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**In Search of Gender Bias in Household Resource  
Allocation in Rural China**

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## Abstract

This paper tests three hypotheses concerning intra-household resource allocation in rural China. First, whether increasing the women's bargaining power alters household expenditure patterns. Second, whether households allocate fewer resources to daughters than to sons. Third, whether increasing the bargaining power of women reduces pro-boy discrimination. We find that expenditure patterns do vary with proxies for women's bargaining power. Pro-boy discrimination is suggested by: lower female outlay equivalent ratios for adult goods; greater sensitivity of household health spending to young boys than to young girls; and high male sex ratios. No evidence is found to support the third hypothesis.

## 1. Introduction

Econometric studies from various countries have tended to show that if men have more power in decisions over household expenditure, more goods are purchased for adults or men than for children and general family use. In the Côte d'Ivoire, men appear to spend a greater proportion of the income they earn on goods such as alcohol and cigarettes; by contrast, women are more likely to purchase goods for children and for general household consumption (Hoddinott and Haddad, 1995)<sup>1</sup>. The identity of the individual receiving non-wage income affects the pattern of household expenditure in Brazil (Thomas, 1993)<sup>2</sup>. Philipps and Burton (1993) find that Canadian men and women in full-time employment have differential spending patterns<sup>3</sup>. Bourguignon, Browning, Chiappori and Lechene (1992) obtained similar findings for French households<sup>4</sup>.

As yet, there have been no comparable studies for China. The Chinese rural economy has experienced rapid growth since the commencement of reform in 1979. An increase in household income will not necessarily be equally distributed among all household members. For instance, children or aged members may not be decision-makers within the household, being instead dependent on others. Growth in household income may not benefit such dependants much if their needs are given low weight by household decision-makers. In the case of rural China, girls' education can be badly affected by the need to increase household labour. Aged members of households may be relatively deprived when they lose their capacity to work. However, the structure of power between men and women within the household may vary. Women can be expected to have a greater influence on household decision-making if their own income or education is high relative to that of men.

In this paper we study rural household expenditure patterns, paying special attention to gender issues. We examine the determinants of resource allocation within the household, focusing on the impact of the relative bargaining power of spouses on the welfare of different demographic groups defined by age and sex. How do gender differences in bargaining power affect the distribution of welfare within the household? The consequences for household outlays on education and medical care for girls are given special attention.

Our analysis is based on the data of a nationally representative household survey, covering 8000 rural households from 19 provinces. The purpose of the survey was to study income distribution in China<sup>5</sup>. The data were collected by the Institute of Economics, Chinese Academy of Social Sciences in 1996, and related to 1995.

## 2. The setting

Until recently most economic research at the household level has been motivated by "unitary" household models (Haddad, Hoddinott and Alderman, 1997)<sup>6</sup>. That is to say, the household has been modelled as maximising a single objective function. Contrary to what is sometimes claimed, this approach can be used to analyse intra-household allocation. Intra-household inequality may be ascribed to compensating for or reinforcing responses to differences in individual member's productivity. Rosenzweig and Schultz (1982) explained why "excess" female mortality in India was associated with low female labour market participation in terms of the reinforcement of productivity differences<sup>7</sup>. Alternatively, intra-household inequalities may reflect differences in the relative weights given to individuals' interests in the household objective function. For example, Behrman (1988) found "pro-son bias" in lean seasons in three Indian villages<sup>8</sup>. However, the unitary model provides a somewhat restricted perspective on intra-household inequality. In particular, it gives no role to inequalities in intra-

household bargaining power in explaining intra-household inequalities in resource allocation. There is a given household objective function which is assumed to be impervious to factors that might be expected to alter the bargaining power of household members. For example, Folbre (1984) argued that an alternative explanation of Rosenzweig and Schultz's (1982) results was that higher female labour market participation raised the bargaining power of women and hence led to better treatment of girls. As Folbre argues:

*"The suggestion that women and female children voluntarily relinquish leisure, education and food would be somewhat more persuasive if they were in a position to demand their fair share. It is the juxtaposition of women's lack of economic power with the unequal allocation of household resources that lends the bargaining power approach much of its persuasive appeal"*<sup>9</sup>.

This richer view of intra-household allocation has been formalised in the class of "collective" household models. These recognise that household decisions are the result of interaction among members with sometimes divergent preferences. Collective models may be further distinguished, following the terminology of game theory, into cooperative and non-cooperative variants. Under the former, binding agreements may be entered into and outcomes may be determined by bargaining processes. Under the latter, no binding agreements are possible and household members do the best they can give the actions of others.

In cooperative models, bargaining power depends in part on an individual's "fall-back" position, i.e., on what their welfare would be were cooperation to fail. There are various interpretations of what such "fall-back" positions would be in practice. They are commonly taken to be separation and the dissolution of the household. However, this may be rather extreme: for more mundane disagreements, the household may persist but perhaps act non-cooperatively.

Over the century the Chinese rural economy has gone through a circle: from traditionally household-run farming to collectivized, commune-run farming, and back again to land-lease-based, household farming. This historical regression shows the tenacious role Chinese households play in farm production. The Chinese rural household has typically been viewed as a close unit that ties its members together with bonds of kinship. Given such a strong family culture, a cooperative or unitary model has commonly been assumed in studying the behaviour of rural Chinese households.

Chinese society in general has been characterised by close family ties. This is particularly true of rural China, where all members of an extended household are supposed to share income and consumption (Ling, 1989<sup>10</sup>; Fei, 1986<sup>11</sup>). In terms of resource allocation, those who need more are supposed to consume more. Those who can earn more in the labour market are given the chance to earn. These patterns of behaviour reflected a family hierarchy, where normally a leading role was given to the most senior male of the household (Fei, 1985<sup>12</sup>). However, in recent years, there has been a gradual fall in the number of extended families in both urban and rural China and a corresponding rise in the number of nuclear families<sup>13</sup>. The typical rural family is no longer a household with multi-generations but a nuclear household with simply two generations - parents and children (73% of the 1995 CASS rural sample). Some incentive for large extended households to sub-divide into smaller nuclear households is provided by the rules allocating land for building residential houses (not farming land). In principle, only those who are married, and having separate registration status from their parents will be entitled to have access to land for housing by the village. One implication of the shift from extended to nuclear households is to give married couples more control over the activities

of their immediate families. This may have given wives more influence. At the very least, issues of bargaining now arise less between generations (between grandparents and parents) and more within a generation (husband and wife). This simplifies our research.

### **3. Hypotheses, models and methods**

We focus mainly on three hypotheses:

H1. Increasing the relative bargaining power of women alters household expenditure patterns;

H2. Households allocate fewer resources to daughters than to sons;

H3. Increasing the relative bargaining power of women increases their daughters' well being within the family.

The first hypothesis concerns whether rural households exhibit consumption behaviour consistent with "unitary" or "collective" models. The second hypothesis concerns sex bias in the allocation of consumption. Although it is arguable that the two hypotheses are linked, this is not necessarily so. The first hypothesis is true under "collective", but not "unitary", household models; the second may be true under both. Therefore we propose the third hypothesis to see the links between mothers' bargaining power and their daughters' well-being - whether there is any change in spending on girls with the change in wives' bargaining power. Appleton, Chessa and Hoddinott (1999) have explored this hypothesis for Uganda using similar methods to this paper, but found no evidence to support it<sup>14</sup>.

In our empirical work, we focus on a wife's education relative to her husband's as our main measure of bargaining power - calculating the ratio of wife's education in years to the sum of the years both husband and wife received. If a male household head has no spouse, the bargaining power should be set equivalent to zero; but for a female household head who has no spouse, her bargaining power is set to one, the highest, in this case. If the fallback position is marital dissolution, then education is a likely determinant. More educated individuals may be better able to obtain paid employment or a new spouse. In non-cooperative outcomes, education may also be important. Ulph (1988) presents a non-cooperative model in which two household members each separately earn income and make household purchases from their individual earnings<sup>15</sup>. The Nash equilibrium has the property that expenditure patterns vary with the share of household income attributable to each member. Since education is likely to influence income shares, it should also be a determinant of expenditure patterns in non-cooperative models such as Ulph's<sup>16</sup>. By contrast, it is not clear why a wife's education relative to her husband's would have any effect in a unitary household model. However, we cannot claim that the variable provides a decisive test of the unitary model. The ratio may matter even in a unitary model to the extent that female education has different market and non-market productivity effects from male education.

