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Journal:	*Applied Economics*
Manuscript ID:	APE-04-0238.R1
Journal Selection:	Applied Economics
Date Submitted by the Author:	26-Jan-2005
JEL Code:	D13 - Household Production and Intrahousehold Allocation < D1 - Household Behavior and Family Economics < D - Microeconomics, I20 - General < I2 - Education < I - Health, Education, and Welfare, J24 - Human Capital|Skills|Occupational Choice|Labor Productivity < J2 - Time Allocation, Work Behavior, and Employment Determination and Creation < J - Labor and Demographic Economics
Keywords:	Education, Human capital formation, Intertemporal choice, Household behaviour

Parental Investment in Children's Human Capital in Urban China

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Abstract. We test the extent of parental forgone consumption used instead to invest in children's human capital by use of intrahousehold resource allocation models. Using an unusual, comprehensive data set for urban China, we find more spending on boys aged 13-15 but more on girls aged 16-18, suggesting that standard human capital theories and traditional perceptions of gender bias do not completely explain educational expenditure decisions. The evidence from urban China is consistent, though, with human capital models which consider parental intertemporal preferences. Also, our findings suggest that the perceived bias in favour of sons exists weakly in contemporary urban China.

JEL Classification Numbers. I20, J24, D13.

Keywords. Education, human capital formation, intertemporal choice, household behaviour.

The possibility of bias for sons is an often-asked question in China.[♣] The one-child policy may have popularised the traditional view of a preference for boys. This paper investigates patterns in household expenditure on the education of sons and daughters to analyse whether there are such gender biases in contemporary urban China. We aim to measure the extent of forgone consumption of parents that is spent instead on the education of their children as a test of the models of parental investment in children's human capital by using a strand of empirical models known as the intrahousehold resource allocation approach. Finally, we will discern whether any such gender differences generate effects such as differential school enrolment rates of boys and girls with policy implications for gender inequality in China.

This paper will first review the educational system of China, focusing on gender differences in school enrolment as an indicator of human capital. This is followed by a model of parental investment in children's human capital that may result in differential spending on the education of sons and daughters if intertemporal considerations are taken into account. Section 3 introduces the intrahousehold resource allocation model to provide a measure of parental forgone consumption used instead on children's education, providing an empirical test of parental investment models. Section 4 describes the data and Section 5 presents the empirical findings as to whether gender is a significant factor in the allocation of household resources toward the education of children in urban China. In Section 6, we investigate whether any differential spending is

[♣] The model of parental investment in children's human capital is Discussion Paper No. 15 in the Centre on Skills, Knowledge and Organisational Performance (SKOPE) series at the Universities of Oxford and Warwick. Kind appreciation is also given to the U.K. Department for International Development for support. Any errors are mine.

due to better returns to education for men. If that is not the entire picture, then we turn to examine the potential role of intertemporal considerations such as future transfers or financial support for parents in urban China. Finally, we conclude in Section 7 with a summary of our findings of gender differences in educational expenditure indicating differential investment of parents in their children's human capital. We aim to uncover whether the oft-perceived tradition of a preference for boys exists in contemporary urban China or whether traditions are changing.

Evidence of pre-labour market gender inequality implies policy conclusions that are different from those based on post-entry inequalities in the labour market. This provides a useful analytical separation in examining the factors concerning gender discrimination, *i.e.*, differentiating between productivity-related differences generated by pre-labour market inequality, such as education obtained as a child, and those that pertain once men and women enter the labour market. Any evidence would also point to the circular nature of gender inequality. In other words, what happens in the labour market can affect decisions made prior to entry to the labour market (Rosenzweig and Schultz 1982).

1 Education in Modern China

The modern Chinese educational system is generally comprised of primary (six years), secondary (six years, three years of lower and three years of upper middle school), and tertiary or higher education (varying between two and five years) (Knight and Li 1993). Education is officially compulsory for nine years to the completion of lower middle school, though not always in practice (NBS 1997*a*). However, overall school enrolment in China is high in 1995, the year corresponding to the data set used in this paper. There are costs involved in schooling that fall into two main categories, tuition and fees, and other expenditures, which may include school uniforms, transportation expenses, and out-of-school or private tuition fees. The mean value of tuition and fees is 398 RMB in our representative survey, while it is much less (153 RMB) for other educational expenditures. In total, these costs are estimated to be less than 5% of average household income, so children's primary and secondary education will entail some but not great costs. There are some differences in school quality as well with the better schools expected to be more expensive.

There are not large gender differences in educational enrolment in urban China in the current period (see Knight and Li 1993 for similar findings in 1988). Figure 1 presents the possible paths in the Chinese school system and partitions enrolment by academic and professional schools into gender proportions, as computed from our data set discussed in Section 3.

[FIGURE 1 HERE]

In the Chinese school system, students attend lower middle school after completing primary school. They then test into upper middle school or middle level professional school. Middle level professional school generally takes one more year to complete than upper middle school and is typically the last level attained. Those who complete upper middle school are likely to apply and test into college. Professional school is an alternative to college. Those who select into professional schools will likely take on administrative or clerical work, and those who do not continue will likely enter the labour force as factory or manufacturing workers. Those who opt out of school early on are still candidates for factory work in particular, given China's growth in manufacturing capacity.

Table 1 gives school enrolment rates for children aged 7-18 in our sample. The mean years of education for all full-time students is 8.77 with a standard deviation of 3.83. For boys, it is 8.86 years of education (with a standard deviation of 3.82), while it is 8.66 years of education for girls (with a standard deviation of 3.84).

[TABLE 1 HERE]

The gross enrolment ratio of all school-aged children was 94 percent, while it was 91 percent for girls and 96 percent for boys (UNESCO 1999).[1]

[TABLE 2]

Table 2 shows that the ratio of enrolled girls to boys has stayed the same or improved from 1980 to 1995 for every level of education, although girls still lag behind at the secondary level and substantially behind at the tertiary level.[2] Using a 1995 rural household survey, Knight and Song (2000) find that boys are significantly more likely to be enrolled in school than girls, with the greater difference for upper middle school-aged children. One explanation posited by Broaded and Liu (1996) is that educational aspirations are different for boys and girls. In their study of Wuhan, boys are more likely to enter into advanced schooling while girls are more likely to enter into professional courses. They posit that this is primarily the result of two factors – tradition and parents' perception of future discrimination against women. They also find that

[1] UNESCO (1999) uses the definition of school-aged children as given by the country (see NBS 1997*b*).

[2] Figures for rural and urban China separately are not available.

women are reluctant to be better educated than any likely future spouse for fear that they might risk limiting their marriage prospects.

This customary reliance on sons and the argument concerning the role of tradition in fostering gender inequalities in education may hold for rural China. In rural China, Gao (1994) argues that patrilocal marriage and patrilineal inheritance are important aspects of the structure of patriarchal society that did not change in the course of economic transformation.[3] Even though marriage and inheritance in China are legislated to give daughters and sons equal privileges as heirs, patrilineal inheritance continues to be practised in rural areas with the result that sons are preferred to daughters (Lee 1998).[4] Sons inherit property, live near their parents and support them in old age. In a household survey conducted in the early 1990s, the Institute of Population Studies of the Chinese Academy of Social Sciences (IPS) finds that rural, but not urban, households show a preference for sons in the distribution of family property. We discuss this survey

[3] Rural residences, for example, have traditionally been passed to sons and not daughters. The introduction of cooperatives abolished private ownership of land, but it did not significantly affect patrilocal residence patterns, argues Gao (1994). The government advocated men moving to their wives' home at marriage, but there are very few instances of this occurrence in rural areas. China's rural villages are usually made up of several large single-surname lineages. Because land is limited, villages restrict outsiders from moving in. Rural residents see women who move in to marry as effectively of their lineage and their descendants are welcomed as part of the lineage. Men who move in to marry are seen as outside the lineage and are excluded because all their descendants will belong to a differently surnamed lineage. The great majority of rural Chinese women must marry or they will not have a home of their own (Gao 1994). Most do not have the privilege of choosing to remain at their natal home because their village is unwilling to distribute land or residence to their husbands and children. In this respect, daughters are unable to benefit their natal families, while a son, aside from having his own land, gains another portion when he takes a wife. The periodic redistribution of land contracted for household production under the household responsibility system is based on the number of people in the household. Finally, by remaining near his parents, a son will be able to care for them in their old age (Croll 1994). Consequently, parents in rural China likely value sons more than daughters.

[4] Lee (1998), in her sociological study of rural-urban migrant factory workers in special economic zones in southern China, finds that parents discriminate against girls in favour of boys because of the perception that girls will eventually marry and move away so parents must rely on their sons in old age in rural China. In many villages there are only primary schools and upper middle school often involves extra fees for room

in detail later in the paper. Finally, in examining educational enrolment patterns in 1988, Knight and Li (1993) find that traditional values favouring the education of boys rather than girls appear to have been eroded in urban areas though not in rural areas.

We will explore whether a preference for boys exists in urban China, or if there are other factors motivating the parental decision to educate their children. To a large extent, due to the rural roots and migration patterns of the current cohort of adults in urban areas, we expect that rural customs will have an impact on parental attitudes in urban China. This is likely to be compounded by the additional linkages of urban with rural China through grandparents and the extended family. However, we hypothesise that parents are rational investors in their children in both rural and urban China, but face different constraints. In other words, there are differences in the economic needs of urban and rural households that affect their decisions regarding investment in children. A number of institutional factors in rural China may have caused parents to value sons more than daughters, giving rise to a tradition of bias toward boys. As the view of China is often driven by the view of rural areas where the bulk of the population live, there is a perception of pro-boy bias. We posit that tradition is often the historical product of practical necessity, and that rational acts under one set of circumstances, such as in rural China, will change when the context is altered, as in urban China with a different set of household needs and constraints. Our findings may run counter to the perceived traditions within China, but might better reflect the practices of an urban population with different concerns. In other words, traditions could be changing.

and board when attending in towns. Thus, she finds that parents educate their sons more than their daughters with the result that more boys are enrolled in school in some rural areas.

Further, in urban China, there is not evidence of two forms of explicit gender bias. Widespread female infanticide has not been documented, perhaps on account on the closer monitoring of neighbourhood committees and the work place related housing arrangements. Housing in 1995 was arranged by the work unit, so members of a work unit tend also to be neighbours. Second, unlike in rural China, there is no observed popular pattern of arranged marriages, perhaps there is less need to secure networks of mutual assistance typically wrought through marriage in agricultural societies. These differences reinforce the notion that gender bias is of a different nature in urban China and our investigation of gender bias is consistently conditional on girls living in their parents' households. Therefore, our study is to discern evidence of gender bias as it manifests in educational expenditure and school enrolment of girls in urban households.

Becker (1993) in his book, *A Treatise on the Family*, identified the parental role in developing the human capital of children. The investment in children's human capital, under credit constraints, necessarily entails forgone current consumption for the household. There is a strand of literature – intrahousehold resource allocation models – that could provide an empirical test of the extent to which parents will forgo consumption to spend on children's education through discerning patterns of consumption within households (see Deaton 1989; Behrman 1997; Haddad, Hoddinott and Alderman 1997 for excellent overviews of this approach). The degree of expectations of returns from children will vary among societies; however, we posit that parents invest in their children with an eye toward their own future utility as well as that of their offspring. These intertemporal considerations can generate differential investments in the human capital of sons versus daughters that are unrelated to preference or bias particular to a society. We use the intrahousehold resource allocation models to investigate educational expenditure in China where there is widely perceived gender bias to provide a test of these models by measuring the degree of parental investment in the form of forgone consumption.

2 A Model of Human Capital

Adapting Becker's three-period model, we introduce a final-period retiree who does not earn income and whose utility is comprised of consumption only, which is a function of transfers from his children and returns from assets, such as pension schemes. The utility function of parents of two children in the t^{th} period is

$$U_t = u_t + \delta(W^m_{t+1} + W^f_{t+1} + U_{t+1}), \qquad (1)$$

where u_t is their utility this period from consumption, W^m_{t+1} is the future income of their son, W^f_{t+1} is the future income of their daughter, U_{t+1} is next period's utility, and δ is the discount rate or subjective rate of time preference. The utility derived from their children is assumed to be separable from the utility produced by their own consumption. Utility next period, U_{t+1}, is comprised of consumption in the form of returns from savings invested in assets, A_{t+1}, and transfers from their son's future household, B^m_{t+1}, and from their daughter's future household, B^f_{t+1}.

The marginal yield on assets, A_{t+1}, is R_a, while the marginal yields on investments in the human capital of the son and daughter with respect to the returns to their future income (R^m_h, R^f_h) and the portion of that which will generate transfers to parents in the next period (R^m_b, R^f_b) are given by

$$R^m_h = \partial W^m_{t+1}/\partial\gamma^m_t,\ R^f_h = \partial W^f_{t+1}/\partial\gamma^f_t,\ R^m_b = \partial B^m_{t+1}/\partial\gamma^m_t,\ R^f_b = \partial B^f_{t+1}/\partial\gamma^f_t, \qquad (2)$$

where $\gamma^m{}_t$ and $\gamma^f{}_t$ denote the proportion of household income, Q_t, expended on the human capital of their son and daughter, respectively.

The intertemporal budget constraint is

$$Z_t + \gamma^m{}_t + \gamma^f{}_t + A_{t+1}/R_a + B^m{}_{t+1}/R^m{}_b + B^f{}_{t+1}/R^f{}_b = PV(Q_t), \qquad (3)$$

where $PV(Q_t)$ is the present value of parental household income, comprised of Q_t and expected Q_{t+1}. In other words, parental household income this period consists of proportion of own expenditure (Z_t) that include consumption, transfers to their parents, savings invested in assets for retirement, and proportion of expenditure that is forgone consumption invested in children's education ($\gamma^m{}_t$ and $\gamma^f{}_t$). Household resources next period (Q_{t+1}) is equal to the discounted value of all expected sources of consumption ($A_{t+1}/R_a + B^m{}_{t+1}/R^m{}_b + B^f{}_{t+1}/R^f{}_b$), *i.e.,* assets and transfers, which are the result of savings and investment in children's human capital.

