based informal networks in rural finance have been termed "insurance capital" by Rosenzweig (1993). Our study contributes to this line of research by investigating the event of an accurately observed and important "shock" to rural families - the arrival of a son - and how such event leads to heterogeneous demand and supply of funds by otherwise similar families. This link between a son and a family's finance has rarely been established before, neither is household heterogeneity in borrowing, lending and investing.

In rural regions where households' livelihoods depend largely upon agricultural production the arrival of a son has been argued to be strongly preferred. Perhaps related to this production advantage, agrarian social conventions have parents depend primarily on their sons for support in old age (sometimes a son of a specific birth order), not daughters.[13] It is not surprising that fertility levels, as well as infant and child mortality levels (Das Gupta 1987; Kishor 1993; Muhuri and Preston 1991) have reflected this gender preference. Chu (2001) presents evidence that strong son preference led to the prevalence of prenatal sex determination and sex-selective abortion in rural central China.[14] She concludes that prenatal sex selection was probably the primary cause, if not the sole cause, for the continuous rise of the sex ratio at birth in the study area for the past decade.[15]

Any discussion of sex-selective abortions and fertility patterns in China must account for China's

[13] A partial list of studies documenting strong son preference in Asia includes Haughton and Haughton, 1995; Pong, 1994; and Larsen et al. 1998. Chu (2001, p.267) reports son preference in the scale of birth celebrations and how people speak of their sons and daughters. Related, Knight et al. (2008) discuss evidence of rural Chinese parents cosseting their infant sons more than their infant daughters.

[14] From the same survey (Chu, 2001) reports that amongst women who had sex selective abortions, nearly half of reported pregnancies were subject to sex determination by ultrasound examination, and nine out of 10 of the determined female fetuses in second pregnancies were aborted if the couple's first child was a girl.

[15] Many other studies also arrive at the conclusion that sex-selective abortion in China is an important cause for the rising sex ratio. Note that the manner in which sex selection takes place in China has evolved from abandoning female infants and female infanticide to sex selective abortions, following the widespread adoption of ultrasound machines in China from late 1980's to early 1990's. See Chu 2001; Murphy, 2003; Yi, et al., 1993; Johnson, 1996; and Ebenstein 2008 for details.

one-child policy.[16] While the policy is national, its implementation at the local level exhibits great heterogeneity. Empirical studies have found that the enforcement was more strict in urban areas (Zhang and Spencer 1992; Ahn 1994) and that better-educated women are more likely to comply with the policy (Wang 1989; Zhang and Spencer 1992; Ahn 1994).[17] To implement the policy, local governments at all levels are given incentive contracts in the form of fiscal and career rewards for fulfilling birth control targets and heavy penalties for falling short (Hardee-Cleaveland and Banister 1988; Short and Zhai 1998). For example, government officials may be demoted for allowing too many above-quota births in their regions, which means loss of all future income and benefits that come with government positions. The one-child policy encouraged the use of sex selective abortions by families with strong son preference when prenatal sex detection technology became widely available.[18] However, the consensus in the demography literature (Gu and Roy 1995, for example) is that this policy in China can at most account for the acceleration of the rising sex imbalance at higher birth parities, while the overall rising sex imbalance at birth since the mid-1980s is attributed to the changing social norm of desiring smaller family size combined with persistent son preference. Such rising sex imbalance at birth has also been witnessed in Korea, Taiwan and India and many in demography argue that fertility already peaked in China before the one-child policy. One main factor that can influence how intensely each locality wants to enforce the one-child policy is the regional overall and by parity sex ratios. Greater sex imbalance in a region not only represents strong local cultural preference for sons but also means increased pressure

[16] It is not true that the so named policy only allows each couple one child. Due to diehard resistance to its implementation and fearful of potential social unrest, in some rural areas and in certain years the one-child policy has been relaxed to allow women to have a second child if the first child is female (Hardee-Cleaveland and Banister 1988; Qian 1997).

[17] There are many potential explanations for both of these relationships. On the former, as discussed, parents in rural areas may have a stronger desire for a son for both consumption and investment reasons. On the latter, women with more education may also have better knowledge of the effective contraceptive methods, and thus engage in better birth control. These women are also more likely to suffer a larger cost by violating the policy, as a higher level of education is associated with improved socioeconomic status.

[18] In the early 1980s, officials dispatched portable ultrasound machines to hundreds of cities in China to improve medical diagnosis that were later used for fetus sex detection (Ertfelt 2006).

for local officials to enforce the policy, given that upper level governments frequently use those figures to assess their performance and set new performance targets. Another important factor determining local enforcement will is land size and population size in a region. If a village has a large population over small plots of land, the collective desire to control population growth is strong since more birth means worse land reallocation in the future. As a result, there is a more intense enforcement of the birth control policy. Naturally, idiosyncratic characteristics of officials in each locale also influences the enforcement will. Instead of viewing the one-child policy as one universal policy across the nation or using its much limited macro-level variation that divides provinces into levels of enforcement strictness, our paper will be the first to utilize such factors that influence the much greater variation of enforcement intensity at local levels of this highly controversial policy to properly account for sex selective fertility patterns.

Finally, in the field of family economics, the gender of a child has been extensively documented to affect consumption, saving and human capital accumulation.[19] We contribute to this literature by documenting various financial activities, preferred investment channels and the accompanied consumption patterns of modern Chinese rural families with young children. We next describe the dataset that enables us to conduct such an investigation in rural China.

3 Data

This paper uses data from a 2003 National Rural Household Survey (hereafter RHS03). This is a cross-sectional survey conducted by the Rural Survey Team (RST) of the National Bureau of Statistics (NBS). It matches information collected from questionnaires on up to 9 household members in 300 rural Chinese villages, with detailed village level information from local officials via survey administered in the preceding calendar year. The RHS03 is unique in that it contains information on a multitude of dimensions reflecting household financial activities and is understudied relative to most micro datasets collected by the National Bureau of Statistics (NBS) in China. The

[19] See Deolalikar and Rose (1998), Rose (2000) and Jacoby (1994) respectively for evidence on gender differences in these domains in other developing countries.

RST adopted a four-step stratifying approach towards sampling. First, 10 of China's 31 provinces were selected.[20] For each province, the RST randomly selected three counties or county level districts based on levels of economic development.[21] From each of these 30 counties, 10 villages were then selected at random. Using a household roster, the RST randomly selected 10 households from each village to participate in the survey.

In total, 3000 households were selected for the in-house study. The RTS conducted a single interview with each household in either February or March of 2003. During this interview, a 10 page questionnaire was read to the household heads, whose responses were immediately recorded.[22] Responses to the questionnaires provided information on the demographic composition of the household, incomes, expenditures, lending, borrowings, and entrepreneurial activities. The household head also provided detailed history regarding their own fertility and about their children who still reside at the residence.[23] The RHS03 also contains matched questionnaires about the village answered by village officials in 2002. This survey provides information on village demographics, topography, aggregate statistics on labor and businesses as well as property rights. There are multiple questions related to the development of the village (i.e. presence of TV signal, highway access, electric power, etc.) and distance to many government structures and transit options. Interestingly, the survey has a rich battery of questions on both the source and costs of using water for productive activities.

In our analysis, we focus on the financial activities of families in which the eldest child is no more

[20] Namely, Jilin, Liaoning and Heilongjiang provinces in northeast China with traditional manufacturing, Shandong and Jiangsu, who are among the wealthiest coastal provinces, Henan, Anhui, Hubei and Hebei in central China, whose agriculture is still prominent in the economy and Sichuan in southwest China with the most population.

[21] Primarily using GDP and GDP per capita criteria, the RTS picks one highly-developed county, one that is middle of the pack from a development perspective and one that is under-developed.

[22] To address the concerns of illiteracy and lack of telephone communication in some parts of China, all data was collected by at-home interviews. A selected household was visited successively by surveyors until the interview could occur, explaining the complete compliance rate.

[23] The questions on family structure and the history of the number of live births for the household head are substantially more detailed than other datasets from rural China, increasing our confidence that we have reasonably accurate family histories.

than 18 years of age (we investigate the robustness of our results to alternative age cutoffs, such as 16 and 20). This sampling requires each household to have at least one child. In families of at least three generations, the term "children" refers to the youngest generation of the household. Several reasons compel us to restrict the sample this way. First, the data provides no information that can separate daughters from daughters-in-law or grand daughters from grand daughters-in-law. In the sample parents refer to the spouses of their children also as "children". That is, if a 46-year-old head of household claims that the 22-year-old male and 21-year-old female residing in the house are his children, the female child could indeed be his daughter-in-law. This shortcoming of the data could confuse family fertility pattern in a significant way by adding daughters, at the very least. Limiting our sample for analysis to families where all children are still to be married is the surest way to avoid this problem. More importantly, given that this is an investigation of whether parents make different investment choices for sons over daughters before the children start to provide filial support back to their parents, having adult children greatly complicates the analysis. For example, little information is collected about their pecuniary and non-pecuniary contributions to parents, which alters a family's financial calculations; marriage of a child is an important decision that may be influenced by a family's financial situation; dependent children live with parents but not all married children do, so there may be an endogenous censoring of family offspring structure once families have adult children. Given the cross-sectional nature of the data, we have no good ways to control for potential biases associated with having adult children. We make the conservative cut of (≤ 18) for the eldest child, although almost all marriages occur strictly after age 20 for both girls and boys in rural China. This is equivalent to focus only on the first stage of an overlapping generation model.