In addition to relative education, we use a number of other indicators of bargaining power based on the characteristics of the household head. Perhaps the most direct is the sex of the household head. This reflects the administrative convention that registered husbands are automatically defined as being the household heads. Women will only be defined as household heads if they have no husbands or if their husbands have "permanent" migrant employment (i.e. they are registered elsewhere). One might expect women to have more influence over household expenditures if they have been registered as household heads. Even if women household heads have husbands, the fact that the husbands are registered elsewhere presumably reduces their

day-to-day influence over household expenditures. We also include variables for the sector in which the heads are employed and for whether they are Communist Party members. In both cases, we allow these variables to have a different impact on male and on female household heads.

We test our first hypothesis by including proxies for bargaining power as explanatory variables in household expenditure functions. In particular, we estimate an augmented Working-Lesser expenditure function, where the share,  $W_j$ , of total household expenditure on goods of type  $j$  is given by:

$$W_j = a_j + b_{1j} \ln(Y/N) + b_{2j} \ln n + b_{3j} S_i + b_{4j} R_i + c_j' Z + \sum_{k=1}^{k-1} \Theta_{kj} N_k/N + e_j$$

where:

$Y$  = household income (predicted)

$N$  = household size

$N_k$  = number of household members in demographic group  $K$

$S = 1$  if household head is a man, 0 otherwise

$R$  = ratio of wife's years of education to that of both husband and wife

$Z$  = vector of other control variables

$e$  = error term

and  $a, b, c$  and  $\Theta$  are parameters.

The dependent variables are the value of purchases on the  $j$ th good as a share of total household purchases<sup>17</sup>. Eleven categories of goods and services were distinguished in the data: food; cigarettes/alcohol; clothing; transport; daily-used goods; durable goods; medical care; housing (repairs only); education; financial support to non-resident parents; and other non-specified items. We separate spending on education into that on children's schooling and that on adults' training. Unfortunately, most of the expenditure categories used by the survey cannot be defined as exclusively adults' or children' goods, nor men's goods or women's goods. However, information from the survey shows that only a small percentage of adult women smoked (9% of female household heads versus 80% of male household heads). Hence, cigarette and alcohol spending are treated as male adult goods. Full-time education before university (children's schooling in our case) should be treated as children's consumption.

The budget share models control for household size and demographic composition. The  $N_k/N$  variables also provide an indirect test of our second hypothesis. The surveys do not directly record the resources each individual received from the household. However, some inferences are possible based on the effect of household demographic composition on the pattern of household expenditures. For example, if a higher proportion of boys in a household is associated with more educational spending than an equivalent higher proportion of girls, then this suggests that less is spent on girls' education. Moreover, Deaton (1987) has argued that expenditure on adult goods may be a way of gauging discrimination in favour of sons. In particular, if an extra boy is associated with a larger fall in expenditure on adult goods than an extra girl, then it could be inferred that the household is making larger sacrifices for boys than

for girls<sup>18</sup>.

To test the third hypothesis, we divide the whole sample into four quarters sorted by women's bargaining power - the ratio of the wife's years of education to that of the husband and wife combined. The budget models will be estimated separately for each quarter to see if boy-girl discrimination varies with women's bargaining power.

Among the set of independent variables, we have controlled for some characteristics of the household head, and their interaction terms with gender. The political and occupational status of the household head may affect decisions about household spending. Consequently we include dummy variables for Communist Party membership and for occupation. The occupations are classified as farm-worker, unskilled (manual) non-farm worker, skilled non-farm worker, professional, cadre, individual trader, and other non-specified category. We allow for the fact that more educated households may differ in their spending patterns from less educated households by controlling for the education,  $E_i$ , of the household head. We have also tried the total educational years of the husband and wife in the models instead of  $E_i$ . However, it has less statistically significant effects than the educational level of the household head and the two sets of variables are highly correlated.

Other variables included in the expenditure functions are household income per capita (to control for the effect of income) and household location. Total household income per capita is endogenous to expenditure shares and consequently we use its predicted value<sup>19</sup>. Dummy variables for household structure of generation-type are also included: nuclear households might have different consumption patterns compared to households with grandparents or grandchildren, or to those containing only one generation. Location variables included in the models are provincial dummy variables and whether the household lives in an officially designated poor county.

#### 4. The results

##### *Descriptive statistics*

Table 1 reports the mean shares of expenditure on the different categories of goods and services identified in the data. The biggest proportion of household cash spending is on food (38%), followed by clothing (13%)<sup>20</sup>. Spending on education (mostly for schooling) is the third biggest consumption item (10%) but spending on cigarettes and alcohol is almost as large (9%). Expenditure on health care averages 5%.

96% households in this sample are headed by men (Appendix Table 2 refers). Compared with their female counterparts, male household heads are younger; more likely to be married than widowed or single; more often Communist Party members; better educated; and less likely to be full-time house-workers. However, female-headed households have higher household income per capita together with higher values of bank savings and houses. 80% of all male household heads smoke, compared to only 9% of female household heads.

Women have less education than men in this sample (Table 2). On average, the ratio of wife's years of education to that of wife and husband combined is 36 to 100. In 48% of households the wife's educational level is equal to that of her husband; in 41% the husband's educational level is higher than that of his wife; in only 6% is the wife's educational level higher than her husband's<sup>21</sup>.

The household structure by gender and age is also reported in Table 2. Household members aged 0-6 years are pre-schoolers; those 7-12 are of primary school age; those 13-15 are



of middle school age whilst those 16-18 are of high school age. We term those aged 56-65 as the semi-retired group, and those aged 66 and over as the aged group.

### *The role of gender in bargaining power*

Table 3 reports the expenditure functions for seven categories of goods and services: food (purchases only, not self-consumption), cigarettes and alcohol, school education (excluding adults' job-training cost), clothing, medical cost, durable goods and daily-used goods<sup>22</sup>.

We do not reject our first hypothesis. Wives' bargaining power, measured in terms of their education relative to that of their husbands', has a significant effect on household expenditure patterns, *ceteris paribus*. This is contrary to what would be predicted by unitary household models but consistent with collective models. Specifically, as wives' relative education rises, so does expenditure on children's education, clothing and durable goods. The opposite effects are apparent with purchases of food, cigarettes and alcohol, medical cost and daily goods. The coefficient on the relative education variable can be interpreted as the change in the relevant budget share arising from a unit change in the education ratio. Thus, if wives' education were to increase from zero to one, spending on children's education would rise by 1.1 points. Given that the mean budget share is 9.9 percentage points, this translates into a proportionate rise in spending on children's education of over 10%. For clothing, the corresponding figure is also large. Increasing wives' educational ratio from zero to one would raise the clothing budget share by 1.7 percentage points. For durable goods, the effect is 0.4 percentage points. The negative effects are also sizeable: 1.7 percentage points for food purchases; 1.0 percentage points for cigarettes/alcohol; and 1.1 percentage points for medical costs.

The effects of our other proxy for women's bargaining power - whether they are the household head - are consistent with the results from the relative education proxy in all but two cases (food purchases and durable goods). In particular, households headed by women spend more on education and clothing and less on alcohol/tobacco.

Our results seem consistent with the hypothesis of "maternal altruism": that women prefer to spend more on "children's goods" and less on adult goods. However, our measures of children's goods (schooling) and adult goods (cigarettes/alcohol) are rather specific. Although undoubtedly a children's good, schooling is also an investment in human capital. Parental education may complement learning acquired from school. Indeed, it is conceivable that mother's education is more of a complement with child schooling than father's education. This provides one possible explanation for our finding within a "unitary household" framework. In China, women smoke much less than men, indicating that cigarettes at least are more "men's goods" than "women's goods". Alcohol may also be more of a man's good, although perhaps to a lesser degree. Nonetheless, this does not invalidate referring to the alcohol/cigarettes expenditure function as a test of the unitary model. Even if alcohol/cigarettes are exclusively consumed by men, after controlling for the proportion of men in the household, proxies of female bargaining power should have no effect.

One surprising finding worthy of comment is that the wives' education relative to their husbands, and having a woman household head, both lower expenditure on medical care. Were the wives' educational ratio to rise from zero to one, spending on medical costs would fall by one percentage point (a proportionate decrease of approximately one fifth). This might reflect

women giving a lower priority to health care. However, there is an alternative and more plausible explanation: the wives' education may improve the health of their families, so making health care less necessary.

### *Boy-girl discrimination*

Inferences about intra-household resource allocation can be made by examining the coefficients of household age and gender groups. This shows how household expenditure on particular types of goods and services vary with the age and gender composition of the household.