An education production function provides that the adult earnings of children will be produced by human capital investment by parents and also on account of innate ability. This forms a second set of constraint given by:

$$R^m{}_h = R(\gamma^m{}_t, H^m{}_t) \text{ and } R^f{}_h = R(\gamma^f{}_t, H^f{}_t), \qquad (4)$$

where a son's income, $R^m{}_h$, will be determined by expenditure on education by his parents ($\gamma^m{}_t$) and his ability ($H^m{}_t$), and similarly for a daughter.

The allocation between investing in assets or children when contemplating consumption next period is determined by a first order condition equating the marginal yields on the three sources of income in the third period:

$$\delta A'_{t+1} + \delta B^{m'}{}_{t+1} + \delta B^{f'}{}_{t+1} = \lambda_u / R_k = \delta U'_{t+1}, \tag{5a}$$

where λ_u is the marginal utility of income. The yields on human capital are expected to decline as more resources are invested, $\partial R^m{}_h/\partial\gamma^m{}_t \leq 0$, $\partial R^f{}_h/\partial\gamma^f{}_t \leq 0$, $\partial R^m{}_b/\partial\gamma^m{}_t \leq 0$, and $\partial R^f{}_b/\partial\gamma^f{}_t \leq 0$, $\partial R^m{}_h/\partial H^m{}_t \leq 0$, $\partial R^f{}_h/\partial H^f{}_t \leq 0$, and will eventually equal returns to assets in this model including ability,[5] R_a assumed to be constant. Since $\partial R^m{}_h/\partial R_a < 0$, $\partial R^f{}_h/\partial R_a < 0$, $R^m{}_h > R_a$ and $R^f{}_h > R_a$, the marginal rate of return is denoted R_k.

The next first order condition maximises parental utility and determines their optimal consumption in periods two and three:

$$U'_t = \delta R_k U'_{t+1} = \lambda_u. \tag{5b}$$

The last first order condition determines investment in children's human capital in terms of the utility derived from the future income of the children:

$$\delta R^m{}_h W^{m'}{}_{t+1} = \lambda_u,\ \delta R^f{}_h W^{f'}{}_{t+1} = \lambda_u. \tag{5c}$$

Combining the first order conditions gives

$$\lambda_u/R_a = \lambda_u/R^m{}_b = \lambda_u/R^f{}_b = \lambda_u/R^m{}_h = \lambda_u/R^f{}_h, \tag{6}$$

which shows that the marginal rates of return on human capital for both the children's future income and expected transfers equal the return on assets in both periods. Differential spending on sons and daughters can thus be efficient rather than solely a result of bias of altruism.

The decision to invest in children's human capital in this and other models in the Becker tradition will entail forgone consumption by parents spent instead on the

[5] The support for this premise is well established and can be found in Becker (1993) whereby investment in ability for children will generate more investment in the more able of the children until the marginal rates of return to the investment is equal for all children.

education of children. There is a strand of empirical literature termed models of intrahousehold resource allocation which we propose would provide a direct test of such forgone consumption. These models reveal the decision of parents in a household to spend on children's education versus own consumption, consistent with the parental investment model as outlined above. In so doing, any evidence of differential expenditure on the education of sons and daughters can also be discerned. These models can be extended to investigate wealth or endowment effects as in Behrman *et al.* (1995) and for credit constraints, although we do not currently have data to so. Credit constraints certainly exist in China in 1995, a period prior to commercial credit liberalisation (Naughton 1996), and is so inferred in interpreting our results. Given these limitations, we posit that the intrahousehold resource allocation models provide one type of empirical evidence that can provide one measure the extent of forgone consumption by parents, albeit imperfectly. At a minimum, they allow for inferences of patterns of gender bias among children for a given household's resource allocation decisions, for which these models have been widely used in investigating patterns of consumption in developing countries (see Doss 1996 for an overview).

The next section outlines the empirical testing we will undertake and how the intrahousehold resource allocation models can be utilised to test parents' forgone consumption used instead on children's education, consistent with the theoretical models which posit that such decisions are taken when parents who decide to invest in children's education.

3 Differences in Household Expenditure Patterns on Children's Education

Intrahousehold resource allocation models seek to disaggregate household expenditure and can determine whether composition of a household affect spending decisions (see Deaton 1997). Studies of developing countries suggest the importance of the age-gender composition of the household in resource allocation decisions. They tend to find that expenditure patterns favour males (see Deaton 1997). Medical care for girls is a luxury good in that it is more income and price elastic than for boys in Pakistan (Alderman and Gertler 1997). Regarding children's education, DeTray (1988) finds in Malaysia that the demand for girls' schooling is more income elastic than for boys. Similarly, the education of girls is a luxury good in Vietnam (Behrman and Knowles 1999).

Household expenditures are also thought to differ with the degree of influence of women, suggesting a joint decision-making model (see Haddad, Hoddinott and Alderman 1997). For instance, Hoddinott and Haddad (1994) find in the Côte d'Ivoire in the 1980s that doubling the cash income of women increases the household budget share of food and reduces the shares of alcohol and cigarettes. Haddad and Hoddinott (1994) also find in the Côte d'Ivoire that increasing women's share of cash income betters the health status of boys relative to girls. For Brazil, Thomas and Strauss (1997) find that increased female earnings are associated with a larger share of the household budget being devoted in human capital – such as health and education – as well as leisure goods, including recreation. Song (2001), in a study of rural China in 1995, finds that greater female bargaining power changes expenditure patterns in favour of health care and education, but does not reduce the pro-boy discrimination in these expenditures (for an overview of bargaining theories, see Lundberg and Pollack 1996).

We use this approach to measure the decision of parents to forgo consumption to spend on education as a measure of direct investment in children's human capital and also investigating any gender differences posited in the theoretical model. We propose that this is a useful direct test of this genre of parental investment models where parents decide to give up current consumption in order to spend on their children's human capital.

In line with this literature, both a unitary household decision-making model and a joint decision-making model will be estimated to determine the best fit (see Deaton 1997 for the theoretical underpinnings and restrictions of these models).

3.1 Unitary Household Decision-making Model

Derived from the specifications of the theoretical model, we transform the variables into the specifications of this set of empirical models found in Deaton (1997). The proportion of household expenditure on the share of household expenditure on children's education is given by

$$\gamma^{e}_{t} = \beta_0 + \beta_1 \ln[(Z_t + \gamma^{e}_{t})/n) + \beta_2 \ln(n) + \sum_{g=1}^{G-1} \beta_3 (n_g/n) + \beta_4 \boldsymbol{X}_t + \varepsilon_t, \qquad (7)$$

where γ^{e}_{t} denotes the share of household expenditures spent on the education of children, $Z_t+\gamma^{e}_{t}$ is total household monetary expenditure, n denotes household size, n_g is the number of individuals of age-gender demographic group g, $\sum n_g/n$ represents the proportion of individuals of demographic group g in the household, $\boldsymbol{X}_t$ is a vector of control variables, and ε_t is the error term.

3.2 Joint Household Decision-making Model

An alternative formulation takes into account potential bargaining as between parents concerning the education of their children. A proxy for relative bargaining power is included. The equation is now given by

$$\gamma^{e}{}_{t} = \beta_0 + \beta_1 \ln[(Z_t+\gamma^{e}{}_{t})/n) + \beta_2 \ln(n) + \sum_{g=1}^{G-1} \beta_3(n_g/n) + \beta_4 \boldsymbol{X}_t + \beta_5 E^{m}{}_{t} + \varepsilon_t, \quad (8)$$

where $E^{m}{}_{t}$ denotes the years of education of the mother as a ratio of the total years of education of both spouses, which is a proxy for female bargaining power. We tried alternative proxies, such as women's share of earned income to that of both spouses (see the proxies used by Hoddinott and Haddad 1994 for the Côte d'Ivoire and Song 2001 for rural China).

3.3 Interpreting Patterns of Intrahousehold Resource Allocation

As explained by Deaton (1989, 1997), because we do not have data regarding actual expenditure on the education of boys and girls but only on all the children in the household, the analysis is based on a correlation between the number of boys and girls in the household and the amount of forgone consumption. This is evidenced through the variable, $\sum n_g/n$. From both the unitary and the joint decision-making formulations of the model, the coefficient β_3 indicates the relationship between educational expenditure and the age-composition of the household. If β_3 are significant and different for boys and girls, then there is evidence of differential investment in children's human capital as seen through forgone consumption of parents. Again, this is a direct test of parents forgoing consumption to spend on children's education as well as a method to discern whether such forgone consumption and expenditure differ by gender.

4 Data

We tested our hypotheses using an unusually comprehensive and representative urban household survey conducted in China and related to 1995. The survey has rich data on consumption and income for each household. The survey was designed by the Institute of Economics, Chinese Academy of Social Sciences, in consultation with international scholars. The households are drawn from a sub-sample of the NBS annual household income and expenditure survey. Eleven of the 30 provinces of China are included. For details, see Riskin, Zhao and Li (2001).

The pertinent descriptives are as follows. There are 6,594 households and 21,697 individuals, of whom 70.3 percent are aged 19 and over, and primary and secondary school-aged children (7-18 years of age) are approximately 17.12 percent. Of such children, boys are slightly more numerous than girls (8.61 percent and 8.51 percent, respectively), and the gender ratio of girls to boys is 98.84. In terms of age-gender demographics, boys aged 7-12 are 3.82 percent of household members, boys aged 13-15 are 2.70 percent, boys aged 16-18 are 2.09 percent, while girls aged 7-12 are 4.02 percent, girls aged 13-15 are 2.37 percent and girls aged 16-18 are 2.12 percent.

The mean proportion of annual household resources expended on children's education is 4.69 percent (with a standard deviation of 0.09). In absolute figures, it is 573 yuan or RMB (with a standard deviation of 1,219). Total mean household expenditure is 12,222 yuan (with a standard deviation of 10,365), while mean household income is 14,290 yuan (with a standard deviation of 8,591). As expected under the one-child policy, the mean number of household members is 3.13 (with a standard deviation of 0.83). More than three-quarters of the households are two-generations (78.16 percent), while one-generation households comprise 15.52 percent, three-generation households are 5.55 percent, and the remaining 7.65 percent are other types of household, defined as those with relatives other than the nuclear family or includes non-relatives. The head of household is male in a majority of the sample (65.93 percent), and just under half of all households (45.64 percent) include a Communist Party member.

5 Empirical Findings

We first examine whether there are gender differences in parents' expenditures on children's education. The results of the two-stage least squares estimation of a unitary household decision-making model of resource allocation toward children's education are presented in Table 3. The independent variables include household level variables as well as the characteristics of the household head in addition to city dummy variables. The education variable is a rank variable indicating the level of education completed, while the occupation variable is also a rank variable indicating professional to unskilled workers. We tested the robustness of the specification by using one-generation households as the omitted variable, for instance. Different characteristics of the household head were also tried. Our results concerning the significance of the age-gender household composition variables do not change.

Given the nature of household consumption studies, there are variables which could be endogenous to the system. Accordingly, potentially endogenous variables were tested according to the Durbin-Wu-Hausman test (Greene, 1997). Instruments were selected according to the criteria specified in Bound *et al.* (1995). Ownership of telephone proxied the standard of living of the household and household type ranging from flats to houses validly instrumented household expenditure per capita and the number of people in the household, respectively. A detailed discussion of the instruments and endogenous variables can be found in the Appendix. The 2SLS estimation is properly identified according to the Sargan test, the instruments were jointly significant at the 1 percent level and the partial R-squared of the first stage regression is of reasonable magnitude. On account of the rich detail in this data set, we were thus able to instrument for the endogenous variables to a good level. Further details of the first stage regressions are provided in the Appendix.

[TABLE 3 HERE]

Not surprising, there is a 4.98 percentage point increase in the proportion of household resources allocated to children's education associated with two-generation households. Turning to the age-gender household composition variables,[6] we find that the proportions of boys and girls aged 13-15 and 16-18 affect the proportion of household resources expended on children's education, but not children aged 7-12. As education is

[6] Other significant variables include the education of the household head and the proportion of men aged 56-65 in the household, along with a number of province dummy variables. The education of the household head and the proportion of men aged 56-65 both have negative effects on children's educational expenditures. There are numerous possible explanations. Regarding the education of the household head, as expenditure is a proportion of household income if better educated household heads earn more income then education fees form a smaller part of total household income. It is also possible that we have only captured direct expenditure on children's education and not indirect spending. In other words, parents will invest a set amount of time and resources in their children. More educated household heads may spend more time investing in their children by helping them with homework or perhaps spend time and resources on cultivating social networks to further the children's future opportunities. Less educated household heads may not be able to invest in these other respects and thus their spending is direct, while indirect expenditures and time spent are not captured in this estimation. Other factors could also include providing health and support for their children, which could be reflected in parental time and their own forgone consumption. The proportion of men aged 56-65 in the household probably include retirees who are not now earning income but may require additional expenditure on their consumption that will take away from spending on children's education. This corresponds to other studies in which adult men in the household are associated with an increase in spending on alcohol and cigarettes and a decrease in spending on education and health (for example, see Hoddinott and Haddad 1995). Finally, as compared with the omitted province of Jiangsu, poorer provinces such as Liaoning, Anhui, Henan and Yunnan have significantly negative coefficients.

heavily subsidised, this is not surprising for the younger age groups (see Knight and Li 1996). The proportion of boys aged 13-15 increases household expenditure on children's education by 14.65 percentage points, while girls aged 13-15 increase expenditure by a smaller amount (13.17 percentage points).[7] The situation is reversed for boys and girls aged 16-18, in which the effects on household educational expenditure are respectively 14.34 percentage points and 19.98 percentage points. The results of this model suggest that there are differential patterns of household expenditure on the education of boys and girls that are significant for middle school children (ages 13-15 best correspond to lower secondary school while ages 16-18 best correspond to upper secondary school). Household expenditure patterns appear to favour boys aged 13-15, but girls aged 16-18.