3.1 Patterns in the Data

Table 1 presents summary information on the variables that we will use in our analysis. Most of the villages are small in size (with a population of 1768 residents on average) and roughly 15% of these villages do not have a doctor. There is substantial heterogeneity in both the total area of

cultivated land across villages as well as land per capita. The village sex ratio of the first child is 117.44 boys for 100 girls and in our estimation sample that only consists of families with children under the age of 18 it is 115.1 boys for 100 girls. Importantly, the sample statistics suggest that RHS03 is indeed a representative snapshot from the population of rural Chinese households.[24]

Among the families in our sample, we first observe that they are small in size, with slightly over four members on average. The majority of the families (70%) consist of only two generations. The average number of children in the family is 1.52 and on average there are 0.84 boys in each household. Slightly over 25% of the households do not have a male child. Among the household heads, fewer than 25% completed high school and fewer than 5% are college educated. Lastly, there is substantial heterogeneity in the myriad of measures of financial activities and the data is heavily skewed to the right for each measure. The heterogeneity in these financial activities appears to be similar to what has been documented with other data sources in rural China.

Table 2 shows how the gender of a child is associated with household decision making in a variety of domains by simple unconditional comparisions for a specific subsample of our data. It summarizes the financial activities of nuclear families with two parents: The columns differ based on whether the family has a male child. We observe substantial heterogeneity in financial activity along this slice of the offspring gender structure. On average, the families that have at least one boy receive significantly more funds from relatives and friends both from urban and rural areas; make larger gifts to friends and relatives in rural areas; and spend more money on investment

[24]In addition, we aggregated our data to the provincial level to determine whether the sample mean would fall within a 90% confidence interval centered on the population mean as reported in the Year Book of Chinese Economy in 2003 issued by National Bureau of Statistic in China. There area total of six variables for which our data and the National Year Book collected a similar measure. Givcen that we have 10 provinces this entailed 60 comparisions in which we used the sample standard deviation as an unbiased estimate of the population standard deviation. We found that in only 5 of the 60 of these comparisions that the sample standard mean fell outside a 90% confidence interval centered on the population parameter. Further, there was not a systematic pattern (either by variable or province). This further increases our confidence in the data. Note the six meausres we used were per-capita landsize managed by rural households, per capita net income, per capita living expenditure, per capita housing size, number of large vehicles per 100 households, number of large and medium tractors per 100 households.

in the family business, fixed assets for productive activities and non-consumption items. We will soon present formal evidence for all rural household structures that will paint a more complete and rigorous picture of how the arrival of a son increases financial activities .

Consistent with evidence on sex selection, we observe in the data that having a girl first significantly increases the likelihood that a family will have an additional child (54.12% versus 37.41%, one-sided test of equality of proportions, z = 8.8659, Pr(Z > z) = 0.0000), providing suggestive evidence of differential stopping rules.[25] Sex ratio on subsequent children is heavily skewed towards boys, particularly if first child is female. Conditional on having a girl first, sex ratio of the second child is 181 boys for 100 girls, Pr(Z > z) = 0.00. Interestingly, if your first child is male and if you do have a second child, the sex ratio is 92.6:100, Pr(Z > z) = 0.007. In addition, conditional on having two girls a household is significantly more likely to have a third child (odds ratio is 2.25 compared to other combinations). The village unconditional sex ratio of the second child is 144.7 boys for 100 girls and for the third child it increases to 150:100.

Given the prevalence of sex selection, we also examined whether there were any relationships between family background and the child's gender. Table 3 presents OLS estimates from a regression of whether a child is male on a series of predetermined parental characteristics and income, both including and excluding village fixed effects. The first two columns examine the gender of the first child. We find that there are very weak relationships between any of the explanatory variables and the gender of the first child; the full specification is jointly insignificant at conventional levels. Similarly in the last two columns, we present evidence that few family characteristics are significantly associated with the gender of the second child. Only the coefficent on income/1000 sqaured is negatively significant but miniscule in magnitude. In summary, while the general patterns in the data are consistent with other datasets on rural China, there are clear evidence of exercised choices regarding the gender and the number of children, which will have important implications for how we should treat the family structure variables in the formal analysis.

[25] The coefficient on having a boy first on the number of children a household has at the time of the survey from a simple OLS regression that also controls for both wage and total income, occupation, parental education and other parental characteristics is -0.289 and is statistically significant (t=9.96).

4 Empirical Setup

To motivate our empirical investigation, we propose the following mechanism for how the arrival of a male heir, especially the first son, increases a Chinese family's incentive to engage in a variety of financial activities that include lending, borrowing, transferring and gift exchange. The mechanism mimics a standard theory of statistical discrimination. Assume that parents care about the welfare of their children equally but, compared to a daughter, a son is expected to provide more pecuniary transfers to them when they are old, due to the existence of a social norm that dictates a son's filial support but less of a daughter's. That is, parents do not have an explicit "taste" against daughters, but believes that a son will bring more benefit to them in the future. Assume also that parents can invest in their child's future earnings ability in stage one, which affects the child's capacity to support his or her elderly parents in stage two. If the same amount of investment into a child's earnings ability in stage one brings greater yield for parents than the expected returns of the same amount on other available investments or saving instruments, parents will invest more into their child's future earnings ability than in a society where parents expect zero transfer from their child when they reach old age. Given that a son is believed to transfer more than a daughter, ceteris paribus, parents would thus invest more in their son's earnings ability.[26] That is, the greater the expected gap in filial obligations between a son and daughter in a society, the greater the gap in the investment parents would make in children of different genders. Faced with increased incentives to invest in a son's physical capital (the land, equipment and business he will possess), human capital (education and training) and social capital (good standings in various social networks), parents of a male heir will become more engaged in a variety of financial activities to enable those investments. In short, when a son is believed to be a better investment prospect than a daughter for parents' old age support, he gets more investment when young, and the family with a young son becomes more financially active to enable such investment than if they did not have a son.

[26] For parents with both a son and a daughter, they may only invest via a son for future filial support since the socially expected return from a daughter is lower, ceteris paribus. In this setting, parents invest only as much into a daughter as they care about her welfare. If we factor in the desire for risk diversification, parents may also want to invest in their daughter (still less than their son) for future transfers.

The advantage of this proposed mechanism based on parents' concern for old age care is that it is sensitive to market conditions and policy interventions, and can therefore generate sharp empirically testable predictions. For example, if the labor market condition has changed such that for the same amount of parental investment, daughters are expected to earn more wages than sons, this mechanism should predict that the gender-differential investment gap will narrow, ceteris paribus. When parents can depend more on government for old-age care or when better investment options are available for parents, this mechanism predicts that parent will invest less in their children and the gender-differential investment gap will also narrow. Should such predictions fail in empirical tests, we can confidently state that monetary incentives are most likely not a dominant reason for favoring a son, thus highlighting cultural reasons.

Obviously economic rationale is not the only explanation why parents may favor sons over daughters. Cultural and social reasons abound. For example, if parents value their legacy, and in a patriarchal society a son is believed to be a better instrument for parents to leave their legacy, increased investment into a son may also result. However, the legacy that parents value has to be of a specific type. For example, it should increase with more investment into a child's future productivity and there should not exist obviously better ways to increase it other than through increased investment in a son.[27] For example, if parents value carrying on the family name and only sons are socially permissible to do so, it would not necessarily make parents invest more into each son or one son. Having more sons and making sure they marry well and have children promptly could dominate the strategy of investing heavily into the existing sons' future productivity. Thus, cultural preferences towards sons do not automatically result in intra-family gender-differential investments. Moreover, the hypotheses that certain cultural norms are driving gender differential investments by parents are much less refutable than the ones based on economic incentives, given that the evolution of culture is often hard to measure, less understood and likely insensitive to market conditions or policy intervention. We argue here that even though our data does not enable us to make direct distinction between investment via a son and a "taste" for a son, we should

[27] Setting up a foundation or building a museum or library cuold be alternative ways for parents to leave their legacy. Thus, legacy concerns do not automatically lead to more investment in a son.

adopt the former as the Null hypothesis, whose mechanism is articulated above, because it holds the promise to be identified or refuted from a "taste" of a son, for which the opposite does not hold. For its ability to generate more informative results, we propose it as a more promising start for this type of research program. We will discuss later our evidence favoring the invest-via-a-son hypothesis.