We argued *a priori* that cigarette and alcohol are mainly men's goods. This is reflected in the results. All the included age-sex groups have negative coefficients compared with the default group of men aged 19-55. Applying Deaton's (1987) test, there is some evidence of discrimination in favour of the youngest boys and against the youngest girls. In particular, the coefficient on boys aged 0-6 is -3.4% (significant at 1%) compared with only -2.1% (significant at 10%) for girls aged 0-6. This difference in the coefficients is statistically significant at the 2% level and suggests that men sacrifice more for very young boys than for very young girls. However, the reverse is true of children aged 13-15: more sacrifices seem to be made for middle school girls than middle school boys.

Perhaps the most disturbing finding is that boys aged 6 years or below have a coefficient on medical cost more than double that for girls of the same age. Note that the coefficients calculated in the model are relative to the effect of the male group aged 19-55: they are not the actual medical spending on the groups. However, the coefficients suggest that over 50% more is spent on the health care of a young boy than on that of a young girl<sup>23,24</sup>. This may imply discrimination against young girls: households may treat their boys' health problems more seriously than their girls'. Alternatively, it may merely be that there is a higher incidence of child illness among young boys than among young girls. It is well known that boys are biologically more susceptible to illness at a young age than are girls. However, it is unlikely that the biological differential is sufficient to warrant a 50% differential in health spending per child. Indeed, the sex ratios amongst children aged 0-6 do not seem consistent with higher infant mortality: if anything, there is evidence of excess female infant mortality.

Only 3.00% of household members are girls aged six or under, whereas 3.69% are boys of the same age. This contrasts with figures from Côte d'Ivoire, where the proportions of young girls and boys are aged under six are almost exactly equal (9.0% and 9.2% of all household members respectively)<sup>25</sup>. These sex ratios suggest that, as Sen (1990) asserted, China may suffer from "missing women"<sup>26</sup>. Official statistics also show high male-female sex ratios, rising in the 1980s. In 1988, the sex ratio of children aged 0-4 was 106.10<sup>27</sup>. The sex ratio of children aged 0-6 increased to 110.50 in 1990<sup>28</sup>. The ratio in 1993 was even higher: 114.16<sup>29</sup>. Our figure for 1995 is much higher than this, at 1.23.

Traditionally boys have been more welcome to rural households in China. Infant girls have sometimes been found abandoned in orphanages and there have been suggestions that they were sometimes victims of infanticide<sup>30</sup>. This may reflect some old Chinese traditions of inheritance and succession to property. According to the old civil law that applied before the 1930s, daughters and widows could not inherit household assets. If the deceased (male) had no sons, his household assets could only be inherited by his brother's sons if there were any. If the deceased had no brothers, any other male relative should inherit his assets but not his own daughters or widow. However, these pro-son traditions were greatly weakened during the

middle part of this century. A new civil law introduced by the Nationalist Government in the 1930s had changed the old law: daughters as well as widows could inherit household assets (Item 1147, Civil Law, 1928). This boy-girl discrimination may also reflect the tenacious custom to support old-age parents in rural China: boys are always expected to support their parents in old age, whereas daughters transfer to their husbands' family (normally in other village). The sons stay in the village, inheriting both the assets and the duty to support their parents. This can provide a basis for boy-preference among mothers as well as fathers. In the 1950s, the Communist government gave official support for equality between the sexes. Substantial job discrimination and wage discrimination against women are officially outlawed. Researchers have indeed found that urban women have a high rate of job participation in China relative to other countries. Possession of education may protect Chinese women against discrimination, or give them access to jobs with less discrimination. Neither the 1953 census nor the 1964 census showed an excess of boys over girls.

Things appear to have begun to change in the late 1970s. The 1982 census showed more boys than girls, with a sex ratio of 107 (for more detailed analyses of this phenomenon, see Hull, 1990<sup>31</sup>; Davin, 1990<sup>32</sup>; Johansson and Nygren, 1991<sup>33</sup>; Coale, 1991<sup>34</sup>; Zheng et al, 1993<sup>35</sup>; Johnson, 1996<sup>36</sup>). Three proximate causes have been put forward for the rise in the male-female sex ratio: under-reporting of girls (for example, if more are in orphanages); infanticide; and pre-natal sex selection. Although the three explanations differ in the degree to which they are malign, they all imply a pro-son preference. Two factors may explain why this preference appeared to intensify after the late 1970s. The first is on the demand side, with the introduction of the one-child policy launched in 1979<sup>37</sup>. It seems likely that if Chinese couples can only have one child, they will favour a boy. If couples were free to have more children, some might prefer a balance between sons and daughters, weakening any sex bias. However, the relaxation of the one-child policy to allow rural households to have another child if the first one were a girl does not appear to halt the rise in the male-female sex ratio. The second change is on the supply side, with the increasing availability since 1980 of services which can identify the sex of a foetus. However, we cannot dismiss the possibility that the sex ratios could be due to some cruelty happening to girls before or after birth. Consistent with this, our findings give rise to some concern about discrimination against very young girls in terms of health care.

Any discrimination against girls in terms of health care does not appear to be extended to schooling. Household spending on schooling varies similarly with proportions of boys and girls, suggesting no discrimination in outlays on school. Even at the high school age, when the presence of boys is associated with greater school spending than is the presence of girls, the effects are quantitatively small.

#### *Does mothers' bargaining power affect boy-girl discrimination?*

In planning this research, we considered three indicators of women's bargaining power: the ratio of the wife's education relative to her husband's; the wife's working time relative to her husband's; and the proportion of the wife's cash income to the total earned by both the husband and wife. Ultimately, we decided to use the indicator of wife's bargaining power proxied by education. This variable proved to be statistically more significant in the regressions but was also highly correlated with women's share of the cash income. We divide the whole sample into quarters by ordering the education ratio. The first quarter represents households in which wives have the lowest bargaining power, and the fourth, the highest. Table 4 provides the mean characteristics by the quartered samples. This shows that women's share of cash income is

higher in quarters with higher relative education. However, a woman's share of working time does not vary by quarter in this way: women in quarters 1 and 3 have lower percentages of working time than those in quarters 2 and 4. Therefore we introduced the women's share of working time as an additional independent variable. Aside from this, we employ the regression models used in Table 3 but estimate them only for three items of expenditure: cigarettes and alcohol; medical costs; and education. We find that mother's higher bargaining power affects boy-girl discrimination in terms of cigarette spending, education and medical expenditure, but usually in the opposite direction to that expected: girls appear to do worse relative to boys in households where women have higher bargaining power.

Superficially, the sex ratio is an example of these unexpected findings: there are fewer girls relative to boys in households where female bargaining power is high. Table 5 shows that the lowest quarter (women with lowest bargaining power) has the lowest boy-girl sex ratio among the four sub-samples - 107 compared to 115, 114 and 113 for quarters 2, 3 and 4 respectively. However, the association between higher female bargaining power and higher boy-girl sex ratios is only apparent when comparing the quarter with the highest bargaining power with the rest. Moreover, the reverse association exists if attention is confined only to children under seven.

More compelling evidence on the unexpected effects of female bargaining power on boy-girl discrimination is provided by data on medical expenditure, spending on alcohol and cigarettes, and on education (results not reported in tables, but available upon request). Households with higher women's bargaining power do not exhibit less boy-girl discrimination in their household medical spending. As a matter of fact, households in the fourth quarter yield a coefficient on young boys (aged 0-6) 3 times greater than that of young girls (0.081 versus 0.025). Similarly, in the top two quarters in terms of women's bargaining power, spending on cigarettes and alcohol falls less with the presence of girls than boys, and the opposite is true for the bottom two quarters (Table 6).

Households with women of higher bargaining power tend to spend more on their daughters' education up to middle-school level than on their sons'. This is the same result we obtained from the analysis of the whole sample (Table 3). But mother's high bargaining power does not raise the coefficient relating to daughters of high school age. By contrast, it does so for boys. In the quarter with the highest women's bargaining power, the coefficient on high-school aged boys is twice that on girls (0.34 compared to 0.15). In the lowest quarter, the gap is far more modest (0.23 compared to 0.19) (Table 7). These variations in the relative effects of high-school age girls and boys reflect variations in enrolment rates (Table 8). Enrolment rates for boys of high school age rise slightly with female bargaining power. However, for girls, high-school enrolment rates are lowest for households with either the highest or lowest female bargaining power.