We next include proxies for bargaining power as between spouses to determine whether the unitary household decision-making model is the proper specification. None of the proxies for spousal bargaining power is found to be significant (see also IPS 1994[8]). One set of estimations is reported in Table 4.

[TABLE 4]

The results in Table 4 correspond to the unitary household decision-making model (Table 3) in that girls aged 13-15 are associated with a smaller proportion of household educational expenditure than boys of the same age cohort, while girls aged 16-18 receive more expenditure on their education than boys of the same ages. Specifically, the proportion of girls aged 13-15 in the household increases expenditure by

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[7] Joint F-tests on all of these sets of coefficients reject the null hypothesis that they are equal for boys and girls of the same age groups.

13.14 percentage points, while boys of the same ages increase expenditure by 14.65 percentage points. The proportion of boys aged 16-18 increases household expenditure on education by 14.33 percentage points, while girls aged 16-18 increases household expenditure by 19.98 percentage points. Joint F-tests on these sets of coefficients reject the null hypothesis that they are equal for boys and girls of the same age groups. These findings provide further support that the household spends more on daughters in upper secondary school and sons in lower middle school.

5.1 Accounting for school quality

We attempted to isolate the effects of school quality by disaggregating educational expenditures to the extent permitted by our data. Expenditures on children's education comprise two items – expenditures on tuition and fees, and other expenditures. Tuition and fees serve as our best proxy for school quality, as we do not have data on actual schools in the survey. By separating the two categories, we may find that the differences are a function of school quality insofar as better schools are more costly. The mean value of tuition and fees is 398.80 RMB (with a standard deviation of 1027.85) while it is 153.87 RMB (with a standard deviation of 683.89) for other educational expenditures. We cannot identify these other expenditures, but posit that they include school uniforms, transportation expenses and out-of-school tuition fees. None of the coefficients on the age-gender household composition terms were significant and the link with school quality is not clear cut.

5.2 Implications of the one-child policy

[8] The survey conducted by IPS (1994) finds little difference in responses regarding household expenditure when spousal bargaining power is taken into account. The several measures of bargaining power include spouses' age difference, educational levels and proportion of earned income.

We also explore the implications of the one-child policy implemented in the late 1970s and early 1980s on household expenditure on children's education, *i.e.*, families with one child will spend on their child regardless of his or her gender. The cohort of school-aged children in 1995 is affected by this policy. Table 5 gives the mean values for household expenditure on children's education for single-child, single-boy and single-girl households, as compared with all households with children that include single-child households.

[TABLE 5 HERE]

Single-child households represent 60.3 percent of all households with children in the sample. Of these households, 51.6 percent are single-boy households and the remainder are single-girl households. Single-child households spend 2.55 percent more on children's education than all households with children. Single-girl households spend more, on average, on children's education in both sub-categories than single-boy households. These figures suggest that parents are willing to spend more on education where there is one child, and also that there may be more associated expenses for girls than boys in single-child households, such as clothing, that are captured in the other expenditure category. One possible explanation as to why tuition and school fees are also higher for single-girl households may have to do with girls testing into better schools with higher fees. However, our discussion above indicates that our data set does not permit us to explore school quality. Given these patterns, nevertheless, we may find that the larger educational expenditure associated with the proportion of girls aged 16-18 is explained by single-girl households. Table 6 gives the results of the intrahousehold resource allocation model of expenditure on children's education estimated for the sub-sample of single-child households, and further disaggregated by single-boy and single-girl households.

[TABLE 6 HERE]

The results of Table 6 do not shed further light on the degree to which the age-gender composition of the household affects expenditure on children's education. Although single-child households are a majority of the sample of households with children, the age-gender composition variables are not significant in these estimations. Therefore, the patterns of household expenditure on children's education are not well explained by single-child households. In sum, we find that the proportion of household expenditure on the education of children significantly differs for children aged 13-15 and 16-18, corresponding to the two levels of secondary school.

5.3 Academic versus professional schools

Table 7 shows there are more girls enrolled in middle level professional school than boys, both in absolute numbers and as a percentage of the total aged 16-18.[9] The reverse is true for upper middle school in which there are fewer girls than boys – again both absolutely and as a percentage of total enrolment. It is possible that girls self-select into professional rather than academic upper secondary school. The testing process into upper middle school is another possibility. However, it is difficult to distinguish ability from the influence of examination preparation at lower middle school that may result from more household expenditure on the education of boys aged 13-15.

[TABLE 7 HERE]

[9] There are 499 boys aged 16-18, making the gender ratio 1.03 for this cohort.

Our original estimation of the intrahousehold resource allocation model did not separate children according to whether they attended academic or professional schools. To test for possible differences stemming from the type of school, we re-estimate the household expenditure model.[10] The results are given in Table 8.

[TABLE 8 HERE]

As expected, children who are not enrolled in school do not affect the pattern of household expenditure on education (Table 8). A larger proportion of household resources is spent on girls aged 16-18 regardless of the type of school (middle level professional school or upper middle school) than on boys of the same age-group and enrolled in the same schools (all coefficients are significant at the 1 percent level).[11] Joint F-tests on these sets of coefficients reject the null hypothesis that they are equal for boys and girls of the same age groups. We find that the coefficients for each set of boys and girls of the same age groups are statistically different. These results confirm the results of our original estimation in which academic and professional schools are considered together.

Therefore, our findings reveal that there is more spending on boys aged 13-15 but more on girls aged 16-18, suggesting that standard human capital theories and

[10] The estimated model is of the unitary household decision-making form since we did not find evidence to support a bargaining model.

[11] In order not to omit observations, we include those children aged 16-18 enrolled in college and in professional school. There are 11 men enrolled in college and above and another 11 in professional school. There are 12 women enrolled in college and above and 19 in professional school. Despite their small numbers, the coefficients on educational expenditure on sons and daughters who are enrolled in college are positive and significant (at the 5 percent and 1 percent levels, respectively). The coefficient for girls in college is almost twice as large than that of boys. For those attending professional school, we find that the coefficient on girls is positive and significant (at the 1 percent level), but not significant for boys. This lends additional evidence that more is spent on girls than boys aged 16-18 regardless of the type of school.

traditional perceptions of gender bias do not completely explain the educational expenditure decision. We next turn to examine whether these findings are consistent with models which consider parents' intertemporal preferences.

6 Returns to Parental Investment

Standard human capital theory would suggest that the current educational attainment of the adult population and their earnings affect the current expenditure on education and enrolment of children? Table 9 and Figure 2 depict the educational attainment of the adult population, divided into working-aged men and women (19-55) and those aged 56 and over.

[TABLE 9 HERE]

[FIGURE 2 HERE]

Using the earnings data in the survey, we predict mean annual income for men and women with each level of educational attainment standardising for the characteristics of their respective samples (see the Appendix for the earnings functions). These findings are consistent with studies of returns to education in China and in particular with the results of other researchers using this data set specifically to investigate returns to education (*e.g.,* Knight and Li 1996). Predicted mean annual income is higher for sons than daughters with the average characteristics of the sample for all educational levels (Table 10).

[TABLE 10]

We conclude that parents spend more on the education of sons than daughters who are aged 13-15 on account of men receiving higher rates of return to education. However, parents spend more on daughters than sons aged 16-18 in both types of upper secondary school. The evidence suggests that higher rates of return to education cannot be the motivation in the latter case because men earn higher returns than women in upper middle school. Of the possible explanations, it is also plausible that there are different kinds of families in the sample. The parents who spend more on daughters aged 16-18 may have also spent more on daughters at the time when they were aged 13-15 than on sons of the same age groups. However, we are unable to test this outcome without data for the same families from previous years. We turn to another possible explanation which is that there are future transfers to consider when parents make investment decisions that are based not just on the standard returns to education for the child but on his or her future expected household income. Because we do not have two generations of data on transfers to parents, we will estimate expected future transfers to parents based on assessing children's future household income, which is consistent with the theories of parental investment when parents look ahead to expected returns in making current investment decisions.

To obtain the expected household income of a child, we need to incorporate theories of assortative mating to predict the likely income of a child's future potential spouse. The predicted annual mean income of the children's likely future spouse is the predicted annual mean income of men and women weighted by the probabilities of marrying a spouse who has attained each educational level based on Table 11.

[TABLE 11]

Table 11 shows that 82.3 percent of women of each level of educational attainment marry at or above their own educational level, while it is less (55.5 percent) for men. In the absence of perfect assortative mating, parents have only a probabilistic expectation that a child will marry a spouse with comparable education based on the distribution of the educational attainment of spouses in the current cohort of married couples. In other words, a woman with educational attainment at or above the college level has a 60.47 percent chance of marrying a man who has attained the same level of education, a 15.28 percent chance of marrying a man with a professional school education, a 7.31 percent chance of marrying a man of middle level professional school educational attainment, a 7.64 percent chance of marrying a man who has completed upper middle school, a 3.65 percent chance of marrying a man who has completed lower middle school, a 0.66 percent chance of marrying a man with a primary school education and probability of naught of marrying a man with less than primary school education. These weights are multiplied by the respective predicted annual mean income of men who have completed each level of education. If there were perfect assortative mating, then column (1) would equal column (4) and columns (2) and (3) would be equal in Table 12. The combined income of the child and that of their likely future spouse's generates an expectation of the child's future household income from which parents may obtain transfers, shown in Table 12.

[TABLE 12 HERE]

Table 13 gives the predicted mean annual income for the future households of daughters and sons based on their respective expected mean income and that of their likely spouse [column (1) in Table 13 is the sum of columns (1) and (4) in Table 12, while column (2) in Table 13 is the sum of columns (2) and (3) in Table 12]. Expected mean annual household income is higher for daughters than sons for each level of educational attainment. These are static expectations and may not accurately reflect the rapid economic changes taking place in China in 1995. However, to the extent that parents act on available information, this exercise is useful in attempting to gain an understanding of parental expectations of future transfers.

[TABLE 13 HERE]

We find that the smallest difference between the expected future household income of sons and daughters is for those who have completed lower middle school, while the largest difference is for those who have completed middle level professional school. This coincides with our finding that parents invest more in sons than daughters aged 13-15 (corresponding to lower middle school) but more in daughters than sons aged 16-18 (corresponding to upper secondary school).

Finally, by law children have an obligation to support their parents.[12] In addition, approximately 80 percent of all persons are employed in the state sector in urban China that provides pensions.[13] This may reduce some of the tendency to favour sons over daughters that arises in rural China, which lacks pension schemes and has a greater adherence to traditional preferences for boys discussed earlier. When also considered in light of the large number of families with one child, there may also be a diminished expectation of relying on sons in old age. This could reinforce the interpretation that there intertemporal concerns are strong, and there are indeed future transfers to consider.

[12] See The Protection of the Rights and Interests of Old People Law (October 1, 1996), particularly Article 11: "Children and their spouses are both to support their parents both financially, spiritually and of their particular needs." There is a counterpart in the criminal law providing for sanctions.

[13] Of the 15,233 employed individuals, the workplace is SOEs for 12,157 persons.

These explanations are also consistent with a degree of altruism in China, heightened by the one-child policy, which suggests changing traditions in urban areas.

7 Conclusion

This paper used a strand of models – intrahousehold resource allocation approach – to test the extent to which parents forgo current consumption to invest in their children's human capital. Utilising these models, we were able to measure parental expenditure on children's education rather than own consumption, providing a test of parental investment models for urban China.

Our findings were that the proportion of household resources allocated to children's education in urban China in 1995 is not well explained by examining only returns to education or a preference for boys. If a bias for sons were the governing motivation, then we would not expect to find more expenditure on the education of daughters aged 16-18. Rather, the evidence suggests otherwise.

Insofar as expenditures on children's education entail forgone consumption, parents are likely to be efficient as well as altruistic in their decisions. This is reinforced by specific intertemporal considerations found in China, such as the expectation that parents in retirement will depend on transfers from children, as well as on assets, for consumption in an imperfect credit market and pensions system. Moreover, the circular nature of perceived future labour market discrimination will affect the investment decision in counteracting ways.

Future labour market discrimination will cause investment to differ for sons and daughters. Given perceived gender earnings differentials, parents will invest more in the human capital of sons, in accordance with standard returns to education analyses. A second consideration in our adapted model is expected transfers. Favourable assortative mating will generate higher returns from investments in daughters than in sons. This is owing to the same gender earning differentials that will cause daughters to marry spouses with higher returns to human capital and augment their future household income more than for sons. We thus expect that parents will invest more in the human capital of daughters. These two effects are endogenous and co-exist. For urban China, we find evidence consistent with these two effects. With some limitations to the interpretation of the results, the empirical data calibrating household consumption provides some evidence of the human capital models.

In conclusion, there are some – but not large – gender differences in the educational enrolment of school-aged children in urban China. Despite more expenditure on the education of girls than boys aged 16-18, there is evidence that girls have higher attrition rates beyond lower middle school, are more likely to be enrolled in professional than academic schools, and expect lower returns to this education than boys. Therefore, we find gender differences in urban China are the likely result of perceived earnings inequality that may in turn cause these children to receive unequal investment in their human capital prior to entering the labour market.