So far, we have focused on individual households. In network-based rural finance, households both demand and supply funds to each other, so we must bring our discussion to the equilibrium level. Our mechanism has postulated that, compared to a family with a young daughter, ceteris paribus, a family with a young male heir demands more credit due to stronger incentives to invest in a son's future earnings by building physical and human capital for the son. As well, a family with a son is willing to supply more credit and reciprocate gifts to other households to build up greater social capital for the son. Thus, a family with a son is clearly preferred by credit (and reciprocal gifts) suppliers as well as credit (and reciprocal gifts) demanders on the market, ceteris paribus, or at least it cannot be argued that a family with a son should be less preferred in the market to the same family with a daughter instead. This greatly simplifies the prediction of equilibrium quantities. In equilibrium, the greater demand and supply from a family with a young male heir translates into a greater equilibrium level of credit obtained and supplied, as well as more gift exchange.[28]

4.1 Empirical Strategy and Identification

To investigate the equilibrium level of activities in specific domains of financial activity and capture the vector of variables of interest in X_i and other variables that typically affect market demand and supply in X_c. These factors also include several controls for existing assets (i.e. land size) that could be used for collateral. Our focus is to understand how offspring structure affects these

[28] In a companion paper, we describe in detail the rural network-based financial market with families that have sons versus those with daughters and provide an alternative explanation of the functions of this market when we have heterogeneous households, to the prevailing argument of the need for consumption insurance. In this paper, we focus on the household level, not the market level.

financial activities and we estimate the following equation

$$Y_i^* = X_i\beta + X_c\gamma + \varepsilon_i^* \tag{1}$$

where Y_i^* is the equilibrium level of financial activity. A complication is that we do not directly observe Y_i^* but rather see Y_i where

$$Y_i = Y_i^* \ \ if\ Y_i^* \geq 0 \tag{2}$$

$$Y_i = 0 \ \ if\ Y_i^* < 0 \tag{3}$$

In other words the data only contains X_i and $Y_i = \max\{0, Y_i^*\}$ and implicitly the regression error term ε_i is also censored, as $\varepsilon_i = \varepsilon_i^*\ if\ Y_i = Y_i^*$, and $\varepsilon_i = 0 - X_i\beta - X_c\gamma$ if $Y_i = 0$. Our main interest will be to investigate the sign, magnitude and coefficient on the two variables contained in X_i : whether the family has a son and the number of children in the household.

Two econometric issues arise in the estimation of equation (2). First, the complication means that Y is a zero-inflated continuous variable and an OLS estimation of equation (1) would yield biased and inconsistent estimates. If we assume that $\varepsilon_i^* \tilde{} N(0, \sigma^2)$, the model can be estimated via maximum likelihood to recover consistent estimates.[29] This is commonly referred to as a Type I Tobit model. However, a Type I Tobit model requires that all the covariates in X_i be exogenous. In our setting our key explanatory variables of interest capture dimensions of family offspring structure that are likely to be endogenous in the sense that they reflect fertility decisions as to whether the parents would conceive a (an additional) child and whether to engage in sex selective abortion. If parents who exercise their strong son preference that results in more children and more sons in a family are also the ones tend to borrow more, the effect of having a son on family borrowing is likely to be overestimated. This type of endogeneity presents the second empirical hurdle for our investigation.

[29] It is well established that consistency of estimates derived from a Tobit maximum likelihood estimation procedure is sensitive to the assumption on the error term's distribution. While semi-parametric strategies have been proposed for exogenous covariates (e.g. Chay and Powell (2003) for a survey), if the covariates are endogenous an additional challenge is faced since the trimming procedures for these strategies depend on the covariates, hence the trimming itself is endogenous.

To account for both the zero-inflated nature of our dependent variable and for the endogeneity of the number of offsprings and their genders, we follow Newey (1987) and use the Amemiya Generalized Least Squares (AGLS) counterpart of the conditional maximum likelihood estimator. Intuitively the estimation involves two stages. In the first stage, OLS estimation is applied to produce the predicted value for the endogenous regressors on all the exogenous regressors including a set of instruments W_i, that are both correlated with the endogenous regressors and $E(\varepsilon_i^*|Wi) = 0$. In the second stage, Tobit estimation of equation (1) takes places where the endogenous regressors are replaced by their fitted value and residuals from the first-stage regression are included with the other control variables. However, the estimated coefficient on the first-stage fitted values are not efficient since they do not take into account the variance–covariance of the predicted variable and the first-stage residuals. To remedy this, Newey (1987) proposes applying GLS to minimize the distance between the structural parameters β and coefficients from Tobit estimates of the reduced form model of equation (1). This estimator is equivalent to the Minimum χ^2 estimator and under some general regularity conditions this yields asymptotically efficient estimates. A further advantage of this approach is that the minimum distance function provides a straightforward statistic for the test of over-identification restrictions. Thus we do not need to construct the widely used but often controversial J-test (for its weak rejecting power) statistic for over identification tests.

Identification of the structural parameters require that the instruments in W_i only affect financial activities through whether there is a male child in the household and the number of children. As explained in Section 2, our instrument sets include measures of the factors that a household has no direct control over but may influence both the number of children and the propensity of a household to engage in sex selective abortions. First, the implementation intensity of the one-child policy in the local region (village or county). We argue in Section 2, that on average a village with less cultivated land per capita has a stronger collective incentive to implement the birth control policy. That is, more population and less land lead to more collective willingness to impose stricter enforcement of the one-child policy. The stricter the policy is enforced, the greater the propensity for sex selective abortion by individual households, ceteris paribus. Moreover, the existing sex-ratio imbalance of the region can also proxy for enforcement intensity. Holding regional son preference

constant, the more imbalanced a region's sex ratios by parity, the more the pressure from upper levels of government to enforce a stricter birth-control policy. In fact, not being able to rein in a runaway birth rates may result in the sacking of government officials. Obviously, the enforcement intensity of the one-child policy also has direct impact on the average number of children each household has.

Second, the intensity of son preference in the region. The more intense the regional son preference, the greater the propensity for sex selective abortions and the tendency to have more children to ensure a male heir, ceteris paribus. When holding policy enforcement intensity constant, the village and county level sex ration imbalances measure the intensity of son preference in the region, especially on higher order parities (starting with the 2nd child). We argue that after controlling for a household's own characteristics that include land size, incomes, assets and debts as well as several village economic development variables, the village population, village land size and village children sex ratio by parity not only are beyond the direct control of a household, but also should not directly affect a household's financial activities.

One may worry that after controlling for village economic development, some village level characteristic may still correlate with households' financial activities directly. For example, it is conceivable that bigger villages or villages with more land may still see more financial activities on average. While this cannot be ruled out entirely, the raw correlations between factors in W_i and the village-level financial activities tend to be very small, generally falling between -0.1 and 0.1. We would like to emphasize that since our counterfactual is the same household with or without a male heir, to threaten our identification it has to be the case that bigger villages or villages with more land also happen to be villages with more households with a son in our sample. The raw Pearson correlations between village land per capita and size of the villages (variables that are included in W_i) and the percentage of households in each village that have a male child is respectively -0.0383 and 0.0317. Thus, these issues do not appear to threaten our identification strategy. Note that the full set of results presented in the next section are robust to using village land per capita instead of population and land size as instruments in addition to the instrument of village sex ratio.

5 Results

The three panels of Table 4 present Amemiya GLS coefficient estimates of equation (2). Our baseline specification consists of regressing the log of a series of financial activities on covariates that include family structure, household type, family gross income and wage income from salaried positions (both up to a quadratic), regional macroeconomic indicators, parental age and education indicators. Our main interest with this specification is on whether or not the family has a boy and we treat this variable as well as the number of children in the household as endogenous in all specifications. Since each financial activity measure (recall Table 1 containing measures in 2002 RMB) is substantially skewed to the right, we transformed each of these measures (plus a penny) by taking the logarithm. In panel 4A, our focus is on financial transfers both into and out of the household. Notice that if there is a male child in the household, families receive more total income from gifts and remittances and also are significantly more likely to receive loan repayments. The impacts on these factors are approximately equal to six-tenth of one standard deviation increase in the transformed dependent variable. Having a male child also increases the amount of funds transferred outside the household, gifts to relatives as well as the amount of income transferred to the household (all income from gifts and remittances), but the only impact that is statistically significant is at the 15% level and refers to cash gifts to relatives in rural areas. It is reasonable that as a family has more children, they receive more funds and are less likely to make gifts or transfer funds out of the households. In general, having an additional child leads to a large decline in many activities in giving and receiving but does lead to a significant increase in receiving gifts from relatives and friends outside rural areas. If that additional child is a boy, both outgoing and incoming transfers increase. In particular, the total income from gifts and remittances increase over 40% for the household. The last but one row of Table 4 contains results from a Wald test of the exogeneity of the instrumented variables in equation (1). Irrespective of the dependent variable, the test statistic is significant, providing sufficient information in the sample to reject the null hypothesis of no endogeneity.