There appears to be no gender discrimination in terms of educational spending per student. This can be seen by splitting the demographic variables for children into those for children in school and children out of school. The sensitivity of educational expenditure to children in school provides an indirect measure of educational spending per student. After carrying out this decomposition, we see that educational spending responds equally to the presence of male or female students for all age groups. This is invariant to female bargaining power, being true for each of the four quarters of the sample (Table 9).

## 5. Conclusions

Our findings have confirmed that the consumption behaviour of Chinese rural households is more consistent with a collective model than with a unitary model of household behaviour. Men and women appear to have different preferences in consumption. Women's bargaining power strengthens their influence on household consumption decisions: the share of spending on children's education and clothing rises with women's bargaining power. Conversely, the budget share of alcohol and cigarettes falls as women's bargaining power increases.

We also find suggestions of discrimination against very young daughters (aged 0 to 6 years) in favour of sons. The evidence is of three kinds. First, young daughters lead to less of a reduction in the share of spending on cigarettes and alcohol than young sons. Following Deaton, this may reflect adults making fewer material sacrifices for young daughters than for young sons<sup>38</sup>. Secondly, we find that the presence of young girls in the household is associated with much smaller increases in the share of spending on health care than is the presence of young boys. One rough estimate is that 50% more is spent on the health care of young boys than young girls. Whilst it is true that young boys are biologically more vulnerable than young girls, it is unlikely that frailty can fully account for a discrepancy on this scale. Thirdly, we find that the sex ratio among children aged 0-6 is very uneven, with 123 boys for every 100 young girls. Whilst not as bad as some sex ratios reported in the past in rural China, the figure compares poorly with the virtually even sex ratio in many other developing countries. Taken together, these results provide some evidence in support of Sen's assertion of serious pro-son bias in China.

We find no evidence in favour of our third hypothesis: that higher mothers' bargaining power reduces boy-girl discrimination. If anything, the reverse is true. Sex ratios are less favourable to girls in households with high female bargaining power, although this does not necessarily imply greater excess female mortality. However, households with high female bargaining power appear to spend much more (relative to other households) on medical care for young boys compared to young girls. Similarly, as female bargaining power increases, the negative impact of young boys relative to young girls on spending on cigarettes and alcohol becomes stronger. This is consistent with adults (presumably, mainly men) in households making fewer material sacrifices for their young daughters than for their young sons as female bargaining power rises. Finally, girls of high-school age are associated with smaller increases in educational spending relative to boys in households with high female bargaining power. This reflects lower enrolment ratios for girls in such households. In summary, whilst there is evidence that women's bargaining power affects household allocation and that there is some boy-girl discrimination, there is no evidence that women's bargaining power reduces boy-girl discrimination. In rural China women may be no less prone to favour their sons over their daughters than are men. This may be based on the expectation that they will be supported by their sons rather than their daughters in old age.

**Table 1**  
**Dependent Variables Used in the Analysis**

	mean	standard deviation
<b>Total household cash expenditure</b> (in yuan),	3622.34	5059.72
Expenditures shares:		
1. Food (excluding self-consumption)	0.3778	0.1709
2. Cigarettes & alcohol	0.0915	0.0727
3. Cloth	0.1315	0.0947
4. Transport	0.0325	0.0725
5. Daily goods	0.0629	0.0560
6. Durable goods	0.0253	0.0697
7. Medical cost	0.0501	0.0852
8. Education	0.0987	0.1319
of which for schooling only	0.0944	0.1282
9. Housing (repairing)	0.0212	0.0740
10. Paying to parents	0.0039	0.0307
11. Other (non specified)	0.1079	0.1145
Number of observations	7997	

Source: 1995 Rural Household Survey.

**Table 2**  
**Independent Variables Used in the Analysis**

Variable	mean	standard deviation
Male household head	0.9585	0.1994
Wife's years of education over years of education of husband and wife combined	0.3604	0.2079
educational level of household head:		
high school and above	0.1465	0.3537
middle school	0.4175	0.4931
4-6 years of primary school	0.3177	0.4656
1-3 years of primary school	0.0585	0.2347
no education	0.0596	0.2368
Communist Party member	0.1457	0.3528
male Communist Party member	0.1408	0.3478
household head mainly works as:		
1. farm worker	0.8585	0.3485
2. manual worker	0.0293	0.1688
3. skilled worker	0.0008	0.0273
4. professional	0.0031	0.0558
5. cadre	0.0075	0.0862
6. individual trader	0.0167	0.1283
7. other (non-specified)	0.0839	0.2772
male household head mainly works as:		
1. farm worker	0.7294	0.4442
2. manual worker	0.0714	0.2574
3. skilled worker	0.0158	0.1245
4. professional	0.0154	0.1230
5. cadre	0.0569	0.2316
6. individual trader	0.0355	0.1850
7. other (non-specified)	0.0594	0.2364
log (no. of household members)	1.4236	0.3067
log (predicted household income per capita)	7.6830	0.5879

Table 2 -continued

<u>Age-sex composition of household:</u>		
male aged 0-6	0.0369	0.0909
male aged 7-12	0.0638	0.1221
male aged 13-15	0.0331	0.0859
male aged 16-18	0.0323	0.0857
male aged 19-55	0.2993	0.1507
male aged 56-65	0.0352	0.1034
male aged 66-	0.0178	0.0656
female aged 0-6	0.0300	0.0837
female aged 7-12	0.0538	0.1108
female aged 13-15	0.0271	0.760
female aged 16-18	0.0298	0.797
female aged 19-55	0.2905	0.1356
female aged 56-65	0.0274	0.0896
female aged 66-	0.0230	0.0722
one generation household	0.0405	0.1971
two generation household	0.7304	0.4437
three generation household	0.2226	0.4160
other types of household	0.0065	0.804
household in poor county	0.2263	0.4185
<u>province:</u>		
Beijing	0.0125	0.1111
Hebei	0.0623	0.2416
Shangxi	0.0375	0.1900
Liaoning	0.0375	0.1900
Jilin	0.0375	0.1900
Jiangsu	0.0624	0.2419
Zhejiang	0.0500	0.2179
Anhui	0.0563	0.2305
Jiangxi	0.0438	0.2046
Shangdong	0.0875	0.2826
Henan	0.0875	0.2826
Hubei	0.0503	0.2185
Hunan	0.0625	0.2421
Guangdong	0.0625	0.2421
Sichuan	0.0998	0.2997
Gueizhou	0.0375	0.1900
Yunnan	0.0375	0.1900
Shaanxi	0.0375	0.1900
Gansu	0.0375	0.1900

Source: 1995 Rural Household Survey



**Table 3**  
**Two Stage Least Squares Budget Share Regressions**

	model 1	model 2	model 3	model 4
	food	cigarettes	education	cloth
intercept	0.4088(5.6)***	0.1676(5.2)***	0.1378(2.9)**	0.1571(3.9)***
male household head	-0.0253(2.2)**	0.0225(4.6)***	-0.0075(1.0)	-0.0089(1.4)
wife's education years over the years of education of husband & wife combined	-0.0169(1.7)*	-0.0101(2.4)***	0.0108(1.7)*	0.0171(3.1)***
educational level of HH head:				
high school and above	-	-	-	-
middle school	-0.0228(2.9)***	-0.0105(3.1)***	0.0182(3.6)***	0.0028(0.6)
6 years of primary school	-0.0141(2.1)**	-0.0065(2.3)**	0.0130(3.1)***	0.0046(1.3)
3 years of primary school & below	-0.0050(0.8)	-0.0077(2.8)***	0.0102(2.5)***	-0.0009(0.2)
Communist Party member	-0.0206(0.7)	0.0221(1.8)**	-0.0083(0.4)	0.0273(1.8)*
not CP member	-	-	-	-
male Communist Party member	0.0182(0.6)	-0.0150(1.2)	0.0057(0.3)	-0.0333(2.1)**
female non CP member	-	-	-	-
household head mainly works as:				
1. farm worker	-	-	-	-
2. manual worker	0.0189(0.5)	-0.0188(1.2)	-0.0104(0.4)	-0.0313(1.6)
3. skilled worker	0.0337(0.6)	-0.0198(0.7)	-0.0084(0.2)	-0.0167(0.5)
4. professional	-0.0355(0.7)	-0.0307(1.3)	-0.0463(1.3)	0.0423(1.4)
5. cadre	-0.1207(2.2)*	-0.0075(0.3)	0.0201(0.6)	-0.0166(0.6)
6. individual trader	-0.0611(0.4)	-0.0356(0.5)	-0.0748(0.7)	-0.0011(0.0)
7. other (non-specified)	-0.0504(1.5)	-0.0051(0.3)	0.0214(0.9)	0.0151(0.8)
male household head mainly works as:				
1. farm worker	-	-	-	-
2. manual worker	-0.0242(0.6)	0.0198(1.3)	-0.0174(0.8)	0.0238(1.2)
3. skilled worker	-0.0578(0.8)	-0.0007(0.0)	-0.0279(0.6)	0.0235(0.6)
4. professional	0.0090(0.1)	0.0352(1.3)	0.0370(0.9)	-0.0518(1.5)
5. cadre	0.1270(1.8)*	0.0275(0.9)	-0.0189(0.4)	0.0270(0.7)
6. individual trader	0.0946(0.6)	0.0156(0.2)	0.0577(0.5)	0.0024(0.0)
7. other (non-specified)	0.0467(1.3)	0.0123(0.8)	-0.286(1.3)	-0.0105(0.5)
log (no. of household members)	-0.0210(2.0)**	-0.0151(3.3)***	-0.0181(2.6)***	-0.0145(2.5)***
log (predicted household income per capita)	0.0050(0.6)	-0.0028(0.9)	-0.0163(3.4)***	-0.0022(0.5)