[APPENDIX TABLES A1-3 HERE]

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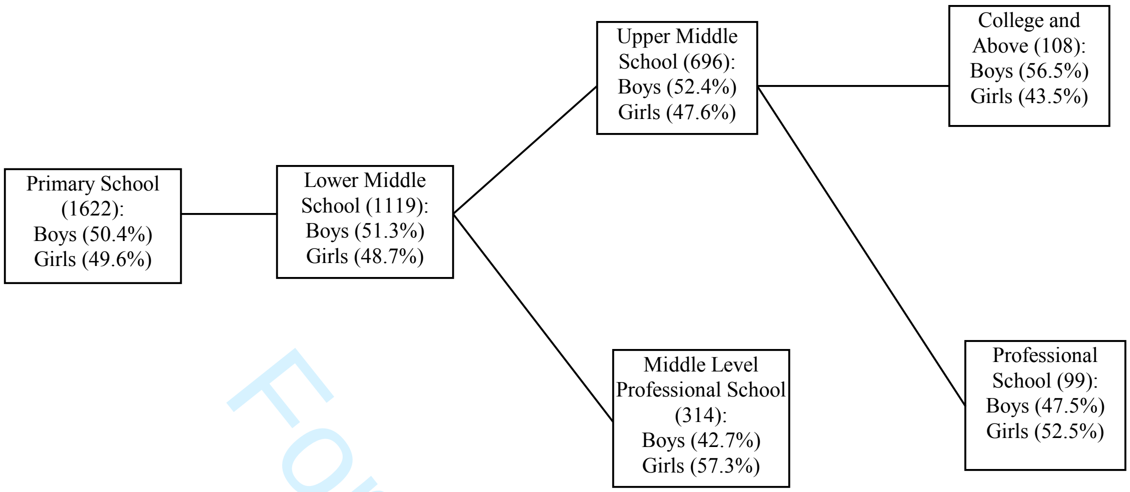
Primary School (1622): Boys (50.4%) Girls (49.6%)
Lower Middle School (1119): Boys (51.3%) Girls (48.7%)
Upper Middle School (696): Boys (52.4%) Girls (47.6%)
College and Above (108): Boys (56.5%) Girls (43.5%)
Middle Level Professional School (314): Boys (42.7%) Girls (57.3%)
Professional School (99): Boys (47.5%) Girls (52.5%)

Figure 1

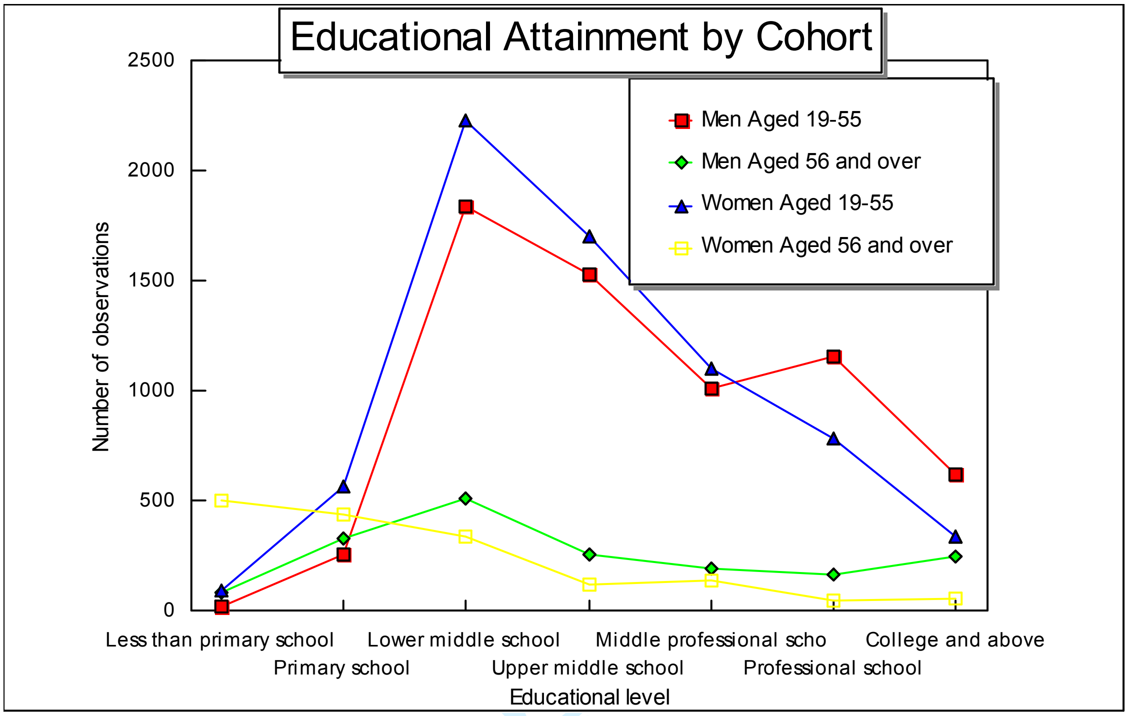
Educational Attainment by Cohort
2500
2000
1500
1000
500
0
Number of observations
Men Aged 19-55
Men Aged 56 and over
Women Aged 19-55
Women Aged 56 and over
Less than primary school
Primary school
Lower middle school
Upper middle school
Middle professional scho
Professional school
College and above
Educational level

Figure 2

Table 1
School Enrolment Rates (%) for Children Aged 7-18
(total number of boys and girls)

Age	Boys	Girls
7	87.5	89.4
	(144)	(142)
8	97.2	95.3
	(145)	(150)
9	99.1	99.3
	(111)	(140)
10	96.1	96.2
	(153)	(133)
11	98.5	96.3
	(137)	(136)
12	97.0	96.8
	(168)	(189)
13	99.5	99.0
	(199)	(193)
14	98.1	95.8
	(206)	(166)
15	98.0	97.8
	(198)	(181)
16	93.8	94.4
	(160)	(196)
17	91.5	90.1
	(176)	(152)
18	84.0	75.0
	(163)	(164)
Total Enrolment Rate	94.6	93.9
	(1960)	(1942)

Source: Urban Household Survey, 1995.

Table 2
Gross Enrolment Ratios of Girls in Selected Years
(gender ratio of girls to boys)

	1980	1985	1990	1995
All School-Aged Children	71 (0.81)	70 (0.82)	79 (0.87)	91 (0.95)
Primary	104 (0.86)	114 (0.86)	120 (0.93)	117 (0.99)
Secondary	37 (0.69)	33 (0.70)	42 (0.75)	62 (0.89)
Tertiary	0.8 (0.32)	1.7 (0.44)	2.0 (0.51)	3.9 (0.53)

Sources: NBS (1997*b*), UNESCO (1999) and World Bank (2000*a*, 2000*b*).

Notes: (1) The data on net enrolment ratios (NER), which would compute the ratio of the number of children of official school age enrolled in school to the number of children school age in the population, is not available for secondary and tertiary education nor is it complete for primary school in China (UNESCO 1999). We report gross enrolment ratios (GER), defined as the total enrolment in a specific level of education, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education in a given school year (UNESCO 1999). As noted earlier, the GER is widely used as an alternative indicator to the NER when data on enrolment by single years of age are not available. NER for primary education is reported in Note (2) to this table.

(2) For primary education, NER for girls was 89 and the gender ratio was 0.92 in 1986, as figures for 1985 were not available. In 1990, NER for girls was 95 and the gender ratio was 0.96. In 1995, NER for girls was 98 and the gender ratio was 1.00.

(3) For tertiary education, the figures are for 1996, as 1995 figures were not available.

Table 3
Two Stage Least Squares Unitary Intrahousehold Resource Allocation Model
Regarding the Proportion of Household Expenditure on Children's Education

Dependent Variable: Proportion of Household Resources Expended on Children's Education	Coefficient (t-statistic)	Mean Value or Percentage (standard deviation)
Intercept	-0.0776	0.0469[14]
	(-0.374)	(0.0898)
Household Characteristics:		
Log of household expenditure per capita (predicted)	-0.0088	8.1370[15]
	(-1.119)	(0.3157)
Log of number of household members (predicted)[16]	0.1366	1.1062[17]
	(1.119)	(0.2016)
Communist Party membership of any member of the household	0.0051	0.4564
	(1.135)	(0.4981)
One-generation household	0.1186	0.1552
	(1.291)	(0.0871)
Two-generation household	0.0498	0.7816
	(1.706)*	(0.3622)
Three-generation household	0.0052	0.0555
	(0.377)	(0.2291)
Characteristics of Household Head:		
Male	-0.0072	0.6593
	(-1.548)	(0.4740)
Educational level	-0.0033	3.8015
	(-3.373)***	(1.5173)
Occupation	-0.0012	5.5657
	(-1.631)	(1.9401)
Age-Gender Composition of Household:		
Male aged 0-6	-0.0096	0.0256
	(-0.233)	(0.0862)
Male aged 7-12	0.0583	0.0382
	(1.349)	(0.1046)
Male aged 13-15	0.1465	0.0270
	(3.719)***	(0.0894)
Male aged 16-18	0.1434	0.0209
	(6.180)***	(0.0785)
Male aged 19-55	-0.0027	0.2893
	(-0.147)	(0.1711)
Male aged 56-65	-0.0440	0.0653
	(-2.061)**	(0.1503)
Male aged 66 and over	-0.0404	0.0299
	(-1.398)	(0.1101)

[14] Mean value and standard deviation of the dependent variable are reported, and similarly in each table in the paper.

[15] The mean of the natural logarithm of household expenditure per capita (actual) is 8.1366 with a standard deviation of 0.7323.

[16] We use the logarithm of number of household members to better correspond with the proportion of household expenditure and age-gender composition variables (see also Song 1999).

[17] The mean of log of number of household members (actual) is 1.1063 with a standard deviation of 0.2682.

Female aged 0-6	-0.0191	0.0235
	(-0.466)	(0.0831)
Female aged 7-12	0.0636	0.0402
	(1.418)	(0.1071)
Female aged 13-15	0.1317	0.0237
	(3.852)***	(0.0844)
Female aged 16-18	0.1998	0.0212
	(9.348)***	(0.0780)
Female aged 19-55	0.0136	0.3094
	(0.589)	(0.1634)
Female aged 56-65	0.0052	0.0593
	(0.168)	(0.1492)
Provinces:		
Beijing	-0.00004	0.0721
	(-0.007)	(0.2587)
Shanxi	-0.0106	0.0937
	(-1.324)	(0.2915)
Liaoning	-0.0207	0.1010
	(-4.242)***	(0.3013)
Anhui	-0.0095	0.0721
	(-1.695)*	(0.2587)
Henan	-0.0265	0.0865
	(-3.465)***	(0.2812)
Hubei	0.0018	0.1070
	(0.391)	(0.3091)
Guangdong	-0.0070	0.0787
	(-0.875)	(0.2694)
Sichuan	-0.0049	0.1223
	(-1.261)	(0.3277)
Yunnan	-0.0100	0.0935
	(-2.021)**	(0.2911)
Gansu	-0.0040	0.0577
	(-0.616)	(0.2331)
R^2	0.0905	
Adjusted R^2	0.0861	
F(32, 6555)	26.17***	
Number of observations	6588	

Source: Urban Household Survey, 1995.

Notes: (1) Omitted dummy variables are: female household head, households without any Communist Party members, females aged 66 and over, Jiangsu province and other types of households.

(2) *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.

(3) Instruments are ownership of telephone and type of house; see Appendix for first stage regression results.

Table 4
Two Stage Least Squares Joint Household Decision-making Model
Regarding the Proportion of Household Expenditure on Children's Education

Dependent Variable: Proportion of Household Resources Expended on Children's Education	Coefficient (t-statistic)	Mean Value or Percentage (standard deviation)
Intercept	-0.0794	0.0551
	(-0.407)	(0.0899)
Household Characteristics:		
Log of household expenditure per capita (predicted)	-0.0088	8.1370
	(-1.118)	(0.3157)
Log of number of household members (predicted)	0.1369	1.1062
	(1.145)	(0.2016)
Communist Party membership of any member of the household	0.0051	0.4564
	(0.0045)	(0.4981)
One-generation household	0.1187	0.1552
	(1.313)	(0.0871)
Two-generation household	0.0499	0.7816
	(1.718)*	(0.3622)
Three-generation household	0.0052	0.0555
	(0.378)	(0.2291)
Characteristics of Household Head:		
Male	-0.0065	0.6593
	(-0.611)	(0.4740)
Educational level	-0.0033	3.8015
	(-3.366)***	(1.5173)
Occupation	-0.0012	5.5657
	(-1.641)	(1.9401)
Age-Gender Composition of Household:		
Male aged 0-6	-0.0096	0.0256
	(-0.232)	(0.0862)
Male aged 7-12	0.0583	0.0382
	(1.340)	(0.1046)
Male aged 13-15	0.1465	0.0270
	(3.714)***	(0.0894)
Male aged 16-18	0.1433	0.0209
	(6.120)***	(0.0785)
Male aged 19-55	-0.0026	0.2893
	(-0.145)	(0.1711)
Male aged 56-65	-0.0437	0.0653
	(-2.146)**	(0.1503)
Male aged 66 and over	-0.0400	0.0299
	(-1.466)	(0.1101)
Female aged 0-6	-0.0191	0.0235
	(-0.464)	(0.0831)
Female aged 7-12	0.0636	0.0402
	(1.407)	(0.1071)
Female aged 13-15	0.1314	0.0237
	(3.847)***	(0.0844)
Female aged 16-18	0.1998	0.0212
	(9.305)***	(0.0780)
Female aged 19-55	0.0135	0.3094
	(0.565)	(0.1634)
Female aged 56-65	0.0051	0.0593
	(0.162)	(0.1492)

Provinces:		
Beijing	-0.0001	0.0721
	(-0.009)	(0.2587)
Shanxi	-0.0106	0.0937
	(-1.338)	(0.2915)
Liaoning	-0.0207	0.1010
	(-4.269)***	(0.3013)
Anhui	-0.0096	0.0721
	(-1.691)*	(0.2587)
Henan	-0.0265	0.0865
	(-3.489)***	(0.2812)
Hubei	0.0018	0.1070
	(0.389)	(0.3091)
Guangdong	-0.0070	0.0787
	(-0.877)	(0.2694)
Sichuan	-0.0062	0.1223
	(-1.256)	(0.3277)
Yunnan	-0.0100	0.0935
	(-2.023)**	(0.2911)
Gansu	-0.0040	0.0577
	(-0.615)	(0.2331)
Proxy for Bargaining Power:		
Wife's years of education as a proportion of the husband's and wife's combined years of education	0.0014	0.6259
	(0.106)	(0.2997)
R^2	0.0903	
Adjusted R^2	0.0857	
F(33, 6554)	25.45***	
Number of observations	6588	

Source: Urban Household Survey, 1995.