In panel 4B, our attention turns towards expenses the family has on both consumption and investment activities. For those outcome variables in which all families partake and there is no

censored activities (i.e. expenditures on consumption and expenditures on food) we report linear IV estimates and conduct Hausman tests for endogeneity all each outcome except expenditure on fixed assets or expenditure on assets. Examining this panel, several interesting findings emerge. Families with a son behave as if having a longer term financial horizon: they make significantly larger investment in both family businesses and on long-term assets that increase productivity in agricultural activities. While these families make larger investments, they also spend less on household consumption expenses and food; while both decreases are statistically significant, the magnitudes are small (6.6% of a s.d. on consumption and 8.2% for food). The investment and consumption patterns here are clearly more consistent with the invest-via-a-son mechnism that predicts more investment (productive) but not necessarily more consumption (not all productive) while contradict the taste-for-a-son mechnism that predicts more consumption for a son. While contrary to the general perception, these results on food consumption are consistent with recent work by Lee (2007) who also does not find any evidence of bias on food consumption but presents evidence of significant bias on medical care towards sons in rural China.[30] Not surprisingly, families with more children consume more and spend more on food (neither statistically significant, though) and are significantly less likely to engage in investment oriented activities. Taken together, the results in Panel B of Table 4 indicate that ceteris paribus, having a boy does lead to increased financial activities that are investment oriented.

Finally, in Panel C of Table 4, we find that having a boy is associated with more debts and loans, but none of these impacts are statistically significant. The sign of the estimates is suggestive that having a boy may increase the degree to which others perceive one's risk of default. Note that families with boys do on average receive lower interest rates from both the formal and informal sectors, but this decrease is not statistically significant. While families that have more children tend to have higher asset and debt levels on average, whether the family has a son exerts no significant influence on these amounts.

[30] As illustrated in table 4B, we do not find evidence of a signifcant link between medical care consumption and having a son. Lee (2007) concludes that, while the family-planning policy may have increased sex selective abortions, it also likely improved the observed welfare of the girls who are born in the family.

While some of the patterns related to having a boy and the household's financial activities could be surprising, the general relationship between other covariates, including the number of children and financial activities, is generally what is expected. Whereas income impacts financial activities, parental education and age have very few significant impacts, indicating that the only demographic characteristics of a family that seem to have significant impact on financial activities are related to the size and gender composition of the children in rural China.[31]

To check the performance of instruments, we first examined the first-stage regressions. Estimates of the first stage equations are presented for the full estimation sample in the first two columns of Table 5. Notice that all the instruments are statistically significant in explaining whether there is a male child, and as indicated in the bottom row, are jointly relevant in explaining both of the family structure variables. The F-statistic from a test of the joint significance using the full set of instruments from a linear regression are in all cases significantly greater than commonly used cutoffs for weak instruments.

Since the AGLS estimate is equivalent to the minimum χ^2 estimate, the value of the criterion function is a χ^2 statistic with degrees of freedom equal to the number of extra instruments. This can be used as a joint test of the overall specification of the model and the validity of the instruments. The p-value of the χ^2 statistic (in [] parentheses in the second to last row of table 4) is greater than 0.10 for every outcome considered in table 4. Thus, the null-hypothesis that the model is correctly specified and the instruments are valid cannot be rejected.

We next re-estimate equation (1) only on the subsample of families for which the first child was a female. For this subsample, one could argue the endogeneity issues that arise from ensuring a male child and the resulting number of kids may be more severe. The results are presented in a set of three panels in Table 6. Looking across these panels, we find that the signs of the coefficients appear similar but, due to the smaller sample size, many lose their statistical significance. Cash gifts

[31] The ages of the children (both of the eldest and youngest) do not have strong systematic patterns. We considered several alternative variables for dimensions of the children along their birth order. However, only the number of children and whether or not having a son entered in most specifications in a statistically significant manner and maintained a consistent quantitative and qualitative pattern.

made to rural relatives and friends and cash gifts received from relatives outside increase markedly (significant at the 15% level) when an additional child is male. The large positive impacts of having a boy on investment in family business (5% sig.) and productive fixed assets for agricultural activities (15% sig.) still remain, together with the statistically signifcant but small in magnitude reduction in consumption, especially food for these familes, providing further support for the invest-via-a-son as opposed to taste-for-a-son mechanism. In general, the relationship between the number of children in a family and financial activities are similar to that reported in Table 4, although most coefficients are smaller in magnitude. Lastly, tests of exogeneity continue to suggest these family structure variables should be treated as endogenous throughout the analysis.

The third and fourth columns of Table 5 present the first stage regression results that correspond to Table 6. As before, three of the four instruments are individually statistically significant in explaining each of the endogenous regressors. While the first stage F-statistic for whether there is a male child is above current cutoffs for weak instruments, the joint relationship of these instruments on the number of children is 7.36. Given that there are multiple endogenous regressors, we computed the Cragg-Donald statistic and compared it to the cutoffs presented in Stock and Yogo (2005). The results suggest that weak instrument bias is of limited concern in this sample. Taken together, our results in tables 4 and 6 suggest that having a boy in rural China alters how a family conducts its affairs, and indicates the importance of having a boy on a family's decision to maintain and invest in an agricultural livelihood.

5.1 Discussion

Several features of the empirical results are worth some additional elaboration. First, we present evidence of substantial gender bias in investments into both family businesses and fixed-assets. Investing in family specific businesses and on productive fixed assets is a very son-specific investment in China. We do not see similar bias underlying investments into human capital. While these results may appear surprising to some, they are consistent with a growing body of evidence on rural Chinese

household.[32] It is possible that we did not capture gender bias in human capital investments since our data only contains a single year of education expenses and the difference on annual basis is too small to detect the bias. A more likely explanation however, is that investing in a child's human capital is neither a viable nor an attractive option to the average rural household in 2002, Thus, it could be a rational response given the growing cost of university and secondary school education, the increasing inaccessibility of high school education (Wu and Zhang, 2010) and the lack of a well-functioning student loan program, which all present substantial barriers for rural households to send their children to pursue higher education.[33] Coupled with the finding that the primary return to high school education may be as an input for post-secondary education (e.g. Appleton, Hoddinott, and Knight, 1996) and that few rural children ever can attend tertiary education (<5%), the likelihood of realizing benefits by increasing son's income through education investment appears to be a viable option only for those few families in rural China with gifted sons and higher family incomes. Taken together, investing in land and family business for a son are more available and feasible than human capital investment for a son in rural China in general, at least they are not inferior to schooling investment.

Second, while there is substantial discussion in the economics and demography literature on the macroconsequence of the skewed sex ratios in China, and policy discussions related to whether parents make different human capital investments based on the gender of their child, our results indicate that this is not the only or even major dimension of discriminating investment in stages of child development.[34] Although our data cannot directly distinguish between "invest via a son"

[32]For instance, see Knight et al. (2008) evidence for how sons affect labor supply decisions and investments in productive fixed assets.

[33]See Cai, Park and Zhao (2004) or Hanumn (2004) for discussion and evidence related to entry barriers for college and universities in China. Note that there is also increasing unemployment among college graduates and the extent to which jobs are allocated through social network, which put rural families at great disadvantage, may further explain lower desire to investment into tetiary education. More generally, it appears that higher education was an increasingly risky investment in China for rural households in early 2000's.

[34]This result is consistent with evidence reported with US data (Lundberg and Rose, 2002) as well as data from rural China (Knight et al., 2008) that the gender of the child also impacts both wages and labour supply, and how the family makes time investments in child rearing. Knight (2008) conclude that having a son acts as a spur to securing

mechanism versus "taste for a son" mechanism, it is not obvious why "taste for a son" should necessarily lead to a reduction in food and other consumptions if the family has a son, whereas the "invest via a son" hypothesis perceives the son to be an optimal investment vehicle for the family, which could naturally coincide with our results indicating small decreases in food and other consumptions and increases in both fixed asset and family business investments when the family has a son. After all, these are investments made for the young son who would inherit land and the family business, be more bound to the parents later in life through the investment in land productivity and family business expansion. More generally, studies that examine whether gender differences in human capital investments exist in China rarely consider and account for these potential differences in home inputs.

Third, we have explored the geographic pattern of our estimates since there has been unbalanced socioeconomic development across provinces following the economic reform in the late 1970s which, as Qian (2008) shows, is correlated with the increase in sex ratios in China. Specifically, we reestimated equation (1) omitting pairs of provinces as sorted by per-capita income.[35] Our interest is to determine to what extent the impact of offspring structure on financial activity is a regional phenomena and which provinces are driving the results reported in Table 4. We find that the significant impacts of offspring structure on a range of financial activities are not driven by any specific province pair and generally are obtained within each province. An important exception occurs when we examine the lowest three provinces in rural income per capita: Anhui, Hebei and Henan. Using data from these provinces, we find that having a boy only leads to a statistically significant decrease in expenditure on food, and the magnitude of the effect is roughly 70% of the size of that reported in Table 4, but does not have a significant impact on financial activities and investments. In contrast, estimating equation (1) with data from the highest per-capita income

non-farm employment, which is generally more remunerative than farming. Wei and Zhang (2010) argue that there will be differences in savings behavior as a child ages (that may also impact development through the availability of other resources) between families with and without a son.