Table 3 - continued

	model 1	model 2	model 3	model 4
<u>Age-sex composition of household:</u>				
male aged 0-6	0.0866(3.7)***	-0.0335(3.2)***	-0.0167(1.1)	0.0198(1.5)
male aged 7-12	-0.0400(2.1)**	-0.0395(4.7)***	0.148(12.1)***	0.0284(2.7)***
male aged 13-15	-0.0882(3.7)***	-0.0430(4.2)***	0.258(16.7)***	0.0228(1.7)*
male aged 16-18	-0.1681(7.0)***	-0.0652(6.2)***	0.238(15.3)***	0.0567(4.3)***
male aged 19-55	-	-	-	-
male aged 56-65	0.0933(4.1)***	-0.0234(2.4)**	-0.0070(0.4)	-0.0467(3.7)***
male aged 66-	0.1505(4.7)***	-0.0207(1.5)	0.0038(0.2)	-0.5190(3.0)***
female aged 0-6	0.0966(3.8)***	-0.0206(1.9)*	-0.0058(0.3)	0.0143(1.0)
female aged 7-12	-0.0245(1.2)	-0.0449(5.1)***	0.169(12.7)***	0.0206(1.8)*
female aged 13-15	-0.1306(4.9)***	-0.0821(7.1)***	0.269(15.7)***	0.0408(2.8)***
female aged 16-18	-0.1002(3.8)***	-0.0683(5.9)***	0.210(12.4)***	0.0312(2.1)**
female aged 19-55	-0.0001(0.0)	-0.0311(3.6)**	0.0084(0.7)	0.0164(1.5)
female aged 56-65	0.0702(2.5)***	-0.0310(2.5)***	-0.0063(0.3)	-0.0041(0.3)
female aged 66-	0.0879(2.8)***	-0.0457(3.4)***	-0.0270(1.4)	-0.0303(1.8)*
one generation household	0.0167(1.4)	-0.0059(1.1)	-0.0032(0.4)	-0.0300(4.6)***
two generation household	-	-	-	-
three generation household	-0.0106(1.7)*	0.0012(0.5)	-0.0059(1.5)	0.0062(1.9)*
other types of household	0.0123(0.6)	-0.0104(1.0)	-0.0207(1.3)	0.0043(0.3)
household in a poor county	-0.0115(2.4)**	0.0152(7.2)***	-0.0091(2.9)***	0.0028(1.0)
household in a rich county	-	-	-	-
<u>province:</u>				
Beijing	0.0315(1.8)*	-0.0343(4.3)***	0.0077(0.7)	0.0050(0.5)
Hebei	0.0266(2.3)**	-0.0190(3.8)***	-0.0475(6.4)***	0.0253(4.0)***
Shangxi	0.0150(1.1)	-0.0285(4.5)***	-0.0357(3.9)***	0.0535(6.8)***
Liaoning	0.0505(3.9)***	-0.0409(7.1)***	-0.0275(2.2)**	0.0107(1.5)
Jilin	0.0514(4.0)***	-0.0356(6.4)***	-0.0344(4.2)***	0.0148(2.1)**
Jiangsu	-	-	-	-
Zhejiang	0.0286(2.6)***	-0.0096(2.0)**	-0.0158(2.2)**	-0.0330(5.4)***
Anhui	0.0096(0.7)	-0.0026(1.1)	-0.0268(3.4)***	-0.0012(0.2)
Jiangxi	0.0262(2.1)**	-0.0404(7.2)***	-0.0341(4.1)***	-0.0193(2.8)***
Shangdong	0.0451(4.5)***	-0.0189(4.3)***	-0.0088(1.3)	0.0100(1.8)*
Henan	-0.0387(3.4)***	-0.0246(4.9)***	-0.0193(2.6)***	0.0643(10.2)***
Hubei	-0.0842(6.8)***	-0.0110(2.0)**	0.0486(6.1)***	-0.0106(1.6)
Hunan	0.0191(1.5)	-0.0386(6.9)***	0.0070(0.8)	-0.0368(5.3)***
Guangdong	0.1192(12)***	-0.0552(12)***	0.0488(7.3)***	-0.0710(12.6)***
Sichuan	-0.0202(1.6)	-0.0117(2.1)**	-0.0139(1.7)*	-0.0118(1.7)*
Gueizhou	-0.0282(2.0)*	-0.0211(3.4)***	-0.0483(5.2)***	0.0158(2.0)**
Yunnan	0.0684(4.9)***	-0.0078(1.3)	-0.0146(1.6)*	-0.0154(2.0)**
Shaanxi	-0.0638(4.5)***	-0.0240(3.9)***	-0.0112(1.1)	0.0386(5.0)***
Gansu	-0.0436(2.8)***	-0.0289(4.2)***	-0.0010(0.1)	0.0214(2.5)***
F-statistics	22.798	14.035	42.756	26.346
adjusted R <sup>2</sup>	0.1327	0.0838	0.2267	0.1511
sample size	7977	7977	7977	7977

Table 3 - continued

	model 5	model 6	model 7
	durable	medical cost	daily goods
intercept	0.0195(0.6)	0.0317(0.8)	0.1056(4.1)***
male household head	0.0038(0.7)	0.0079(1.3)	0.0041(1.1)
wife's education years over the years of education of husband & wife combined	0.0043(1.0)*	-0.0110(2.2)**	-0.0010(0.3)
educational level of household head:			
high school and above	-	-	-
middle school	0.0050(1.4)	-0.0061(1.5)	-0.0018(0.7)
6 years of primary school	0.0024(0.8)	-0.0057(1.7)*	-0.0011(0.5)
3 years of primary school & below	0.0006(0.2)	-0.0019(0.5)	-0.0024(1.0)
Communist Party member	-0.0230(1.8)**	-0.0020(0.1)	-0.0040(0.4)
not CP member	-	-	-
male Communist Party member	0.0257(2.1)**	-0.0018(0.1)	0.0024(0.3)
female non CP member	-	-	-
household head mainly works as:			
1. farm worker	-	-	-
2. manual worker	0.0207(1.4)	0.0196(1.1)	0.0028(0.2)
3. skilled worker	-0.0021(0.1)	0.0026(0.1)	-0.0058(0.2)
4. professional	0.0061(0.3)	-0.0022(0.1)	0.0404(2.1)**
5. cadre	-0.0150(0.6)	-0.0061(0.2)	-0.0240(1.2)
6. individual trader	0.1379(2.0)**	-0.0390(0.5)	0.0307(0.5)
7. other (non-specified)	-0.0165(1.1)	-0.0092(0.5)	-0.0173(1.4)
male household head mainly works as:			
1. farm worker	-	-	-
2. manual worker	-0.0024(0.2)	-0.0132(0.7)	-0.0036(0.2)
3. skilled worker	0.0562(1.9)	0.0072(0.2)	0.0174(0.7)
4. professional	0.0092(3.4)	0.0020(0.1)	-0.0574(2.7)***
5. cadre	-0.0039(1.3)	0.0164(0.4)	0.0077(0.3)
6. individual trader	-0.1229(1.8)*	0.0198(0.2)	-0.0275(0.5)
7. other (non-specified)	0.0570(1.7)*	0.0037(0.2)	0.0202(1.7)*
log (no. of household members)	0.0013(0.3)	-0.0043(0.8)	-0.0080(2.2)**
log (predicted household income per capita)	0.0021(0.6)	-0.0016(0.4)	-0.0048(1.9)*