Notes: (1) Omitted dummy variables are: female household head, households without any Communist Party members, females aged 66 and over, Jiangsu province and other types of households.

(2) *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.

(3) Instruments are ownership of telephone and type of house; see Appendix for first stage regression results.

Table 5
Mean Household Expenditure on Children's Education for All and Single-Child Households
(in yuan with standard deviation and maximums, respectively, in parentheses)

Children's Educational Expenditure	All Households with Children	Single-Child Households	Single-Boy Households	Single-Girl Households
Number of Households	5802	4181	2158	2023
Total Educational Expenditure	602.11 (1278.74; 33,033)	617.85 (1177.98; 33,033)	610.46 (1244.29; 33,033)	625.75 (1103.12; 12,683)
Sub-category: Tuition and School Fees	411.28 (1063.94; 40,000)	409.61 (1092.57; 40,000)	404.25 (1168.71; 40,000)	415.32 (1005.28; 17,010)
Sub-category: Other Expenditures	161.77 (709.31; 25,000)	158.86 (636.62; 17,400)	151.03 (517.05; 6,500)	167.21 (743.32; 17,400)

Source: Urban Household Survey, 1995.

Table 6
Two Stage Least Squares Unitary Intrahousehold Resource Allocation Model
Regarding the Proportion of Expenditure on Children's Education in Single-Child Households

Dependent Variable: Proportion of Household Resources Spent on Children's Education	Coefficient (t-statistic)			Mean Value or Percentage (standard deviation)		
	Single-Child (1)	Single-Boy (2)	Single-Girl (3)	Single-Child	Single-Boy	Single-Girl
Intercept	-0.0865 (-0.148)	0.1830 (0.249)	-0.5014 (-0.467)	0.0551 (0.0889)	0.0550 (0.0909)	0.0551 (0.0868)
Household Characteristics:						
Log of household expenditure per capita (predicted)	-0.0162 (-1.603)	-0.0196 (-1.374)	-0.0106 (-0.699)	8.0814 (0.6959)	8.0730 (0.6742)	8.0902 (0.7182)
Log of number of household members (predicted)	0.1370 (0.543)	0.0200 (0.065)	0.3236 (0.671)	1.1637 (0.1759)	1.1669 (0.1759)	1.1602 (0.1758)
Communist Party membership of any member of the household	0.0059 (1.371)	0.0101 (1.654)*	0.0012 (0.180)	0.4138 (0.4926)	0.4194 (0.4936)	0.4078 (0.4915)
Two-generation household	0.0482 (1.242)	0.0267 (0.423)	0.0627 (1.393)	0.9132 (0.2816)	0.9133 (0.2814)	0.9130 (0.2819)
Three-generation household	0.0237 (1.011)	0.0118 (0.271)	0.0185 (0.599)	0.0813 (0.2734)	0.0816 (0.2738)	0.0811 (0.2730)
Characteristics of Household Head:						
Male	-0.0068 (-1.887)*	-0.0058 (-1.205)	-0.0087 (-1.370)	0.639 (0.4803)	0.6362 (0.4812)	0.6423 (0.4795)
Educational level	-0.0026 (-2.039)**	-0.0036 (-2.130)**	-0.0024 (-0.946)	3.7016 (1.4291)	3.6724 (1.4440)	3.7328 (1.4128)
Occupation	-0.0010 (-1.165)	-0.0003 (-0.247)	-0.0018 (-1.475)	5.6737 (1.9232)	5.6312 (1.9236)	5.7186 (1.9223)
Age-Gender Composition of Household:						
Male aged 0-6	0.2094 (0.335)	-0.0559 (-0.072)	---	0.0390 (0.1052)	0.0756 (0.1367)	0.00 (0.00)
Male aged 7-12	0.2721 (0.434)	0.0072 (0.009)	---	0.0566 (0.1253)	0.1097 (0.1568)	0.00 (0.00)
Male aged 13-15	0.3673 (0.586)	0.1077 (0.138)	---	0.0395 (0.1078)	0.0766 (0.1402)	0.00 (0.00)
Male aged 16-18	0.3639 (0.617)	0.1201 (0.163)	---	0.0301 (0.0944)	0.0582 (0.1250)	0.00 (0.00)
Male aged 19-55	0.0130 (0.218)	0.0079 (0.090)	0.0234 (0.245)	0.3026 (0.0983)	0.3021 (0.0986)	0.3032 (0.0981)
Male aged 56-65	-0.0484 (-0.917)	-0.0275 (-0.386)	-0.0563 (-0.603)	0.0158 (0.0634)	0.0163 (0.0642)	0.0152 (0.626)

Male aged 66 and over	-0.0724	-0.0676	-0.0647	0.0101	0.0099	0.0102
	(-1.095)	(-0.686)	(-0.608)	(0.0506)	(0.0496)	(0.0517)
Female aged 0-6	0.1971	---	0.6192	0.0346	0.00	0.0716
	(0.315)		(0.531)	(0.1006)	(0.00)	(0.1352)
Female aged 7-12	0.2771	---	0.7007	0.0598	0.00	0.1236
	(0.439)		(0.594)	(0.1284)	(0.00)	(0.1618)
Female aged 13-15	0.3512	---	0.7593	0.0332	0.00	0.0685
	(0.572)		(0.661)	(0.1008)	(0.00)	(0.1362)
Female aged 16-18	0.4056	---	0.8011	0.0284	0.00	0.0587
	(0.678)		(0.718)	(0.0873)	(0.00)	(0.1249)
Female aged 19-55	-0.0010	-0.0288	0.0394	0.3195	0.3216	0.3173
	(-0.016)	(-0.310)	(0.362)	(0.0653)	(0.0850)	(0.0897)
Female aged 56-65	-0.0085	-0.0241	0.0433	0.0164	0.0166	0.0162
	(-0.143)	(-0.361)	(0.316)	(0.0603)	(0.0648)	(0.0659)
Provinces:	*Yes*	*Yes*	*Yes*			
R^2	0.1003	0.1039	0.0429			
Adjusted R^2	0.0933	0.0919	0.0295			
$F(31, 3976)$	13.47***	---	---			
$F(27, 2029)$	---	7.07***	---			
$F(27, 1923)$	---	---	8.87***			
Number of observations	4008	2057	1951			

Source: Urban Household Survey, 1995.

Notes: (1) Omitted dummy variables are: female household head, households without any Communist Party members, females aged 66 and over, Jiangsu province and other types of households.

(2) *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.

(3) Instruments are ownership of telephone and type of house; see Appendix for first stage regression results.

Table 7
Enrolment of Children Aged 16-18 in Upper Secondary Schools
(number of observations)

	Male (499)	Female (512)
Upper Middle School	51.3% (256)	43.16% (221)
Middle Level Professional School	17.03% (85)	23.05% (118)
Not Enrolled in School	12.22% (61)	13.09% (67)
Total Enrolment	68.34% (341)	66.21% (339)

Source: Urban Household Survey, 1995.

Table 8
Two Stage Least Squares Unitary Intrahousehold Resource Allocation Model
Regarding the Proportion of Expenditure on Children's Education (by Type of School)

Dependent Variable: Proportion of Household Resources Expended on Education	Coefficient (t-statistic)	Mean Value or Percentage (standard deviation)
Intercept	-0.0367	0.0551
	(-0.176)	(0.0889)
Household Characteristics:		
Log of household expenditure per capita (predicted)	-0.0109	8.1370
	(-1.386)	(0.3157)
Log of number of household members (predicted)	0.1338	1.1062
	(1.086)	(0.2016)
Communist Party membership of any member of the household	0.0044	0.4564
	(0.969)	(0.4981)
One-generation household	0.1151	0.1552
	(1.246)	(0.0871)
Two-generation household	0.0487	0.7816
	(1.678)*	(0.3622)
Three-generation household	0.0033	0.0555
	(0.236)	(0.2291)
Characteristics of Household Head:		
Male	-0.0068	0.6593
	(-1.474)	(0.4740)
Educational level	-0.0031	3.8015
	(-3.237)***	(1.5173)
Occupation	-0.0011	5.5657
	(-1.482)	(1.9401)
Age-Gender Composition of Household:		
Male aged 0-6	-0.0349	0.0256
	(-0.839)	(0.0862)
Male aged 7-12	0.0342	0.0382
	(0.778)	(0.1046)
Male aged 13-15	0.1218	0.0270
	(3.048)***	(0.0894)
Male aged 16-18 enrolled in upper middle school	0.1510	0.0108
	(5.352)***	(0.0566)
Male aged 16-18 enrolled in middle level professional school	0.1584	0.0034
	(4.466)***	(0.0325)
Male aged 16-18 enrolled in college and above	0.2349	0.0004
	(2.402)**	(0.0114)
Male aged 16-18 enrolled in professional school	0.0193	0.0005
	(0.195)	(0.0140)
Male aged 16-18 not enrolled in school	-0.0051	0.0026
	(-0.117)	(0.0283)
Male aged 19-55	-0.0245	0.2893
	(-1.367)	(0.1711)
Male aged 56-65	-0.0674	0.0653
	(-3.243)***	(0.1503)
Male aged 66 and over	-0.0699	0.0299
	(-2.459)**	(0.1101)
Female aged 0-6	-0.0436	0.0235
	(-1.053)	(0.0831)
Female aged 7-12	0.0389	0.0402
	(0.851)	(0.1071)

Female aged 13-15	0.1080	0.0237
	(3.126)***	(0.0844)
Female aged 16-18 enrolled in upper middle school	0.1885	0.0093
	(6.954)***	(0.0530)
Female aged 16-18 enrolled in middle level professional school	0.2595	0.0049
	(7.598)***	(0.0385)
Female aged 16-18 enrolled in college and above	0.4370	0.0005
	(4.846)***	(0.0133)
Female aged 16-18 enrolled in professional school	0.2446	0.0009
	(3.121)***	(0.0164)
Female aged 16-18 not enrolled in school	-0.0243	0.0025
	(-0.529)	(0.0264)
Female aged 19-55	-0.0036	0.3094
	(-0.153)	(0.1634)
Female aged 56-65	-0.0107	0.0593
	(-0.340)	(0.1492)
Provinces:	*Yes*	*Yes*
R^2	0.1008	
Adjusted R^2	0.0953	
F(40, 6547)	22.29***	
Number of observations	6588	

Source: Urban Household Survey, 1995.

Notes: (1) Omitted dummy variables are: female household head, households without any Communist Party members, females aged 66 and over, Jiangsu province and other types of households.

(2) *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.

(3) Instruments are ownership of telephone and type of house; see Appendix for first stage regression results.

Table 9
Educational Attainment for Adult Men and Women
(number of observations)

	Men		Women	
	19-55 (6438)	56 and over (1774)	19-55 (6814)	56 and over (1635)
College and Above	9.68%	13.7%	5.00%	3.55%
	(623)	(243)	(341)	(58)
Professional School	17.92%	9.13%	11.48%	2.63%
	(1154)	(162)	(782)	(43)
Middle Level Professional School	15.77%	10.71%	16.20%	8.44%
	(1015)	(190)	(1104)	(138)
Upper Middle School	23.72%	14.43%	24.95%	7.03%
	(1527)	(256)	(1700)	(115)
Lower Middle School	28.56%	28.86%	32.70%	20.85%
	(1839)	(512)	(2228)	(341)
Primary School	4.01%	18.49%	8.29%	26.54%
	(258)	(328)	(565)	(434)
Less than Primary School	0.34%	4.68%	1.38%	30.89%
	(22)	(83)	(94)	(505)

Source: Urban Household Survey, 1995.

Table 10
Predicted Mean Annual Income of Children in Yuan

Children's Educational Attainment	Sons	Daughters	Earnings Differential
College and Above	7,528.38	7,028.11	7.12%
Professional School	6,622.82	6,302.31	5.09%
Middle Level Professional School	5,994.66	5,812.54	3.13%
Upper Middle School	5,528.95	5,423.29	1.95%
Lower Middle School	5,575.43	5,359.46	4.03%
Primary School	5,487.37	5,091.43	7.78%

Source: Urban Household Survey, 1995.