[35] We omit separately the bottom two, the top two, the bottom three and four, the top three and four and so on. We also examined several provinces by themselves but note that the small sample properties of our estimator are poor.

provinces: Jiangsu and Shangdong, we find the relationships between the financial activities and having a boy to be statistically significant and of the same signs as in table 4. Further, the estimated effect of having a boy on consumption expenditures (however this difference is not statistically significant) and investments in fixed assets is larger in magnitude in provinces with higher per-capita income. There are two possible explanations for the larger impact. First, in these coastal provinces the productivity of the agricultural sector is higher. Second, as these regions have higher per-capita income, although the percentage of household income devoted to these financial decisions and household expenditures is similar to other provinces, the absolute income devoted is greater.

5.2 Robustness checks

In order to present the best evidence on how offspring structure affects household financial activity in rural China, we conducted six different analyses to investigate the empirical validity and robustness of our results. We first replicated our entire analysis using alternative cutoffs for the oldest child in the household. Restricting the sample to where the eldest child is either no greater than 20 years of age or no greater than 16 years of age does not change the quantitative nor qualitative pattern of our results. Second, we recast the empirical exercise to determine whether offspring structure affected decisions to participate in a variety of financial activities (instead of the logarithmic of the amount of activity) and there were no major changes.

Our next four analyses use the same empirical strategy and estimating equation, but consider whether our results are robust to other potential sources of bias. Potentially, our earlier estimates may suffer from selection bias, since we are implicitly assuming that access to credit did not vary over time for the households in the sample. If few households had access to credit earlier, the unobserved variability of credit ceilings over time and across households may affect financial decision-making and the reliability of the estimates. To explore how the unobserved credit market conditions might affect the estimate, we repeated our analysis but only included families in which the oldest person in the home is first less than 50 years of age (1126 observations), and then less than 40 (801 observations). In both of these scenarios, the qualitative and quantitative effect of having a boy

on financial activities is not greatly affected. Similarly, when we reanalyzed the data to determine how the relationship varies based on the age of the oldest child instead of the eldest person in the household. Again there were no major changes in the patterns but we did notice that using higher cutoffs for the oldest child that the magnitude of the effects of child gender on transfers in and out of the household varied in a systematic manner. Specifically, in families where the oldest child is above 12 (and more so when above 14), the family on average receives smaller gifts from friends and relatives, but they are making larger transfers outside the home. This may be in response to expecting a larger return with a potential marriage in the coming years, a subject we plan to investigate further in future research.

We next examined the sensitivity of our main results to different sets of instruments used to identify the impact of having a male child as well as the number of children in the household. Omitting any of the instruments in isolation lead to little differences in the sign and magnitude of the impact of having a male child. However, in many of the specifications where we just used a subset of instruments, the statistical significance of the number of children variable disappeared. The larger standard errors were not surprising as the explanatory powers with these subsets of instruments were reduced.

For several reasons, it is reasonable to postulate that extended families (i.e. households sharing living arrangements with grandparents or other relatives) may behave differently from nuclear families. For instance, intergenerational transfers from the elderly to the young (or vice versa) may take place within the extended family but would not be recorded in the survey since only transfers received by the household from outside are reported. In our final robustness check, we examined the sensitivity of our estimates separately for the extended families and nuclear families. We find no major differences from the full sample with each subsample. These robustness checks greatly increase our confidence that having a male child in rural China does impact household financial decision making, investments and consumption.

6 Conclusion

While the macro-consequences of sex imbalance in China have been receiving increasing attention from academics, policy makers and media, the micro-level consequences of this strong preference for son on Chinese households have been understudied. Our paper fills in this gap by providing evidence that in modern rural Chinese households, the arrival of a son causes a family to give more gifts and remittances to their relatives and friends as well as receiving from them; this family also gives more loans to others; a family with a young male child consumes less on average compared to if the family has a daughter instead, especially on food, although this gap is small in magnitude (6%-9% of one standard deviation); most importantly, families with young male children invest significantly more in family business and fixed assets for land productivity but there is little evidence of increased investment in education. These decreases in consumption expenses and increases in investment activities are slightly larger for families whose young son is not the first-born. It is as if having a male child turns the entire family into a much more motivated business entity than if it does not have a son. Although we cannot directly refute a non-pecuniary "taste-for-a-son" story, we argue that these patterns are more consistent with our proposed "invest-via-a-son" mechanism, where parents care equally about a son and a daughter but perceive a son as a better investment vehicle for their old age care due to the prevailing social norm in China that dictates a son's filial support for elderly parents more than a daughter's. We propose that these land and business investments could be the more prevailing forms of differential investments into a son versus a daughter in rural China given that these investments are more feasible and generally son-specific, while human capital investments are costly, risky and unviable for an average rural household. These results clearly have implications for policies that aim to address rising sex imbalance amid economic growth and discriminating investment to female children in rural China and possibly other developing countries. It also has implications for policy-makers who view increased credit market participation by rural Chinese households as a pre-condition for further economic development and formal financial institutions attracted by the size of this generally untapped market.

In summary, our paper contributes to the existing literature in two ways. First, the differential

financial and investment activities of a Chinese rural family with a young son instead of a young daughter establish household heterogeneity in rural finance along the offspring gender dimension. Thus may hold the potential to explain rural finance beyond risk pooling and consumption insurance of representative households receiving outside exogenous shocks. Second, it links household fertility decisions, especially sex selection, to how a family operates as a business entity, providing economic consequences of demographic changes at a household level. With the promise from the research community of Chinese household panel data in the future, we will be able to understand these household finances in more details and more life-cycle stages.

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Table 1: Summary Statistics of the Main Sample

Variable	Mean	Standard Deviation	Minimum	Maximum
Number of boys in each family	0.8438	0.6007	0	3
Family size	4.0938	1.0083	2	9
First child is male	0.5642	0.4989	0	1
Family has a second child	0.4576	0.4983	0	1
Second child is male	0.5952	0.4912	0	1
Village sex ratio of first born children (sample)	0.5872	0.2809	0.31	0.87
Village sex ratio of second born children (sample)	0.6055	0.2290	0.25	0.9
Whether there is any doctor in the village	0.8257	0.3795	0	1
Acreage of cultivated land	3377.474	3080.957	159	20407
Village population size	1768.901	915.5011	207	5302
Village land per capita	2.2036	3.7054	0.137	79.837
Total household income	14599.65	10677.77	.0144	1.687
Household head is a business operator	0.0442	0.2056	0	1
Household head is a cadre (government official)	0.0599	0.2374	0	1
Household head is both a business operator and cadre	0.0097	0.098	0	1
Household head is on welfare (Wubaohu)	0.0018	0.0426	0	1
Household head has another occupation	0.1023	0.3031	0	1
Annual wage income for the household head	3437.441	4457.272	0	1
Household head has a college education	0.0454	0.2082	0	1
Household head has a high school education	0.2452	0.4303	0	1
Age of the mother	35.3606	7.1105	19	56
Age of the father	36.4787	7.3815	20	60
Age of the oldest child	11.5866	4.8499	1	18
Cash gifts made to friends and relatives	591.4546	926.0483	0	21000
Expense on financial transfers out of the household	728.6665	1438.24	0	17025
Loans obtained from informal credit	783.3269	2612.193	0	2200
Loans obtained from rural financial co-op	243.4401	1373.382	0	35163
Gifts from friends and relatives	172.2191	907.707	0	30000
Gifts from only rural friends and relatives	34.57869	331.6523	0	20000
All income from gifts and remittances	440.1416	1416.708	0	8300
Loans obtained from banks	58.29237	559.9215	0	23500
Amount of money returned from loans	432.3269	2060.632	0	12000
Total household expenditures	13013.29	13124.13	0	40000
Household expenditures on family enterprises	3390.769	6448.529	942	192844
Household exp on fixed-asset for productive activities	313.5448	1301.18	0	135598
Household expenditures on consumption	6957.104	5477.184	0	15350
Household expenditures on food	3129.799	1643.905	1001	62996
Cash gifts mad e to friends and relatives in rural areas	29.64831	145.5833	0	18974
Household expenditures on assets	103.0369	1082.409	0	39369
End of term net amount of debt	1137.967	3383.926	0	36000
End of term net debt to other individuals	672.0048	2609.146	0	30000
End of year net value of all financial assets	7041.399	10380.1	0	108344
Observations	1652			

Note: All financial variables are measured in 2002 Yuan.