Table 3 - continued

	model 5	model 6	model 7
<u>Age-sex composition of household:</u>			
male aged 0-6	-0.0223(2.2)**	0.0692(5.5)***	-0.0130(1.6)
male aged 7-12	-0.0193(2.3)***	0.0223(2.2)**	-0.0151(2.3)**
male aged 13-15	-0.0234(2.3)***	0.0061(0.4)	-0.0158(1.9)**
male aged 16-18	-0.0218(2.1)***	0.0010(0.1)	-0.0148(1.8)*
male aged 19-55	-	-	-
male aged 56-65	-0.0328(3.3)***	0.0472(3.9)***	-0.0001(0.0)
male aged 66-	0.0314(2.2)***	0.0358(2.1)**	0.0018(0.2)
female aged 0-6	-0.0261(2.4)***	0.0340(2.5)***	-0.0161(1.8)*
female aged 7-12	-0.0300(3.1)***	0.0201(1.8)*	-0.0245(3.5)***
female aged 13-15	-0.0123(1.1)	0.0136(0.9)	-0.0098(1.0)
female aged 16-18	-0.0369(3.2)***	0.0076(0.5)	-0.0060(0.6)
female aged 19-55	0.0018(0.2)	0.0429(4.0)***	0.0137(1.9)**
female aged 56-65	-0.0009(0.8)	0.0468(3.1)***	0.0049(0.5)
female aged 66-	-0.0011(0.8)	0.0494(3.0)***	0.0017(0.2)
one generation household	-0.0034(0.7)	0.0075(1.2)	-0.0099(2.4)***
two generation household	-	-	-
three generation household	0.0042(1.6)*	0.0031(0.9)	0.0004(0.2)
other types of household	0.0017(0.2)	-0.0118(1.0)	-0.0053(0.7)
household in a poor county	-0.0053(2.5)***	0.0056(2.2)**	-0.0017(1.0)
household in a rich county	-	-	-
<u>province:</u>			
Beijing	0.0187(2.4)**	0.0170(1.8)*	-0.0168(2.7)***
Hebei	-0.0120(2.4)**	0.0104(1.7)*	-0.0006(0.2)
Shangxi	-0.0172(2.7)***	0.0098(1.3)	0.0054(1.1)
Liaoning	-0.0191(3.4)***	0.0049(0.7)	-0.0094(2.2)**
Jilin	-0.0243(4.4)***	0.0253(3.8)***	-0.0111(2.5)***
Jiangsu	-	-	-
Zhejiang	-0.0111(2.3)**	0.0207(3.6)***	0.0009(2.1)**
Anhui	-0.0111(2.1)**	-0.0019(0.3)	0.0121(2.8)***
Jiangxi	-0.0136(2.5)**	0.0172(2.5)***	0.0205(4.7)***
Shangdong	-0.0107(2.5)**	0.0047(0.9)	-0.0004(0.1)
Henan	-0.0137(2.7)***	-0.0247(4.0)***	0.0039(0.9)
Hubei	-0.0147(2.7)***	-0.0176(2.7)***	0.0084(2.0)***
Hunan	-0.0171(3.1)***	-0.0044(0.6)	0.0160(3.6)***
Guangdong	-0.0120(2.7)***	-0.0084(1.5)	0.0033(0.9)
Sichuan	-0.0155(2.9)***	-0.0128(1.9)**	0.0034(0.7)
Gueizhou	-0.0181(3.0)***	-0.0202(2.7)***	0.0349(7.1)***
Yunnan	-0.0141(2.4)***	-0.0116(1.6)	0.0129(2.7)***
Shaanxi	-0.0095(1.6)	-0.0424(5.7)***	0.0176(3.6)***
Gansu	-0.0127(1.9)*	-0.0404(4.9)***	0.0018(0.3)
F-statistics	4.240	5.693	6.300
adjusted R <sup>2</sup>	0.0222	0.0319	0.0359
sample size	7977	7977	7977

Notes: The omitted dummies in these models are female household head, educational level at 3 years or lower of HH heads, non-communist party member, HH head working in the farming sector, husband working in the farming sector, male aged from 19-55, household of two generations, household located in the rich county and Jiangsu province. \*\*\* denotes the significance level at 1% and below, \*\* at 5% and \* at 10% .

Source: 1995 Rural Household Survey.

Table 4

## Mean Characteristics by Quartered Sample in Terms of Wives' Bargaining Power

Variable	Quarter 1 (lowest female bargaining power)	Quarter 2	Quarter 3	Quarter 4 (highest female bargaining power)
<u>gender indicators between husband and wives:</u>				
male household head	0.9905	0.9870	0.9640	0.8923
female household head	0.0095	0.0130	0.0360	0.1076
wife's education years over that of both husband and wife combined	0.0727	0.3119	0.4849	0.5726
ratio of wives' working time (in day) to the total of both husbands and wives combined	0.3522	0.4480	0.3465	0.5557
cash income earned by husband (in yuan)	663.9725	850.0365	932.0790	636.1994
cash income earned by wife (in yuan)	87.5865	140.1900	206.9935	166.7671
% of wives' cash income to husbands'	7.6606	20.0329	39.0341	67.4826
<u>households:</u>				
actual income per capita	2298.9	2553.7	2763.0	2253.1
ratio of household head receiving high- school education & above to the quartered sample	0.13	0.14	0.24	0.07

Source: 1995 Rural Household Survey.

Table 5  
Comparison of the Quartered sub-samples: Number of Children by Age Group and by Sex, and Age and Sex Ratios

	<u>Aged 0-6</u>			<u>Aged 7-12</u>			<u>Aged 13-15</u>			<u>Aged 16-18</u>			<u>Boy-girl</u>
	<u>boys</u>	<u>girls</u>	<u>ratio</u>	<u>boys</u>	<u>girls</u>	<u>ratio</u>	<u>boy</u>	<u>girl</u>	<u>ratio</u>	<u>boy</u>	<u>girl</u>	<u>ratio</u>	<u>ratio</u>
													<u>(all ages)</u>
Quarter 1 (lowest female bargaining power)	287	226	127	463	429	108	302	292	103	304	319	95	107
Quarter 2	362	259	139	542	513	106	326	246	132	316	328	96	115
Quarter 3	354	296	120	629	538	117	259	220	118	242	243	100	114
Quarter 4 (highest female bargaining power)	350	322	109	627	510	123	279	266	105	279	262	106	113
Total	1353	1103	123	2261	1990	114	1166	1024	114	1141	1152	99	112

Source: 1995 Rural Household Survey

Table 6  
Does Mothers' High Bargaining Power Make Their Daughters Suffer Less  
in Terms of Cigarette Spending?  
Second Stage Regression Models by Mothers' Bargaining Power

dependent variable: ratio of spending on cigarette and alcohol to total household spending					
gender-age group:	Quarter 1 (lowest female bargaining power)	Quarter 2	Quarter 3	Quarter 4 (highest female bargaining power)	
male aged 0-6	-0.0331	-0.0124	-0.0320*	-0.0521***	
male aged 7-12	-0.0352**	-0.0338**	-0.0297**	-0.0527***	
male aged 13-15	-0.0679***	-0.0173	-0.0413**	-0.0352*	
male aged 16-18	-0.0553***	-0.0735***	-0.0693***	-0.0589***	
male aged 19-55	0	0	0	0	
male aged 56-65	-0.0238	0.0157	-0.0482**	-0.0234	
male aged 66-	-0.0389	-0.0133	-0.0032	-0.0142	
female aged 0-6	-0.0458*	-0.0400*	0.0031	-0.0195	
female aged 7-12	-0.0413**	-0.0365**	-0.0517***	-0.0510***	
female aged 13-15	-0.0874***	-0.0728***	-0.0618***	-0.0942***	
female aged 16-18	-0.0555***	-0.0873***	-0.0754***	-0.0514**	
female aged 19-55	-0.0115	-0.0513***	-0.0046	-0.0455***	
female aged 56-65	-0.0097	-0.1263***	-0.0008	-0.0275	
female aged 66-	-0.0535***	-0.1013***	-0.0012	-0.0369	
adjusted R <sup>2</sup>	0.0764	0.0741	0.0874	0.0882	
F-values	4.845	4.719	5.452	5.490	
dependent means	0.0987	0.0923	0.0877	0.0871	
number of observations	1999	1999	1999	1997	

Notes: (1) For brevity, we only report the coefficients on variables for proportions of the certain age-sex groups. Other independent variables included in these models but not reported in the table are those referred to Table 3.