Table 11
Educational Attainment of Spouses in Urban China, 1995
(number of observations of married couples)

Women \ Men	College and Above	Professional School	Middle Level Professional School	Upper Middle School	Lower Middle School	Primary School	Less than Primary School
College and Above	**60.47/24.76** (182)	15.28/4.22 (46)	7.31/2.30 (22)	7.64/1.79 (23)	3.65/0.55 (11)	0.66/0.39 (2)	0.00/0.00 (0)
Professional School	18.51/16.87 (124)	**41.04/25.25** (275)	15.07/10.55 (101)	12.23/6.37 (82)	8.51/2.83 (57)	1.19/1.54 (8)	0.30/3.33 (2)
Middle Level Professional School	18.51/16.87 (148)	23.69/21.21 (231)	**22.97**/23.41 (224)	15.08/11.41 (147)	16.92/8.18 (165)	1.74/3.28 (17)	0.21/3.33 (2)
Upper Middle School	8.04/15.51 (114)	16.57/21.58 (235)	13.61/20.17 (193)	**34.70/38.20** (492)	21.72/15.27 (308)	1.48/4.07 (21)	0.00/0.00 (0)
Lower Middle School	4.92/15.10 (111)	10.34/21.40 (233)	12.69/**29.89** (286)	16.90/29.58 (381)	**45.70/51.07** (1030)	5.90/25.63 (133)	0.49/18.33 (11)
Primary School	4.20/5.03 (37)	5.44/4.41 (48)	11.45/10.55 (101)	12.47/8.54 (110)	**35.60**/15.57 (314)	25.17/**42.77** (222)	1.13/16.67 (10)
Less than Primary School	2.67/1.09 (8)	3.67/1.01 (11)	6.00/1.88 (18)	9.67/2.25 (29)	27.33/4.07 (82)	**32.67**/18.88 (98)	10.00/**50.00** (30)

Source: Urban Household Survey, 1995.

Note: The largest percentage within each educational level is in bold type, where the percentage of women of each level of educational attainment in rows that marry men of the educational level corresponding to each column is denoted first. The percentage of men by educational attainment in columns that marry women of each educational level corresponding to each row is denoted second. The notation is the percentage of women of each educational level that marry men of each educational level/percentage of men of each educational level that marry women of each educational level.

Table 12
Predicted Mean Annual Income of Children and of their Likely Future Spouses in Yuan

Children's Level of Educational Attainment	Sons (1)	Daughters (2)	Male-Female Earnings Differential	Sons' Future Spouse (3)	Daughters' Future Spouse (4)
College and Above	7,528.38	7,028.11	7.12%	5,732.31	6,664.72
Professional School	6,622.82	6,302.31	5.09%	5,701.34	6,242.95
Middle Level Professional School	5,994.66	5,812.54	3.13%	5,492.40	6,220.49
Upper Middle School	5,528.95	5,423.29	1.95%	5,368.68	5,729.30
Lower Middle School	5,575.43	5,359.46	4.03%	5,206.68	5,641.78
Primary School	5,487.37	5,091.43	7.78%	4,811.91	5,463.87

Source: Urban Household Survey, 1995.
Note: Author's calculations based on Tables 10 and 11.

Table 13
Predicted Mean Annual Household Income of Children in Yuan

Children's Level of Educational Attainment	Sons' Future Household (1)	Daughters' Future Household (2)	Daughters'-Sons' Household Income Difference (2)-(1)
College and Above	13,260.69	13,692.83	432.14
Professional School	12,324.15	12,545.25	221.10
Middle Level Professional School	11,487.05	12,033.03	545.98
Upper Middle School	10,897.64	11,152.58	254.95
Lower Middle School	10,782.10	11,001.24	219.14
Primary School	10,299.27	10,555.30	256.03

Source: Urban Household Survey, 1995.
Note: Author's calculations based on Tables 10, 11 and 12.

Appendix: First-Stage Regression Results for the Two-Stage Least Squares Intrahousehold Resource Allocation Models (Tables A1-2) and Estimated Earnings Functions for the Urban Sample (Table A3)

Table A1
Instrumenting for Household Expenditure Per Capita

Dependent Variable: Log of Household Expenditure Per Capita	Coefficient (t-statistic)	Mean Value or Percentage (standard deviation)
Intercept	7.7613	8.1366
	(81.160)***	(0.7323)
Household Characteristics:		
Ownership of telephone[18]	0.1330	1.7277
	(14.762)***	(0.9265)
One-generation household	0.6610	0.1552
	(7.094)***	(0.3622)
Two-generation household	0.1917	0.7816
	(2.099)**	(0.4132)
Three-generation household	0.0262	0.0556
	(0.270)	(0.2291)
Provinces:		
Beijing	0.2075	0.0721
	(5.437)***	(0.2587)
Shanxi	-0.4150	0.0937
	(-11.743)***	(0.2915)
Liaoning	-0.1107	0.1010
	(-3.211)***	(0.3013)
Anhui	-0.2582	0.0721
	(-6.830)***	(0.2587)
Henan	-0.3637	0.0865
	(-10.081)***	(0.2812)
Hubei	-0.0910	0.1070
	(-2.671)***	(0.3091)
Guangdong	0.3609	0.0787
	(9.367)***	(0.2694)
Sichuan	-0.0865	0.1223
	(-2.616)***	(0.3277)
Yunnan	-0.1260	0.0935
	(-3.587)***	(0.2911)
Gansu	-0.3327	0.0577
	(-8.113)***	(0.2331)
R^2	0.1860	
Adjusted R^2	0.1843	
F(33, 6854)	112.15***	
Number of observations	6888	

Source: Urban Household Survey, 1995.
Notes: (1) Omitted dummy variables are: female household head, households without any Communist Party members, females aged 66 and over, Jiangsu province and other types of households. Not all variables are reported for brevity.
(2) *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.
(3) Heteroskedasticity-consistent robust standard errors are computed.

[18] There are four outcomes for ownership of telephone, ranked as follows: no telephone, telephone publicly paid for, private telephone and public telephone.

Table A2

Instrumenting for the Number of Household Members

Dependent Variable: Log of Number of Household Members	Coefficient (t-statistic)	Mean Value or Percentage (standard deviation)
Intercept	1.3758	1.1063
	(53.586)***	(0.2683)
Household Characteristics:		
Type of house[19]	0.0053	4.3238
	(4.228)***	(1.7279)
One-generation household	-0.7434	0.1552
	(-29.789)***	(0.3622)
Two-generation household	-0.2357	0.7816
	(-9.631)***	(0.4132)
Three-generation household	0.0071	0.0556
	(0.272)	(0.2291)
Provinces:		
Beijing	-0.0246	0.0721
	(-2.431)**	(0.2587)
Shanxi	0.0384	0.0937
	(4.093)***	(0.2915)
Liaoning	0.0072	0.1010
	(0.776)	(0.3013)
Anhui	-0.0113	0.0721
	(-1.122)	(0.2587)
Henan	0.399	0.0865
	(4.163)***	(0.2812)
Hubei	-0.0004	0.1070
	(-0.039)	(0.3091)
Guangdong	0.0414	0.0787
	(4.195)***	(0.2694)
Sichuan	-0.0186	0.1223
	(-2.119)**	(0.3277)
Yunnan	-0.0049	0.0935
	(-0.519)	(0.2911)
Gansu	0.0190	0.0577
	(-1.743)*	(0.2331)
R^2	0.1340	
Adjusted R^2	0.1297	
F(33, 6897)	30.74***	
Number of observations	6931	

Source: Urban Household Survey, 1995.

Notes: (1) Omitted dummy variables are: female household head, households without any Communist Party members, females aged 66 and over, Jiangsu province and other types of households. Not all variables are reported for brevity.

(2) *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.

(3) Heteroskedasticity-consistent robust standard errors are computed.

[19] There are seven outcomes for the type of house, ranked as follows: single family unit with auxiliary rooms, one bedroom apartment, two bedroom apartment, three bedroom apartment, four bedroom apartment, ordinary apartment unit without or with shared kitchen and toilet, and single storey house or rooms without auxiliary rooms.

Table A3
The Determinants of Income for All Working-Aged Men and Women (by Educational Levels)

Dependent Variable: Log of Annual Income	Coefficient (t-statistic)						Mean Value or Percentage (standard deviation)	
	Men			Women			Men	Women
	Probit	Corrected MLE	Uncorrecte d OLS	Probit	Corrected MLE	Uncorrected OLS		
Intercept	4.5525	6.3397	6.3827	1.0595	6.3395	6.2928	8.7290	8.5094
	(---)	(26.366)***	(26.574)***	(0.867)	(30.116)***	(29.818)***	(0.6015)	(0.6671)
Education Level Completed:								
College and above	-3.5194	0.6015	0.5968	0.4258	0.5803	0.5901	0.0968	0.0500
	(-2.799)***	(3.910)***	(3.873)***	(0.806)	(5.734)***	(5.829)***	(0.2957)	(0.2181)
Professional school	-3.4707	0.5079	0.5042	0.8892	0.5287	0.5384	0.1792	0.1148
	(-2.736)***	(3.324)***	(3.294)***	(1.638)	(5.440)***	(5.537)***	(0.3836)	(0.3188)
Middle level professional school	-3.6339	0.4400	0.4352	0.5049	0.4587	0.4681	0.1577	0.1620
	(-2.978)***	(2.883)***	(2.847)***	(1.059)	(4.761)***	(4.857)***	(0.3644)	(0.3685)
Upper middle school	-3.6631	0.4199	0.4161	0.3382	0.3147	0.3226	0.2372	0.2495
	(-2.928)***	(2.766)***	(2.736)***	(0.737)	(3.306)***	(3.387)***	(0.4254)	(0.4327)
Lower middle school	-3.9632	0.3309	0.3272	0.3480	0.1987	0.2062	0.2856	0.3270
	(-3.139)***	(2.197)**	(2.169)**	(0.772)	(2.100)**	(2.179)**	(0.4518)	(0.4691)
Primary school	-4.0891	0.2403	0.2359	5.3015	0.1050	0.1135	0.0401	0.0829
	(-3.159)***	(1.559)	(1.528)	(---)	(1.080)	(1.168)	(0.1961)	(0.2758)
Personal Characteristics:								
Age	0.0892	0.0865	0.0844	0.0397	0.0912	0.0930	37.8879	37.6909
	(1.331)	(9.817)***	(9.602)***	(0.681)	(10.477)***	(10.659)***	(9.7425)	(9.5860)
Age squared	-0.0015	-0.0010	-0.0010	-0.0008	-0.0013	-0.0013	1530.3910	1512.4850
	(-1.635)	(-9.730)***	(-9.502)***	(-1.092)	(-12.134)***	(-12.317)***	(726.3334)	(715.1966)
Experience	0.0370	0.0118	0.0120	0.0343	0.0248	0.0249	19.6987	18.4391
	(1.833)*	(4.424)***	(4.457)***	(2.562)***	(10.333)***	(10.349)***	(9.5261)	(9.04993)
Occupation	0.0502	-0.0171	-0.0174	0.0559	-0.0265	-0.0260	5.7091	6.0445
	(1.355)	(-2.795)***	(-2.841)***	(1.827)*	(-3.911)***	(-3.827)***	(1.9060)	(2.0866)
Communist Party member	4.8251	0.0941	0.0948	4.8998	0.1135	0.1136	0.2967	0.1327
	(---)	(6.254)***	(6.288)***	(---)	(5.852)***	(5.848)***	(0.4568)	(0.3392)
Have children	-0.7163	---	---	-0.6401	---	---	0.2165	0.1752
	(-2.675)***			(-3.120)***			(0.4119)	(0.3802)
Provinces:								
Beijing	4.5410	0.2956	0.2954	-0.1185	0.2035	0.2032	0.0249	0. 0219
	(---)	(7.277)***	(7.264)***	(-0.284)	(4.376)***	(4.367)***	(0. 1556)	(0. 1463)
Shanxi	4.4274	0.2506	0.2515	4.4978	0.2505	0.2511	0. 0281	0. 0277
	(---)	(6.412)***	(6.423)***	(---)	(8.092)***	(8.103)***	(0. 1653)	(0. 1642)
Liaoning	0.0019	0.1953	0.1951	0.0932	0.1877	0.1877	0. 0317	0. 0305
	(0.004)	(3.721)***	(3.712)***	(0.231)	(5.144)***	(5.138)***	(0. 1752)	(0. 1720)
Anhui	0.0150	-0.0942	-0.0943	-0.3659	-0.2046	-0.2053	0. 0248	0. 0241
	(0.034)	(-2.250)**	(-2.249)**	(-1.246)	(-3.532)***	(-3.538)***	(0. 1557)	(0. 1533)
Henan	-0.3038	-0.3192	-0.3197	-0.0483	-0.4266	-0.4261	0. 0278	0. 0264
	(-0.764)	(-7.748)***	(-7.741)***	(-0.114)	(-8.471)***	(-8.449)***	(0. 1644)	(0. 1604)
Hubei	-0.5016	-0.0921	-0.0929	-0.0416	-0.0358	-0.0363	0. 0407	0. 0379
	(-1.855)*	(-3.033)***	(-3.054)***	(-0.118)	(-1.225)	(-1.239)	(0. 1976)	(0. 1909)
Guangdong	4.7400	0.1027	0.1040	4.5054	0.0009	0.0009	0. 0235	0. 0217
	(---)	(2.959)***	(2.992)***	(---)	(0.018)	(0.019)	(0. 1514)	(0. 1458)
Sichuan	0.1293	-0.0946	-0.0946	-0.3896	-0.3216	-0.3226	0. 0395	0. 0374
	(0.317)	(-2.074)**	(-2.071)**	(-1.659)*	(-6.914)***	(-6.928)***	(0. 1947)	(0. 1898)
Yunnan	4.3650	0.1445	0.1451	4.5103	0.1288	0.1290	0. 0287	0. 0283
	(---)	(4.142)***	(4.150)***	(---)	(3.580)***	(3.578)***	(0. 1671)	(0. 1659)
Gansu	4.5275	0.1716	0.1725	4.4911	0.2262	0.2265	0. 0163	0. 0160

	(---)	(4.386)***	(4.398)***	(---)	(5.986)***	(5.978)***	(0. 1267)	(0. 1254)
Inverse Mills Ratio	---	-0.0566 (-2.822)***	---	---	-0.0448 (-2.552)**	---	0.0128 (0.0274)	0.0171 (0.0286)
R^2	---	---	0.2127	---	---	0.2382		
Pseudo R^2	0.2375	---	---	0.1814	---	---		
X^2 (22)	92.07***	---	---	90.98***	---	---		
Wald X^2 (21)	---	1410.91***	---	---	1728.86***	---		
F(21, 5389)	---	---	67.11***	---	---			
F(21, 6014)	---	---	---	---	---	82.28***		
Number of observations	5938	5907	5907	6078	6036	6036		

Source: Urban Household Survey, 1995.