Table 2: Comparing Financial Activities Unconditionally between Two-Generation Households With and Without a Son

	Nuclear Households Only	
Sample -> Variable	Family has a son	Family does not have a son
Gifts from friends and relatives	99.7169 (522.9805)	58.5149 (267.0181)
Cash gifts made to friends and relatives in rural areas	25.294 (124.181)	17.8713 (87.7934)
Cash gifts made to friends and relatives	521.4944 (676.9027)	509.802 (601.701)
Expense on all financial transfers out of the household	732.6562 (1973.95)	585.1584 (740.3112)
Loans obtained from informal credit	624.7213 (2172.293)	712.5248 (1622.076)
Loans obtained from rural financial co-op	191.4607 (1254.351)	230.6931 (943.2648)
Gifts from friends and relatives that reside outside rural areas	27.3191 (183.9977)	3.0693 (16.5374)
All income from gifts and remittances	319.7371 (942.1122)	342.703 (1126.341)
Loans obtained from banks	41.6 (343.7998)	9.901 (99.5037)
Amount of money returned from loans	393.9798 (2237.112)	538.2277 (1784.554)
Total household expenditures	13335.64 (16139.58)	12139.6 (12471.77)
Household expenditures on family enterprises	3596.791 (8408.564)	3012.891 (4465.107)
Household expenditures on fixed-assets for productive activities	360.8449 (1327.497)	204.5644 (833.0972)
Household expenditures on consumption	6743.546 (5210.973)	6332.95 (5311.942)
Household expenditures on food	2907.405 (1349.333)	2799.97 (1235.272)
Household expenditures on assets	116.6562 (676.7065)	50.0594 (268.5264)
End of term net amount of debt	1109.847 (3439.262)	1036.406 (2579.561)
End of term net debt to other individuals	758.6629 (2853.327)	699.9703 (2316.78)
End of year net value of all financial assets	7101.292 (11104.35)	5476.782 (10866.53)
Observations	445	101

Note: Each cell contains the mean activity in 2002 Yuan and the standard deviation is presented in parentheses.

Table 3: Is There a Pattern between the Gender of a Child and Family Characteristics?

	First Child is Male	First Child is Male	Second Child is Male	Second Child is Male
Household head is a business operator	0.012 (0.059)	0.102 (0.095)	0.116 (0.249)	-0.193 (0.423)
Household head is a cadre (government official)	0.075 (0.063)	0.079 (0.071)	0.223 (0.171)	0.094 (0.279)
Household head is both a business operator and cadre	-0.241 (0.113)**	-0.284 (0.152)	-0.015 (0.176)	-0.137 (0.287)
Household head is on welfare (Wubaohu)	0.153 (0.276)	0.001 (0.275)	0.165 (0.206)	0.097 (0.155)
Household head is employed in two activities	-0.010 (0.032)	0.043 (0.061)	0.302 (0.174)**	0.245 (0.285)
Other type of employment for household head	-0.017 (0.041)	-0.043 (0.079)	0.003 (0.223)	-0.089 (0.404)
Wage income/1000	-0.060 (0.053)	-0.007 (0.080)	0.086 (0.067)	0.034 (0.112)
Wage income/1000 squared	0.010 (0.022)	0.006 (0.039)	-0.044 (0.016)***	-0.069 (0.030)***
Household head has a college education	-0.008 (0.063)	-0.007 (0.070)	-0.039 (0.088)	-0.072 (0.131)
Household head has a high school education	-0.016 (0.032)	-0.014 (0.040)	0.009 (0.042)	-0.021 (0.067)
Age of the mother	0.004 (0.003)	0.006 (0.004)	0.007 (0.005)	0.005 (0.009)
Age of the Father	-0.005 (0.003)	-0.005 (0.004)	-0.006 (0.005)	-0.004 (0.008)
Age of the eldest child	0.014 (0.011)	0.017 (0.013)	-0.017 (0.035)	-0.001 (0.052)
Constant	0.498 (0.090)***	0.406 (0.114)***	0.493 (0.310)	0.525 (0.505)
Village Fixed Effects Included	No	Yes	No	Yes
F test on joint significance of explanatory variables	0.92 [0.5402]	1.02 [0.4336]	3.19 [0.0002]	2.44 [0.0024]
Observations	1652	1652	756	756
R-squared	0.01	0.19	0.02	0.38

Note: Specification also includes household gross income up to a quadratic and indicators for six household structure (i.e. nuclear households, three generations, etc.). Robust standard errors clustered at the village level in parentheses. ** significant at 5%; *** significant at 1%. The p-values from an F test of the joint significance of the explanatory variables are presented in [ ].

Table 4A: Amemiya GLS Estimates of Factors Affecting Financial Activities in Rural Households —Part 1

	Financial Transfers Outgoing			Financial Transfers Incoming			
	Cash gifts made to friends and relatives	Cash gifts made to friends and relatives in rural areas	Expense on all financial transfers out of household	Gifts from friends and relatives	Gifts from friends and relatives that reside outside rural areas	All income from gifts and remittances	Amount of money returned from loans
There is a male child	0.086 (1.533)	9.642 (6.463)^	0.645 (0.982)	34.861 (24.529)^	12.525 (12.562)	5.267 (2.386)**	65.896 (36.385)*
Number of children	-7.766 (2.309)***	-4.501 (12.389)	-1.608 (2.143)	9.983 (12.652)	42.815 (23.655)*	-10.687 (5.232)**	-20.430 (32.656)
Total income/1000	6.249 (1.781)***	21.223 (14.878)	6.595 (1.071)***	8.033 (8.429)	1.880 (13.915)	10.101 (2.592)***	17.645 (18.459)
Total income/1000 squared	-2.629 (1.720)	-44.011 (30.719)	-3.741 (1.016)***	-7.285 (7.990)	-0.934 (11.660)	-6.755 (2.477)***	-23.143 (19.543)
Wage income/1000	0.121 (0.424)	5.344 (2.414)**	0.879 (0.260)***	5.737 (2.580)**	13.226 (4.237)***	-0.193 (0.628)	2.653 (5.108)
Wage income/1000squared	-0.034 (0.185)	-3.048 (1.487)**	-0.257 (0.114)**	-0.304 (0.840)	-4.287 (2.200)*	0.309 (0.275)	0.971 (1.814)
Head is college educated	-0.023 (0.466)	2.868 (1.874)	0.195 (0.286)	-0.381 (2.280)	5.097 (3.545)	0.012 (0.689)	1.802 (4.424)
Head has high school education	-0.004 (0.217)	-0.028 (0.926)	0.078 (0.128)	0.308 (1.031)	1.779 (1.666)	0.235 (0.309)	1.683 (2.041)
Age of the Mother	0.003 (0.022)	0.110 (0.127)	0.015 (0.013)	0.098 (0.110)	0.332 (0.162)**	0.010 (0.032)	-0.173 (0.213)
Age of the Father	-0.049 (0.023)**	-0.087 (0.109)	-0.012 (0.014)	0.298 (0.186)	0.092 (0.177)	0.031 (0.035)	0.542 (0.328)*
Age of the oldest child	0.332 (0.135)*	0.748 (0.551)	-0.017 (0.112)	-1.702 (0.782)**	-2.332 (1.278)*	0.206 (0.272)	-1.116 (2.184)
Age of oldest child squared	0.000 (0.004)	-0.014 (0.019)	0.003 (0.003)	0.012 (0.022)	0.014 (0.036)	0.000 (0.006)	0.005 (0.047)
Constant	17.578 (3.330)**	-12.778 (18.344)	6.066 (3.175)*	-49.456 (16.128)***	-101.857 (35.069)***	15.885 (7.739)**	-25.021 (53.026)
Wald test of exogeneity	36.41 [0.000]	31.04 [0.000]	36.04 [0.000]	23.63 [0.000]	5.89 [0.0525]	61.11 [0.000]	39.03 [0.00]
Observations	1652	1652	1652	1652	1652	1652	1652

Note: Robust standard errors in parentheses clustered at the village level. *,**,*** denote significance at 10%, 5%, 1% respectively; ^ denotes significance at 15% .