(2) \*\*\* denotes statistics significance at 1%, \*\* at 5% and \* at 10%.

Source: 1995 Rural Household Survey.

Table 7

Does Mothers' High Bargaining Power Increase Household Spending on Their Daughter's Education?  
 Second Stage Regression Models by Mothers' Bargaining Power:  
 with Selected Coefficients on School-aged Children by Age and Sex

Dependent variable:

ratio of household spending on education to the total household cash spending

	<u>Quarter 1</u> (lowest female bargaining power)	<u>Quarter 2</u>	<u>Quarter 3</u>	<u>Quarter 4</u> (highest female bargaining power)
boys aged 7-12	0.1902***	0.2054***	0.1869***	0.1977***
boys aged 13-15	0.3445***	0.2957***	0.3059***	0.3060***
boys aged 16-18	0.2332***	0.2641***	0.2641***	0.3438***
girls aged 7-12	0.2051***	0.1658***	0.2373***	0.2142***
girls aged 13-15	0.2921***	0.2935***	0.3050***	0.4087***
girls aged 16-18	0.1928***	0.2766***	0.3547***	0.1491***
adjusted R <sup>2</sup>	0.2634	0.2001	0.2206	0.2271
F-values	17.627	12.628	14.159	14.647
dependent means	0.08438	0.09636	0.09517	0.10172
number of observations	1999	1999	1999	1997

Notes: (1) For brevity, we only report the coefficients on variables for proportions of school-aged groups. Other independent variables included in these models but not reported in the table are those referred to Table 3.

(2) \*\*\* denotes statistics significance at 1%.

Source: 1995 Rural Household Survey.



Table 8  
Number of Children by Age and Sex and School Enrolment Rates of the Quartered Samples

	<u>Total</u>		<u>Quarter 1</u> (lowest female bargaining power)		<u>Quarter 2</u>		<u>Quarter 3</u>		<u>Quarter 4</u> (highest female bargaining power)	
	<u>number</u>	<u>rate</u>	<u>number</u>	<u>rate</u>	<u>number</u>	<u>rate</u>	<u>number</u>	<u>rate</u>	<u>number</u>	<u>rate</u>
boys aged 7-12 in school	2059		413		493		569		584	
boys aged 7-12 not in school	202		50		49		60		43	
	0.91		0.89		0.91		0.91		0.93	
girls aged 7-12 in school	1791		375		449		508		459	
girls aged 7-12 not in school	199		54		64		30		51	
	0.90		0.87		0.88		0.94		0.90	
boys aged 13-15 in school	1046		264		291		241		250	
boys aged 13-15 not in school	120		38		35		18		29	
	0.90		0.87		0.89		0.93		0.90	
girls aged 13-15 in school	866		238		202		201		225	
girls aged 13-15 not in school	158		54		44		19		41	
	0.85		0.82		0.82		0.91		0.85	
boys aged 16-18 in school	538		135		156		118		129	
boys aged 16-18 not in school	603		169		160		124		150	
	0.47		0.44		0.49		0.49		0.46	
girls aged 16-18 in school	496		122		160		111		103	
girls aged 16-18 not in school	656		197		168		132		159	
	0.43		0.38		0.48		0.45		0.39	
total	8734		2019		2271		2131		2223	

Note: Ratios are calculated as the following, children in school/children in school + children not in school.

Source: 1995 Rural Household Survey.

**Table 9**  
**Second Stage Regression Models by Mothers' Bargaining Power:**  
**with Selected Coefficients on School-aged Children both in school and not in school by Age and Sex**

<u>Dependent variable:</u> ratio of household spending on education to the total household cash spending	<u>total</u>	<u>Quarter 1</u> (lowest female bargaining power)	<u>Quarter 2</u>	<u>Quarter 3</u>	<u>Quarter 4</u> (highest female bargaining power)
boys aged 7-12 in school	0.1238***	0.1673***	0.1447**	0.0536	0.1347*
boys aged 7-12 not in school	0.1917***	0.2111***	0.1861***	0.1375***	0.2375***
boys aged 13-15 in school	0.3313***	0.3875***	0.2970***	0.2836***	0.3415***
boys aged 13-15 not in school	0.1579***	0.1883***	0.0464	0.0704	0.2683***
boys aged 16-18 in school	0.5093***	0.5075***	0.5270***	0.4177***	0.5573***
boys aged 16-18 not in school	0.0662***	0.0436	0.0037	0.0015	0.1958***
girls aged 7-12 in school	0.2113***	0.2097***	0.1665***	0.1874***	0.2546***
girls aged 7-12 not in school	0.1145***	0.1774***	0.1068*	0.0682	0.0774
girls aged 13-15 in school	0.3598***	0.3308***	0.3165***	0.3042***	0.4493***
girls aged 13-15 not in school	0.1198***	0.1321*	0.0725	0.2433***	0.0721
girls aged 16-18 in school	0.5249***	0.5091***	0.5097***	0.5164***	0.5372***
girls aged 16-18 not in school	0.0132	0.0137	-0.0015	-0.0354	0.0351
adjusted R <sup>2</sup>	0.2821	0.3305	0.2638	0.2400	0.2822
F-values	65.120	21.140	15.620	13.883	17.018
dependent means	0.0944	0.0852	0.0954	0.0902	0.1069
number of observations	7997	1999	1999	1999	1997

Notes: (1) For brevity, we only report the coefficients on variables for proportions of school-aged groups. Other independent variables included in these models but not reported in the table are those referred to Table 3.  
(2) \*\*\* denotes statistics significance at 1%, \*\* at 5% and \* at 10%.  
(3) Source: 1995 Rural Household Survey.

**Appendix Table 1**  
**OLS Regression Model to Predict Household Annual Income**

dependent variable= household annual income per capita in actual term

independent variable:	coefficient	T-ratio
intercept	6171.4877	44.2 ***
no. of HH members	-318.3909	14.0 ***
farming land (in mu)	17.8182	3.3 **
household located in plain area	-	
household located in mountainous area	-870.5935	10.5 ***
household located in hilly area	-361.7688	5.1 ***
<u>province:</u>		
Beijing	321.3933	1.2
Hebei	-2587.8579	16.5 ***
Shangxi	-3057.3012	16.4 ***
Liaoning	-2486.2777	13.5 ***
Jilin	-2394.5021	12.5 ***
Jiangsu	-	-
Zhejiang	-985.9064	5.9 ***
Anhui	-2620.5612	16.2 ***
Jiangxi	-2432.5391	13.7 ***
Shangdong	-1845.8708	12.8 ***
Henan	-2773.7275	19.2 ***
Hubei	-2529.2943	15.2 ***
Hunan	-2693.6845	16.7 ***
Guangdong	269.2576	1.7
Sichuan	-2918.2638	19.2 ***
Gueizhou	-2261.9363	11.5 ***
Yunnan	-2627.4369	14.1 ***
Shaanxi	-2974.0192	16.3 ***
Gansu	-2959.7061	15.3 ***
adj R <sup>2</sup>	0.1857	
F-value	83.891	
dep mean	2467.18	
no. of observations	7998	

Notes: The omitted dummies in this model are household located in the plain area and Jiangsu province.  
\*\*\* denotes the significance level at 1% and below, and \*\* at 2%.

Source: 1995 Rural Household Survey.