Notes: (1) Omitted dummy variables are: less than primary school education, non-Communist Party members, and Jiangsu province.

(2) *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.

(3) Heteroskedasticity-consistent robust standard errors adjusted for clustering at the household level are computed.

(4) Joint F-tests on the coefficients for returns to schooling reject the null hypothesis that the difference between men and women are equal for each level of education attained.

Parental Investment in Children's Human Capital in Urban China

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Abstract. We test the extent of parental forgone consumption used instead to invest in children's human capital by use of intrahousehold resource allocation models. Using an unusual, comprehensive data set for urban China, we find more spending on boys aged 13-15 but more on girls aged 16-18, suggesting that standard human capital theories and traditional perceptions of gender bias do not completely explain educational expenditure decisions. The evidence from urban China is consistent, though, with human capital models which consider parental intertemporal preferences. Also, our findings suggest that the perceived bias in favour of sons exists weakly in contemporary urban China.

JEL Classification Numbers. I20, J24, D13.

Keywords. Education, human capital formation, intertemporal choice, household behaviour.

The possibility of bias for sons is an often-asked question in China.[♣] The one-child policy may have popularised the traditional view of a preference for boys. This paper investigates patterns in household expenditure on the education of sons and daughters to analyse whether there are such gender biases in contemporary urban China. We aim to measure the extent of forgone consumption of parents that is spent instead on the education of their children as a test of the models of parental investment in children's human capital by using a strand of empirical models known as the intrahousehold resource allocation approach. Finally, we will discern whether any such gender differences generate effects such as differential school enrolment rates of boys and girls with policy implications for gender inequality in China.

This paper will first review the educational system of China, focusing on gender differences in school enrolment as an indicator of human capital. This is followed by a model of parental investment in children's human capital that may result in differential spending on the education of sons and daughters if intertemporal considerations are taken into account. Section 3 introduces the intrahousehold resource allocation model to provide a measure of parental forgone consumption used instead on children's education, providing an empirical test of parental investment models. Section 4 describes the data and Section 5 presents the empirical findings as to whether gender is a significant factor in the allocation of household resources toward the education of children in urban China. In Section 6, we investigate whether any differential spending is

[♣] The model of parental investment in children's human capital is Discussion Paper No. 15 in the Centre on Skills, Knowledge and Organisational Performance (SKOPE) series at the Universities of Oxford and Warwick. Kind appreciation is also given to the U.K. Department for International Development for support. Any errors are mine.

due to better returns to education for men. If that is not the entire picture, then we turn to examine the potential role of intertemporal considerations such as future transfers or financial support for parents in urban China. Finally, we conclude in Section 7 with a summary of our findings of gender differences in educational expenditure indicating differential investment of parents in their children's human capital. We aim to uncover whether the oft-perceived tradition of a preference for boys exists in contemporary urban China or whether traditions are changing.

Evidence of pre-labour market gender inequality implies policy conclusions that are different from those based on post-entry inequalities in the labour market. This provides a useful analytical separation in examining the factors concerning gender discrimination, *i.e.*, differentiating between productivity-related differences generated by pre-labour market inequality, such as education obtained as a child, and those that pertain once men and women enter the labour market. Any evidence would also point to the circular nature of gender inequality. In other words, what happens in the labour market can affect decisions made prior to entry to the labour market (Rosenzweig and Schultz 1982; Sicilian and Grossberg 2001[1]).

1 Education in Modern China

The modern Chinese educational system is generally comprised of primary (six years), secondary (six years, three years of lower and three years of upper middle school), and tertiary or higher education (varying between two and five years) (Knight and Li 1993). Education is officially compulsory for nine years to the completion of

[1] Sicilian and Grossberg (2001) find that the most important factors affecting gender wage differentials in the U.S. are differences in human capital stock and occupational distribution.

lower middle school, though not always in practice (NBS 1997*a*). However, overall school enrolment in China is high in 1995, the year corresponding to the data set used in this paper. There are costs involved in schooling that fall into two main categories, tuition and fees, and other expenditures, which may include school uniforms, transportation expenses, and out-of-school or private tuition fees. The mean value of tuition and fees is 398 RMB in our representative survey, while it is much less (153 RMB) for other educational expenditures. In total, these costs are estimated to be less than 5% of average household income, so children's primary and secondary education will entail some but not great costs. There are some differences in school quality as well with the better schools expected to be more expensive.

There are not large gender differences in educational enrolment in urban China in the current period (see Knight and Li 1993 for similar findings in 1988). Figure 1 presents the possible paths in the Chinese school system and partitions enrolment by academic and professional schools into gender proportions, as computed from our data set discussed in Section 3.

[FIGURE 1 HERE]

In the Chinese school system, students attend lower middle school after completing primary school. They then test into upper middle school or middle level professional school. Middle level professional school generally takes one more year to complete than upper middle school and is typically the last level attained. Those who complete upper middle school are likely to apply and test into college. Professional school is an alternative to college. Those who select into professional schools will likely take on administrative or clerical work, and those who do not continue will likely enter the labour force as factory or manufacturing workers. Those who opt out of school early on are still candidates for factory work in particular, given China's growth in manufacturing capacity.

Table 1 gives school enrolment rates for children aged 7-18 in our sample. The mean years of education for all full-time students is 8.77 with a standard deviation of 3.83. For boys, it is 8.86 years of education (with a standard deviation of 3.82), while it is 8.66 years of education for girls (with a standard deviation of 3.84).

[TABLE 1 HERE]

The gross enrolment ratio of all school-aged children was 94 percent, while it was 91 percent for girls and 96 percent for boys (UNESCO 1999).[2]

[TABLE 2]

Table 2 shows that the ratio of enrolled girls to boys has stayed the same or improved from 1980 to 1995 for every level of education, although girls still lag behind at the secondary level and substantially behind at the tertiary level.[3] Using a 1995 rural household survey, Knight and Song (2000) find that boys are significantly more likely to be enrolled in school than girls, with the greater difference for upper middle school-aged children. One explanation posited by Broaded and Liu (1996) is that educational aspirations are different for boys and girls. In their study of Wuhan, boys are more likely to enter into advanced schooling while girls are more likely to enter into professional courses. They posit that this is primarily the result of two factors – tradition and parents' perception of future discrimination against women. They also find that

[2] UNESCO (1999) uses the definition of school-aged children as given by the country (see NBS 1997*b*).

[3] Figures for rural and urban China separately are not available.

women are reluctant to be better educated than any likely future spouse for fear that they might risk limiting their marriage prospects.

This customary reliance on sons and the argument concerning the role of tradition in fostering gender inequalities in education may hold for rural China. In rural China, Gao (1994) argues that patrilocal marriage and patrilineal inheritance are important aspects of the structure of patriarchal society that did not change in the course of economic transformation.[4] Even though marriage and inheritance in China are legislated to give daughters and sons equal privileges as heirs, patrilineal inheritance continues to be practised in rural areas with the result that sons are preferred to daughters (Lee 1998).[5] Sons inherit property, live near their parents and support them in old age. In a household survey conducted in the early 1990s, the Institute of Population Studies of the Chinese Academy of Social Sciences (IPS) finds that rural, but not urban, households show a preference for sons in the distribution of family property. We discuss this survey

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[4] Rural residences, for example, have traditionally been passed to sons and not daughters. The introduction of cooperatives abolished private ownership of land, but it did not significantly affect patrilocal residence patterns, argues Gao (1994). The government advocated men moving to their wives' home at marriage, but there are very few instances of this occurrence in rural areas. China's rural villages are usually made up of several large single-surname lineages. Because land is limited, villages restrict outsiders from moving in. Rural residents see women who move in to marry as effectively of their lineage and their descendants are welcomed as part of the lineage. Men who move in to marry are seen as outside the lineage and are excluded because all their descendants will belong to a differently surnamed lineage. The great majority of rural Chinese women must marry or they will not have a home of their own (Gao 1994). Most do not have the privilege of choosing to remain at their natal home because their village is unwilling to distribute land or residence to their husbands and children. In this respect, daughters are unable to benefit their natal families, while a son, aside from having his own land, gains another portion when he takes a wife. The periodic redistribution of land contracted for household production under the household responsibility system is based on the number of people in the household. Finally, by remaining near his parents, a son will be able to care for them in their old age (Croll 1994). Consequently, parents in rural China likely value sons more than daughters.

[5] Lee (1998), in her sociological study of rural-urban migrant factory workers in special economic zones in southern China, finds that parents discriminate against girls in favour of boys because of the perception that girls will eventually marry and move away so parents must rely on their sons in old age in rural China. In many villages there are only primary schools and upper middle school often involves extra fees for room

in detail later in the paper. Finally, in examining educational enrolment patterns in 1988, Knight and Li (1993) find that traditional values favouring the education of boys rather than girls appear to have been eroded in urban areas though not in rural areas.

We will explore whether a preference for boys exists in urban China, or if there are other factors motivating the parental decision to educate their children. To a large extent, due to the rural roots and migration patterns of the current cohort of adults in urban areas, we expect that rural customs will have an impact on parental attitudes in urban China. This is likely to be compounded by the additional linkages of urban with rural China through grandparents and the extended family. However, we hypothesise that parents are rational investors in their children in both rural and urban China, but face different constraints. In other words, there are differences in the economic needs of urban and rural households that affect their decisions regarding investment in children. A number of institutional factors in rural China may have caused parents to value sons more than daughters, giving rise to a tradition of bias toward boys. As the view of China is often driven by the view of rural areas where the bulk of the population live, there is a perception of pro-boy bias. We posit that tradition is often the historical product of practical necessity, and that rational acts under one set of circumstances, such as in rural China, will change when the context is altered, as in urban China with a different set of household needs and constraints. Our findings may run counter to the perceived traditions within China, but might better reflect the practices of an urban population with different concerns. In other words, traditions could be changing.

and board when attending in towns. Thus, she finds that parents educate their sons more than their daughters with the result that more boys are enrolled in school in some rural areas.

Further, in urban China, there is not evidence of two forms of explicit gender bias. Widespread female infanticide has not been documented, perhaps on account on the closer monitoring of neighbourhood committees and the work place related housing arrangements. Housing in 1995 was arranged by the work unit, so members of a work unit tend also to be neighbours. Second, unlike in rural China, there is no observed popular pattern of arranged marriages, perhaps there is less need to secure networks of mutual assistance typically wrought through marriage in agricultural societies. These differences reinforce the notion that gender bias is of a different nature in urban China and our investigation of gender bias is consistently conditional on girls living in their parents' households. Therefore, our study is to discern evidence of gender bias as it manifests in educational expenditure and school enrolment of girls in urban households.

Becker (1993) in his book, *A Treatise on the Family*, identified the parental role in developing the human capital of children. The investment in children's human capital, under credit constraints, necessarily entails forgone current consumption for the household. There is a strand of literature – intrahousehold resource allocation models – that could provide an empirical test of the extent to which parents will forgo consumption to spend on children's education through discerning patterns of consumption within households (see Deaton 1989; Behrman 1997; Haddad, Hoddinott and Alderman 1997 for excellent overviews of this approach). The degree of expectations of returns from children will vary among societies; however, we posit that parents invest in their children with an eye toward their own future utility as well as that of their offspring. These intertemporal considerations can generate differential investments in the human capital of sons versus daughters that are unrelated to preference or bias particular to a society. We use the intrahousehold resource allocation models to investigate educational expenditure in China where there is widely perceived gender bias to provide a test of these models by measuring the degree of parental investment in the form of forgone consumption.

2 A Model of Human Capital

Adapting Becker's three-period model, we introduce a final-period retiree who does not earn income and whose utility is comprised of consumption only, which is a function of transfers from his children and returns from assets, such as pension schemes. The utility function of parents of two children in the t^{th} period is

$$U_t = u_t + \delta(W^m{}_{t+1} + W^f{}_{t+1} + U_{t+1}), \qquad (1)$$

where u_t is their utility this period from consumption, $W^m{}_{t+1}$ is the future income of their son, $W^f{}_{t+1}$ is the future income of their daughter, U_{t+1} is next period's utility, and δ is the discount rate or subjective rate of time preference. The utility derived from their children is assumed to be separable from the utility produced by their own consumption. Utility next period, U_{t+1}, is comprised of consumption in the form of returns from savings invested in assets, A_{t+1}, and transfers from their son's future household, $B^m{}_{t+1}$, and from their daughter's future household, $B^f{}_{t+1}$.

The marginal yield on assets, A_{t+1}, is R_a, while the marginal yields on investments in the human capital of the son and daughter with respect to the returns to their future income ($R^m{}_h$, $R^f{}_h$) and the portion of that which will generate transfers to parents in the next period ($R^m{}_b$, $R^f{}_b$) are given by

$$R^m{}_h = \partial W^m{}_{t+1}/\partial\gamma^m{}_t,\ R^f{}_h = \partial W^f{}_{t+1}/\partial\gamma^f{}_t,\ R^m{}_b = \partial B^m{}_{t+1}/\partial\gamma^m{}_t,\ R^f{}_b = \partial B^f{}_{t+1}/\partial\gamma^f{}_t, \qquad (2)$$

where $\gamma^m{}_t$ and $\gamma^f{}_t$ denote the proportion of household income, Q_t, expended on the human capital of their son and daughter, respectively.