Table 4B: Linear IV and AGLS Estimates of Factors Affecting Financial Activities in Rural Households —Part 2

	Investment Oriented Expenditure			Consumption Oriented Expenditure			
	Household expenditures on family enterprises	Household expenditures on fixed-asset for productive activities AGLS	Household expenditures on assets AGLS	Household expenditures on consumption activities	Household expenditures on food	Household expenditures on medical care	Total household expenditures
There is a male child	1.165 (0.609)*	12.300 (7.106)*	3.499 (4.869)	-0.573 (0.316)*	-0.642 (0.312)**	1.107 (1.203)	-0.404 (0.274)
Number of children	-2.877 (1.334)**	-11.327 (13.858)	-12.773 (4.132)***	0.708 (0.674)	0.385 (0.580)	-0.771 (2.593)	-0.528 (0.573)
Total income/1000	8.311 (0.665)***	33.136 (6.663)***	0.000 (0.000)**	3.408 (0.295)***	2.397 (0.285)***	4.265 (1.080)***	5.739 (0.364)***
Total income/1000 squared	-3.856 (0.632)***	-18.602 (5.891)***	-0.000 (0.000)	-1.938 (0.264)***	-1.259 (0.292)***	-2.600 (0.841)***	-2.535 (0.390)***
Wage /1000	-1.056 (0.162)***	-7.334 (2.103)***	-0.000 (0.000)**	0.294 (0.086)***	0.107 (0.063)*	1.110 (0.265)***	-0.080 (0.066)
Wage/1000 squared	0.117 (0.071)*	0.959 (1.069)	0.000 (0.000)	-0.058 (0.048)	-0.026 (0.027)	-0.228 (0.091)**	-0.001 (0.030)
Head is college educated	-0.230 (0.177)	0.289 (1.959)	0.404 (1.590)	0.133 (0.075)*	-0.008 (0.061)	0.038 (0.288)	0.041 (0.075)
Head has high school education	-0.040 (0.080)	-1.369 (0.925)	-0.612 (0.798)	0.034 (0.032)	-0.003 (0.030)	0.018 (0.108)	0.019 (0.029)
Age of the mother	-0.008 (0.008)	0.024 (0.093)	-0.084 (0.081)	-0.001 (0.003)	-0.000 (0.003)	0.019 (0.013)	-0.002 (0.003)
Age of the Father	0.007 (0.009)	0.028 (0.102)	-0.053 (0.078)	-0.001 (0.004)	-0.003 (0.004)	0.011 (0.014)	-0.002 (0.004)
Age of the oldest child	0.096 (0.070)	0.119 (0.749)	0.075 (0.318)	-0.038 (0.034)	-0.022 (0.031)	-0.067 (0.134)	0.019 (0.030)
Oldest child age squared	-0.001 (0.002)	0.001 (0.018)	0.038 (0.018)**	0.002 (0.001)**	0.001 (0.001)**	-0.001 (0.003)	0.001 (0.001)
Constant	10.867 (1.976)***	0.577 (20.761)	10.676 (5.558)*	7.436 (0.960)***	7.625 (0.842)***	4.150 (3.833)	9.578 (0.841)***
Observations	1652	1652	1652	1652	1652	1652	1652

Note: Robust standard errors in parentheses clustered at the village level. *,**,*** denote significance at 10%, 5%, 1% respectively.

Table 4C: Amemiya GLS Estimates of Factors Affecting Financial Activities in Rural Households —Part 1

	Total Household Assets and Debt			Activity Related to Loans		
	End of term net amount of debt	End of term net debt to other individuals	End of year net value of all financial assets	Loans obtained from banks	Loans obtained from informal credit	Loans obtained from rural financial co-op
There is a male child	3.095 (7.895)	2.149 (6.426)	-1.370 (0.894)	10.466 (20.841)	6.347 (13.885)	13.753 (11.907)
Number of children	-21.047 (18.695)	13.280 (6.166)**	3.426 (1.957)*	9.369 (31.002)	11.701 (23.334)	-12.611 (18.615)
Total income	22.074 (12.164)*	0.000 (0.000)*	6.158 (0.976)***	14.847 (17.605)	-11.932 (15.343)	-13.359 (23.086)
Total income squared	-27.319 (18.580)	-0.000 (0.000)	-2.918 (0.927)***	0.417 (13.728)	4.249 (14.936)	-4.311 (49.689)
Wage income	-2.060 (2.459)	0.000 (0.000)	0.751 (0.237)***	-8.153 (12.658)	-2.945 (5.167)	1.298 (3.341)
Wage income squared	-0.046 (1.407)	-0.000 (0.000)	-0.158 (0.104)	-8.308 (15.573)	0.203 (3.627)	0.300 (1.202)
Head is college educated	-0.938 (2.327)	-0.175 (2.109)	0.139 (0.260)	-64.144 (5,176.971)	1.691 (3.978)	1.428 (2.893)
Head has high school education	-1.169 (1.035)	-1.051 (1.019)	-0.017 (0.117)	3.433 (2.591)	1.437 (1.872)	-1.176 (1.669)
Age of the mother	-0.088 (0.104)	0.017 (0.102)	0.001 (0.012)	0.186 (0.308)	-0.197 (0.204)	0.190 (0.162)
Age of the Father	0.099 (0.113)	0.199 (0.101)**	-0.012 (0.013)	-0.297 (0.355)	0.265 (0.213)	-0.112 (0.181)
Age of the oldest child	0.463 (0.959)	-0.551 (0.412)	-0.071 (0.102)	-2.448 (1.805)	-0.503 (1.433)	1.403 (1.144)
Age of oldest child squared	0.000 (0.022)	-0.029 (0.024)	-0.000 (0.002)	0.085 (0.056)	-0.012 (0.038)	-0.064 (0.032)**
Constant	25.293 (27.600)	-30.682 (8.583)***	2.046 (2.898)	-39.608 (44.787)	-34.336 (35.852)	-10.925 (28.941)
Wald test of exogeneity	8.58 [0.014]	9.96 [0.007]	4.35 [0.114]	14.63 [0.004]	17.84 [0.000]	55.33 [0.000]
Observations	1652	1652	1652	1652	1652	1652

Note: Robust standard errors in parentheses clustered at the village level. *,**,*** denote significance at 10%, 5%, 1% respectively.

Table 5: First Stage Regressions

Endogenous Regressor	There is a male child (Table 4)	Number of children (Table 4)	There is a male child (Table 6)	Number of children (Table 6)
Village sex ratio	0.203 (0.036)***	0.030 (0.039)	0.463 (0.048)***	0.061 (0.056)
Acreage of cultivated land	2.77*10E-6 (5.02*10E-6)	-1.15*10E-5 (4.55*10E-6)***	-8.18*10E-6 (5.96*10E-6)	-1.95*10E-5 (6.43*10E-6)***
Village population	2.31*10E-5 (1.38*10E-5)*	2.25*10E-5 (1.34*10E-5)*	2.61*10E-5 (1.36*10E-5)*	4.61*10E-5 (1.89*10E-5)**
Total income/1000	0.097 (0.195)	-0.064 (0.143)	-0.120 (0.237)	-0.167 (0.247)
Total income/1000 squared	0.009 (0.144)	0.125 (0.110)	0.234 (0.184)	0.128 (0.170)
Wage income/1000	-0.093 (0.044)*	-0.034 (0.038)	-0.148 (0.071)*	-0.127 (0.073)
Wage income/1000 squared	0.019 (0.019)	0.020 (0.012)	0.060 (0.037)	0.045 (0.035)
Household Head is college educated	-0.002 (0.053)	-0.052 (0.049)	-0.007 (0.055)	-0.138 (0.055)*
Household Head has a high school education	-0.011 (0.024)	-0.000 (0.020)	0.010 (0.029)	0.028 (0.032)
Age of the mother	0.001 (0.003)	-0.001 (0.003)	-0.004 (0.003)	-0.007 (0.004)
Age of the father	-0.007 (0.003)*	-0.002 (0.003)	-0.005 (0.003)	-0.004 (0.004)
Age of the oldest child	0.035 (0.011)**	0.050 (0.010)**	0.066 (0.012)**	0.092 (0.015)**
Age of oldest child squared	-0.001 (0.001)	-0.001 (0.000)	-0.001 (0.001)*	-0.002 (0.001)*
Constant	0.375 (0.110)**	1.388 (0.101)**	-0.031 (0.120)	1.286 (0.147)**
First Stage F statistic	11.03	12.33	31.51	7.36
Observations	1652	1652	768	768
R-squared	0.69	0.13	0.38	0.39

Note: Robust standard errors in parentheses clustered at the village level. *,**,*** denote significant at 10% 5% 1% respectively. Specifications include the full set of explanatory variable listed under the Table listed in the first row. The p-values from an F test of whether the coefficients on the full set of instruments are jointly equal to zero are presented in [].