**Appendix Table 2**

**Main Characteristics of Household Heads by Gender**  
**1995 Rural Household Survey**

Variable	male	female
<b><u>1. household head:</u></b>		
average age (in year)	43.93	46.54
<b><u>marital status (%):</u></b>		
married	97.1	81.2
widow(er)	1.6	16.0
not in the marriage	1.3	2.8
communist party membership	14.7	11.8
<b><u>production status (%):</u></b>		
in agricultural work	79.4	70.8
in off-farm work	14.8	11.5
house work	1.3	12.7
other	4.5	5.0
<b><u>educational level (%):</u></b>		
high school and above	14.5	12.4
middle school	42.1	33.1
6 year primary school	32.0	25.6
3 year primary school	5.7	8.4
no education	5.4	20.5
smokes	79.8	9.4
<b><u>2. household type (%):</u></b>		
one generation household	4.0	6.3
two generation household	73.3	67.1
three generation household	22.1	24.7
other HH type	0.6	1.8
mean HH assets (current price in yuan)	703.63	466.74
mean HH savings (in yuan)	4698.72	5942.21
mean value of house owned (original price in yuan)	9532.05	12213.42
mean debts (in yuan)	605.31	673.50
household income per capita	2431.99	3280.75
no of observations	7666	332
% of households	95.9	4.1

## Notes

1. Hoddinott, John and Lawrence Haddad (1995). " Does Female Income Share Influence Household Expenditures? Evidence from Cote d'Ivoire", *Oxford Bulletin of Economics and Statistics*, **57**, 1, 77-96.
2. Thomas, D. (1990). "Intra-household Resource Allocation: An Influential Approach", *Journal of Human Resource*, **25**, 636-64.
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4. Bourguignon, F., Browning, M., Chiappori, P.A., and Lechene, V. (1993). "Intra-household Allocation of Consumption: A Model and Some Evidence from French Data", *Annales d'Economie et de Statistique*, **29**, 137-56.
5. The detailed information about the data can be sought from Azizur Khan (1997) "Distribution of Income in China: Evolution of Inequality, 1988-95", University of California, Riverside: (mimeo).
6. Haddad, Lawrence, Hoddinott, J. and Alderman, H. (eds. 1997) *Intra-household Resource Allocation in Developing Countries: Model, Methods, and Policy*, Baltimore and London: The Johns Hopkins University Press published for the International Food Policy Research Institute.
7. Rosenzweig, M. and T. P. Schultz (1982), "Market opportunities, genetic endowments and intra-family resource distribution: child survival in rural India", *American Economic Review*, **72**(4):803-815.
8. Behrman, Jere (1988), "Intra-household allocation of nutrients in rural India: are boys favored? Do parents exhibit inequality aversion?" *Oxford Economic Papers* **40**(1), 32-54.
9. Folbre, Nancy (1984), "Market opportunities, genetic endowments and intra-family resource distribution: comment", *American Economic Review*, **74**, 518-520.
10. Ling, Yaohua (1989) *The Golden Wing: A sociological Study of Chinese Families* (Jinyi). The book was first published by Routledge and Kegan Paul, 1947. It was translated and re-published by Sanlian Publication House (in Chinese).
11. Fei, Xiaotong (1986) *Jiang Village Economy, Peasant Life in China*, (Jiangcun Jinji) the English version was first published by Routledge, 1939 (translated from its English version entitled *Peasant Life in China* into Chinese, and published by Jiangsu Renmin Publication House, 1986).
12. Fei, Xiaotong (1985) *Rural China* (Xiangtu Zhongguo), Sanlian Publication House (in Chinese).
13. Two pieces of evidence which suggest a modest reduction from 1988 to 1995. The first is on the proportion of two and three generation households. In 1988, 2.5% of the sampled rural households were in the sub-category of one-generation, 71.4% were nuclear households; 25.7% were multi-generation households and 0.4% other type of households. In 1995, the comparable figures were: 4.1% one-generation households, 73.0% nuclear households, 22.2% multi-generation households and 0.7 other type. The second piece of evidence is the increase in the number of one generation households with aged heads. In 1988, only 15 % of the one generation households were headed by people aged over 55 years; it increased to 53% by 1995. This suggests that by 1995, more elderly people in the rural areas live without children than 1988.
14. Appleton, S., Chessa, I. and Hoddinott, J. (1999). "Are women the fairer sex: looking for Gender differences in Gender Bias in Uganda" (mimeo), Centre for the Study of African Economies, Oxford University.
15. Ulph, D. (1988). "A General Non-Cooperative Nash Model of Household consumption Behaviour", mimeo, University of Bristol.
16. Hoddinott and Haddad (1995) used Ulph's model to motivate their empirical work relating expenditure patterns to income shares. Women's share of household income did appear to affect expenditure patterns and was in turn determined by women's education relative to men's.
17. Household self-consumption - the consumption on farm products produced by household - is not included in the analysis. Most self-consumed goods are simple food (like grain) household produced on its own farm to meet basic needs and so arguable reflect bargaining power less than cash

expenditures.

18. Deaton, A.(1987). "The Allocation of Goods within the Household: Adults, Children, and Gender", *World Bank Living Standards Measurement Study Working Paper*, No.39.

19. The identifying instruments were geographic dummies: whether the household was in plain, mountainous or hilly areas. These instruments were all highly significant in the model (Appendix Table 1 refers).

20. Unfortunately, one cannot split spending on clothing into spending on children and on adults.

21. 5% of the household heads in the sample do not have spouses - they are either widows, widowers or single. For the purpose of this study, we set the ratio of their education to their (non-existent) husbands to 100% for women heads; for male heads, the variable was set to 0.

22. Spending on house-repairing, transportation, payment to aged parents who do not stay within the household are not reported in the same table, but the results are discussed in the paper. Other non-specific spending is not discussed due to problems of interpretation given its ambiguous definition.

23. A rough if rather contrived estimate is to compare the predicted share of spending on health care of a household comprised entirely of young boys (with otherwise mean characteristics) with the share from an identical household comprised entirely of young girls. The former is predicted to spend 9.5% on health care; the latter only 6.1%.

24. Our results can be compared with those of Burgess and Wang (1995) using a rural household survey of three Chinese provinces. For Sichuan province, they found a large disparity between the coefficients of boys and girls aged 0-4 years in their model of the share of health spending in the household budget: the coefficient for the boys is 3.14 and the coefficient for the girls is only 1.30. However, the gaps in the other two provinces were not substantial. See Burgess, Robin and Wang, P.P. (1995). "Chinese Rural Household Expenditure Analysis", *London School of Economics, Suntory-Toyota International centre for Economics and Related Disciplines*, working paper EF No. 13.

25. Haddad, Lawrence and Hoddinott, John (1994). "Women's Income and Boy-Girl Anthropometric Status in the Cote d'Ivoire", *World Development*, **22**, 543-53.

26. Sen, A.K. (1990): More than 100 million women are missing. *New York Review of Books* 37: 2 20th Dec. p. 61-66.

27. CASS, Population Research Institute (1991), *Almanac of China's Population, 1990*, Beijing, Economic Management Publishing House.

28. SSB (1991), *10 Percent Sampling Tabulation on the 1990 Census of the Peoples' Republic of China*, China State Statistical Bureau.

29. SSB (1995), *China Population Statistics yearbook, 1994*.

30. This was suggested by Fei Xiaotong in his anthropological study in 1935, after finding a very uneven sex ratio between very young boys and girls aged 0-5 (118 boys versus 87 girls, yielding a ratio of 1.36) in Kai Xuan Gong Village, Jiangsu Province.

31. Hull, Terence H. (1990). "Recent Trends in Sex Ratios at Birth in China", *Population and Development Review*, **16**, No.1, 63-83.

32. Davin, Delia (1990) "'Never Mind if it's a Girl, You Can Have Another Try': The Modification of the One-Child Family Policy and its Implications for Gender Relations in Rural Areas", in Delmen, Ostergaard and Christiansen (edt.) *Remaking Peasant China*, Denmark: Aarhus University Press, 81-91.

33. Johansson, S. and Nygren, O. (1991). "The Missing Girls in China: a New Demographic Account", *Population and Development Review*, **17**, No.1, 35-51.

34. Coale, Ansley J. (1991). "Excess Female Mortality and the Balance of the Sexes in the Population: an Estimate of the Number of "Missing Females",

*Population and Development Review*, **17**, No.3, 517-23.

35. Zheng, Yi, Tu Ping, Gu Baochang, Xu Yi, Li Bohua and Li Yongping (1993) "Causes and Implications of the Recent Increase in the Reported Sex Ratio at Birth in China". *Population and Development Review*, **19**, No.2, 283-303.

36. Johnson, K. (1996). "The Politics of the Revival of Infant Abandonment in China, with Special Reference to Hunan", *Population and Development Review*, **22** (1): 77-98.

37. Before 1979, there was no attempt to control the number of births: a household could continue to give birth to children until it was satisfied with the ratio between sons and daughters. One-child policy has completely prevented urban residents from having more than one child and restricted the ability of rural households to have as many children as they wish.

38. Deaton, A and Case A. (1988). "Analysis of Household Expenditures", *LSMS Working Paper No. 28*, World bank, Washington D.C.