Table 6A: Amemiya GLS Estimates of Factors Affecting Financial Activities in Girl First Rural Households —Part 1

	Financial Transfers Outgoing			Financial Transfers Incoming			
	Cash gifts made to friends and relatives	Cash gifts made to friends and relatives in rural areas	Expense on all financial transfers out of household	Gifts from friends and relatives	Gifts from friends and relatives that reside outside rural areas	Amount of money returned from loans	All income from gifts and remittances
There is a male child	0.362 (1.090)	8.403 (5.214)^	-0.039 (0.707)	75.757 (77.787)	14.594 (9.233)^	2.286 (1.620)	137.731 (361.090)
Number of children	-5.957 (2.698)**	-6.435 (14.596)	-0.586 (1.809)	-48.214 (66.135)	22.359 (25.424)	-9.502 (4.144)**	-65.622 (181.568)
Total income	7.121 (2.295)***	9.545 (16.309)	7.401 (1.460)***	6.354 (20.132)	7.406 (17.340)	10.700 (3.324)***	50.047 (62.049)
Total income squared	-3.538 (1.829)*	-18.577 (25.913)	-4.099 (1.142)***	-9.925 (16.092)	-2.340 (12.116)	-6.969 (2.611)***	-101.959 (49.740)**
Wage income	0.413 (0.711)	8.215 (3.938)**	1.548 (0.452)***	2.764 (6.848)	13.393 (6.292)**	-0.412 (1.029)	12.501 (18.779)
Wage income squared	-0.205 (0.348)	-4.658 (2.452)*	-0.499 (0.227)**	0.179 (3.451)	-4.452 (3.120)	0.072 (0.519)	-7.006 (6.083)
Head is college educated	-1.094 (0.693)	4.118 (3.331)	-0.443 (0.442)	-9.947 (12.052)	3.599 (5.448)	-1.133 (1.005)	-9.399 (34.933)
Head has high school education	-0.076 (0.304)	0.291 (1.585)	-0.192 (0.190)	0.444 (2.625)	-0.073 (2.314)	0.239 (0.433)	2.862 (6.252)
Age of the mother	-0.003 (0.032)	0.073 (0.163)	0.042 (0.021)**	0.013 (0.388)	0.588 (0.256)**	-0.003 (0.048)	-0.226 (0.578)
Age of the Father	-0.044 (0.028)	-0.052 (0.141)	-0.009 (0.018)	0.322 (0.347)	-0.128 (0.231)	-0.016 (0.040)	0.837 (1.767)
Age of the oldest child	0.499 (0.239)**	-1.120 (1.997)	0.015 (0.165)	-0.073 (2.042)	-1.314 (2.201)	0.648 (0.378)*	-3.180 (8.065)
Age of oldest child squared	-0.009 (0.007)	0.085 (0.074)	-0.000 (0.004)	-0.022 (0.059)	-0.018 (0.060)	-0.013 (0.010)	0.050 (0.157)
Constant	12.380 (3.894)***	18.236 (31.892)	3.195 (2.593)	30.798 (72.542)	-69.642 (37.925)*	14.350 (5.935)**	38.425 (178.712)
Wald test of exogeneity	15.87 [0.000]	1.18 [0.555]	20.96 [0.000]	10.20 [0.006]	5.02 [0.081]	9.91 [0.007]	14.92 [0.001]
Observations	768	768	768	768	768	768	768

Note: Robust standard errors in parentheses clustered at the village level. *,**,*** denote significance at 10%, 5%, 1% respectively; ^ denotes significance at 15%.

Table 6B: Linear IV and Amemiya GLS Estimates of Factors Affecting Financial Activities in Rural Households —Part 2

	Investment Oriented Expenditure			Consumption Oriented Expenditure			
	Household expenditures on family enterprises	Household expenditures on fixed-asset for productive activities AGLS	Household expenditures on assets AGLS	Household expenditures on consumption activities	Household expenditures on food	Household expenditures on medical care	Total household expenditures
There is a male child	0.726 (0.357)**	7.865 (4.942)^	5.892 (4.344)	-0.815 (0.489)*	-0.778 (0.470)*	0.925 (0.753)	-0.287 (0.506)
Number of children	-1.885 (0.915)**	-7.006 (11.612)	-9.789 (7.202)	1.090 (0.633)*	0.950 (0.583)	-0.319 (2.035)	-0.178 (0.633)
Total income	7.597 (0.736)***	39.214 (8.291)***	42.086 (8.634)**	3.637 (0.497)***	2.412 (0.477)***	4.356 (1.762)**	5.723 (0.417)***
Total income squared	-3.099 (0.577)***	-21.119 (6.006)***	-22.634 (6.428)**	-1.894 (0.330)***	-1.148 (0.352)***	-2.657 (1.102)**	-2.298 (0.259)***
Wage income	-1.312 (0.228)***	-9.304 (3.982)**	-10.024 (4.080)*	0.504 (0.120)***	0.244 (0.104)**	1.718 (0.439)***	-0.024 (0.100)
Wage income squared	0.119 (0.115)	-0.459 (2.987)	-0.636 (3.217)	-0.165 (0.067)**	-0.066 (0.052)	-0.643 (0.259)**	-0.035 (0.059)
Head is college educated	-0.470 (0.223)**	1.014 (2.709)	0.481 (2.463)	0.182 (0.132)	0.098 (0.109)	-0.172 (0.441)	-0.039 (0.121)
Head has high school education	0.010 (0.096)	-1.639 (1.270)	-1.846 (1.275)	0.005 (0.053)	-0.031 (0.047)	-0.030 (0.190)	0.017 (0.045)
Age of the mother	-0.023 (0.011)**	0.111 (0.141)	-0.003 (0.142)	0.005 (0.005)	0.005 (0.004)	0.016 (0.026)	-0.003 (0.005)
Age of the Father	0.007 (0.009)	0.011 (0.119)	-0.042 (0.122)	0.002 (0.005)	-0.005 (0.004)	0.021 (0.019)	0.002 (0.004)
Age of the oldest child	0.144 (0.083)*	-0.421 (1.064)	0.174 (0.634)	-0.062 (0.041)	-0.053 (0.035)	-0.024 (0.187)	0.020 (0.039)
Oldest child age squared	-0.003 (0.002)	0.017 (0.029)	0.014 (0.023)	0.002 (0.001)*	0.002 (0.001)*	-0.004 (0.005)	0.000 (0.001)
Constant	9.747 (1.311)***	-2.830 (16.588)	2.146 (10.092)	6.687 (0.832)***	6.727 (0.744)***	3.103 (2.888)	8.750 (0.806)***
Wald test of exogeneity	1.83 [0.400]	6.21 [0.045]	2.65 [0.266]	6.09 [0.047]	10.24 [0.006]	9.221 [0.018]	13.64 [0.001]
Observations	768	768	768	768	768	768	768

Note: Robust standard errors in parentheses clustered at the village level. *,**,*** denote significance at or below 10%, 5%, 1% respectively; ^ denotes significance at 15%.

Table 6C: Amemiya GLS Estimates of Factors Affecting Financial Activities in Rural Households —Part 1

	Total Household Assets and Debt			Activity Related to Loans		
	End of term net amount of debt	End of term net debt to other individuals	End of year net value of all financial assets	Loans obtained from banks	Loans obtained from informal credit	Loans obtained from rural financial co-op
There is a male child	6.885 (5.711)	1.895 (5.273)	-0.388 (0.546)	-9.202 (19.361)	3.562 (9.875)	12.838 (7.881)^
Number of children	-20.958 (16.216)	12.911 (9.875)	1.700 (1.400)	69.666 (57.406)	17.597 (21.142)	-28.575 (16.086)*
Total income	6.551 (12.850)	4.833 (12.636)	5.560 (1.126)***	55.674 (35.160)	103.734 (99.014)	-22.244 (19.037)
Total income squared	-9.378 (12.755)	-9.145 (13.961)	-2.214 (0.883)**	-22.105 (24.357)	-460.362 (349.173)	8.720 (24.168)
Wage income	-0.583 (4.012)	4.657 (3.967)	0.857 (0.349)**	18.844 (19.346)	-8.292 (8.156)	-7.923 (5.331)
Wage income squared	-1.068 (2.270)	-2.859 (2.355)	-0.084 (0.175)	-21.635 (19.544)	5.418 (5.129)	3.811 (2.282)*
Head is college educated	-3.757 (3.738)	-1.044 (3.249)	-0.017 (0.341)	-56.183 (5,757.645)	2.391 (6.244)	-1.018 (4.084)
Head has high school education	-1.974 (1.592)	-2.675 (1.499)*	-0.153 (0.147)	2.105 (4.711)	0.631 (2.782)	0.723 (2.132)
Age of the mother	-0.130 (0.173)	0.175 (0.167)	0.006 (0.016)	0.720 (0.568)	-0.264 (0.368)	0.228 (0.219)
Age of the Father	0.196 (0.144)	0.289 (0.139)**	-0.011 (0.014)	-0.323 (0.538)	0.225 (0.283)	-0.457 (0.221)**
Age of the oldest child	1.035 (1.479)	-1.475 (1.877)	-0.095 (0.127)	-6.618 (4.857)	0.711 (2.199)	3.304 (1.575)**
Age of oldest child squared	-0.030 (0.023)	0.001 (0.027)	-0.001 (0.002)	0.006 (0.003)	0.005 (0.022)	0.051 (0.053)
Constant	18.481 (22.991)	-32.235 (14.162)**	4.450 (2.006)**	-122.749 (84.846)	-44.251 (30.764)	24.773 (23.313)
Wald test of exogeneity	9.43 [0.009]	5.89 [0.053]	0.52 [0.770]	6.98 [0.033]	7.34 [0.026]	22.60 [0.000]
Observations	768	768	768	768	768	768

Note: Robust standard errors in parentheses clustered at the village level. *,**,*** denote significance at 10%, 5%, 1% respectively; ^ denotes significance at 15%.