The intertemporal budget constraint is

$$Z_t + \gamma^m{}_t + \gamma^f{}_t + A_{t+1}/R_a + B^m{}_{t+1}/R^m{}_b + B^f{}_{t+1}/R^f{}_b = PV(Q_t), \qquad (3)$$

where $PV(Q_t)$ is the present value of parental household income, comprised of Q_t and expected Q_{t+1}. In other words, parental household income this period consists of proportion of own expenditure (Z_t) that include consumption, transfers to their parents, savings invested in assets for retirement, and proportion of expenditure that is forgone consumption invested in children's education ($\gamma^m{}_t$ and $\gamma^f{}_t$). Household resources next period (Q_{t+1}) is equal to the discounted value of all expected sources of consumption ($A_{t+1}/R_a + B^m{}_{t+1}/R^m{}_b + B^f{}_{t+1}/R^f{}_b$), *i.e.,* assets and transfers, which are the result of savings and investment in children's human capital.

An education production function provides that the adult earnings of children will be produced by human capital investment by parents and also on account of innate ability. This forms a second set of constraint given by:

$$R^m{}_h = R(\gamma^m{}_t, H^m{}_t) \text{ and } R^f{}_h = R(\gamma^f{}_t, H^f{}_t), \qquad (4)$$

where a son's income, $R^m{}_h$, will be determined by expenditure on education by his parents ($\gamma^m{}_t$) and his ability ($H^m{}_t$), and similarly for a daughter.

The allocation between investing in assets or children when contemplating consumption next period is determined by a first order condition equating the marginal yields on the three sources of income in the third period:

$$\delta A'_{t+1} + \delta B^{m'}_{t+1} + \delta B^{f'}_{t+1} = \lambda_u/R_k = \delta U'_{t+1}, \tag{5a}$$

where λ_u is the marginal utility of income. The yields on human capital are expected to decline as more resources are invested, $\partial R^m{}_h/\partial\gamma^m{}_t \leq 0$, $\partial R^f{}_h/\partial\gamma^f{}_t \leq 0$, $\partial R^m{}_b/\partial\gamma^m{}_t \leq 0$, and $\partial R^f{}_b/\partial\gamma^f{}_t \leq 0$, $\partial R^m{}_h/\partial H^m{}_t \leq 0$, $\partial R^f{}_h/\partial H^f{}_t \leq 0$, and will eventually equal returns to assets in this model including ability,[6] R_a assumed to be constant. Since $\partial R^m{}_h/\partial R_a < 0$, $\partial R^f{}_h/\partial R_a < 0$, $R^m{}_h > R_a$ and $R^f{}_h > R_a$, the marginal rate of return is denoted R_k.

The next first order condition maximises parental utility and determines their optimal consumption in periods two and three:

$$U'_t = \delta R_k U'_{t+1} = \lambda_u. \tag{5b}$$

The last first order condition determines investment in children's human capital in terms of the utility derived from the future income of the children:

$$\delta R^m{}_h W^{m'}_{t+1} = \lambda_u,\ \delta R^f{}_h W^{f'}_{t+1} = \lambda_u. \tag{5c}$$

Combining the first order conditions gives

$$\lambda_u/R_a = \lambda_u/R^m{}_b = \lambda_u/R^f{}_b = \lambda_u/R^m{}_h = \lambda_u/R^f{}_h, \tag{6}$$

which shows that the marginal rates of return on human capital for both the children's future income and expected transfers equal the return on assets in both periods. Differential spending on sons and daughters can thus be efficient rather than solely a result of bias of altruism.

The decision to invest in children's human capital in this and other models in the Becker tradition will entail forgone consumption by parents spent instead on the

[6] The support for this premise is well established and can be found in Becker (1993) whereby investment in ability for children will generate more investment in the more able of the children until the marginal rates of return to the investment is equal for all children.

education of children. There is a strand of empirical literature termed models of intrahousehold resource allocation which we propose would provide a direct test of such forgone consumption. These models reveal the decision of parents in a household to spend on children's education versus own consumption, consistent with the parental investment model as outlined above. In so doing, any evidence of differential expenditure on the education of sons and daughters can also be discerned. These models can be extended to investigate wealth or endowment effects as in Behrman *et al.* (1995) and for credit constraints, although we do not currently have data to do so. Credit constraints certainly exist in China in 1995, a period prior to commercial credit liberalisation (Naughton 1996), and is so inferred in interpreting our results. Given these limitations, we posit that the intrahousehold resource allocation models provide one type of empirical evidence that can provide one measure the extent of forgone consumption by parents, albeit imperfectly. At a minimum, they allow for inferences of patterns of gender bias among children for a given household's resource allocation decisions, for which these models have been widely used in investigating patterns of consumption in developing countries (see Doss 1996 for an overview).

The next section outlines the empirical testing we will undertake and how the intrahousehold resource allocation models can be utilised to test parents' forgone consumption used instead on children's education, consistent with the theoretical models which posit that such decisions are taken when parents who decide to invest in children's education.

3 Differences in Household Expenditure Patterns on Children's Education

Intrahousehold resource allocation models seek to disaggregate household expenditure and determine whether the characteristics of a household affect spending decisions (see Deaton 1997). For instance, Salm and Gerstle (2004) find that granting cash child allowance to Romanian households increases demand for child consumption goods using a model of intrahousehold resource allocation. Another paper in *Applied Economics* also links household traits and education demand in Spain. Beneito *et al.* (2001) estimate a household demand function for education and find that Spanish household characteristics influence the demand for secondary but not university education of children. They consider several measures of opportunity cost, including expected future income, and the income strata of the household, and find these to be significant determinants of education expenditure at the secondary school level. We also focus on household expenditure on children's education and likewise posit that expected earnings will be important in China. We differ in our estimation strategy in that we use the intrahousehold resource allocation models to test the notion of forgone consumption and also consider expected income for not only the child but also that of his or her future household. Our model takes an intertemporal approach to the question, while agreeing with the theoretical importance of measuring opportunity costs and household resources in determining children's educational expenditure.

Studies of developing countries further suggest the importance of the age-gender composition of the household in resource allocation decisions. They tend to find that expenditure patterns favour males (see Deaton 1997). Medical care for girls is a luxury good in that it is more income and price elastic than for boys in Pakistan (Alderman and Gertler 1997). Regarding children's education, DeTray (1988) finds in

Malaysia that the demand for girls' schooling is more income elastic than for boys. Similarly, the education of girls is a luxury good in Vietnam (Behrman and Knowles 1999).

Household expenditures are also thought to differ with the degree of influence of women, suggesting a joint decision-making model (see Haddad, Hoddinott and Alderman 1997). For instance, Hoddinott and Haddad (1994) find in the Côte d'Ivoire in the 1980s that doubling the cash income of women increases the household budget share of food and reduces the shares of alcohol and cigarettes. Haddad and Hoddinott (1994) also find in the Côte d'Ivoire that increasing women's share of cash income betters the health status of boys relative to girls. For Brazil, Thomas and Strauss (1997) find that increased female earnings are associated with a larger share of the household budget being devoted in human capital – such as health and education – as well as leisure goods, including recreation. Song (2001), in a study of rural China in 1995, finds that greater female bargaining power changes expenditure patterns in favour of health care and education, but does not reduce the pro-boy discrimination in these expenditures (for an overview of bargaining theories, see Lundberg and Pollack 1996).

We use this approach to measure the decision of parents to forgo consumption to spend on education as a measure of direct investment in children's human capital and also investigating any gender differences posited in the theoretical model. We propose that this is a useful direct test of this genre of parental investment models where parents decide to give up current consumption in order to spend on their children's human capital.

In line with this literature, both a unitary household decision-making model and a joint decision-making model will be estimated to determine the best fit (see Deaton 1997 for the theoretical underpinnings and restrictions of these models).

3.1 Unitary Household Decision-making Model

Derived from the specifications of the theoretical model, we transform the variables into the specifications of this set of empirical models found in Deaton (1997). The proportion of household expenditure on the share of household expenditure on children's education is given by

$$\gamma^{e}_{t} = \beta_0 + \beta_1 \ln[(Z_t + \gamma^{e}_{t})/n) + \beta_2 \ln(n) + \sum_{g=1}^{G-1} \beta_3 (n_g/n) + \beta_4 \boldsymbol{X}_t + \varepsilon_t, \qquad (7)$$

where γ^{e}_{t} denotes the share of household expenditures spent on the education of children, $Z_t+\gamma^{e}_{t}$ is total household monetary expenditure, n denotes household size, n_g is the number of individuals of age-gender demographic group g, $\sum n_g/n$ represents the proportion of individuals of demographic group g in the household, $\boldsymbol{X}_t$ is a vector of control variables, and ε_t is the error term.

3.2 Joint Household Decision-making Model

An alternative formulation takes into account potential bargaining as between parents concerning the education of their children. A proxy for relative bargaining power is included. The equation is now given by

$$\gamma^{e}_{t} = \beta_0 + \beta_1 \ln[(Z_t + \gamma^{e}_{t})/n) + \beta_2 \ln(n) + \sum_{g=1}^{G-1} \beta_3 (n_g/n) + \beta_4 \boldsymbol{X}_t + \beta_5 E^{m}_{t} + \varepsilon_t, \quad (8)$$

where $E^m{}_t$ denotes the years of education of the mother as a ratio of the total years of education of both spouses, which is a proxy for female bargaining power. We tried alternative proxies, such as women's share of earned income to that of both spouses (see the proxies used by Hoddinott and Haddad 1994 for the Côte d'Ivoire and Song 2001 for rural China).

3.3 Interpreting Patterns of Intrahousehold Resource Allocation

As explained by Deaton (1989, 1997), because we do not have data regarding actual expenditure on the education of boys and girls but only on all the children in the household, the analysis is based on a correlation between the number of boys and girls in the household and the amount of forgone consumption. This is evidenced through the variable, $\sum n_g/n$. From both the unitary and the joint decision-making formulations of the model, the coefficient β_3 indicates the relationship between educational expenditure and the age-composition of the household. If β_3 are significant and different for boys and girls, then there is evidence of differential investment in children's human capital as seen through forgone consumption of parents. Again, this is a direct test of parents forgoing consumption to spend on children's education as well as a method to discern whether such forgone consumption and expenditure differ by gender.

4 Data

We tested our hypotheses using an unusually comprehensive and representative urban household survey conducted in China and related to 1995. The survey has rich data on consumption and income for each household. The survey was designed by the Institute of Economics, Chinese Academy of Social Sciences, in consultation with international scholars. The households are drawn from a sub-sample of the NBS annual household income and expenditure survey. Eleven of the 30 provinces of China are included. For details, see Riskin, Zhao and Li (2001).

The pertinent descriptives are as follows. There are 6,594 households and 21,697 individuals, of whom 70.3 percent are aged 19 and over, and primary and secondary school-aged children (7-18 years of age) are approximately 17.12 percent. Of such children, boys are slightly more numerous than girls (8.61 percent and 8.51 percent, respectively), and the gender ratio of girls to boys is 98.84. In terms of age-gender demographics, boys aged 7-12 are 3.82 percent of household members, boys aged 13-15 are 2.70 percent, boys aged 16-18 are 2.09 percent, while girls aged 7-12 are 4.02 percent, girls aged 13-15 are 2.37 percent and girls aged 16-18 are 2.12 percent.

The mean proportion of annual household resources expended on children's education is 4.69 percent (with a standard deviation of 0.09). In absolute figures, it is 573 yuan or RMB (with a standard deviation of 1,219). Total mean household expenditure is 12,222 yuan (with a standard deviation of 10,365), while mean household income is 14,290 yuan (with a standard deviation of 8,591). As expected under the one-child policy, the mean number of household members is 3.13 (with a standard deviation of 0.83). More than three-quarters of the households are two-generations (78.16 percent), while one-generation households comprise 15.52 percent, three-generation households are 5.55 percent, and the remaining 7.65 percent are other types of household, defined as those with relatives other than the nuclear family or includes non-relatives. The head of household is male in a majority of the sample (65.93

percent), and just under half of all households (45.64 percent) include a Communist Party member.

5 Empirical Findings

We first examine whether there are gender differences in parents' expenditures on children's education. The results of the two-stage least squares estimation of a unitary household decision-making model of resource allocation toward children's education are presented in Table 3. The independent variables include household level variables as well as the characteristics of the household head in addition to city dummy variables. The education variable is a rank variable indicating the level of education completed, while the occupation variable is also a rank variable indicating professional to unskilled workers. We tested the robustness of the specification by using one-generation households as the omitted variable, for instance. Different characteristics of the household head were also tried. Our results concerning the significance of the age-gender household composition variables do not change.

Given the nature of household consumption studies, there are variables which could be endogenous to the system. Accordingly, potentially endogenous variables were tested according to the Durbin-Wu-Hausman test (Greene, 1997). Instruments were selected according to the criteria specified in Bound *et al.* (1995). Ownership of telephone proxied the standard of living of the household and household type ranging from flats to houses validly instrumented household expenditure per capita and the number of people in the household, respectively. A detailed discussion of the instruments and endogenous variables can be found in the Appendix. The 2SLS estimation is properly identified according to the Sargan test, the instruments were jointly significant at the 1 percent level and the partial R-squared of the first stage regression is of reasonable magnitude. On account of the rich detail in this data set, we were thus able to instrument for the endogenous variables to a good level. Further details of the first stage regressions are provided in the Appendix.

[TABLE 3 HERE]

Not surprising, there is a 4.98 percentage point increase in the proportion of household resources allocated to children's education associated with two-generation households. Turning to the age-gender household composition variables,[7] we find that the proportions of boys and girls aged 13-15 and 16-18 affect the proportion of household resources expended on children's education, but not children aged 7-12. As education is heavily subsidised, this is not surprising for the younger age groups (see Knight and Li 1996). The proportion of boys aged 13-15 increases household expenditure on children's education by 14.65 percentage points, while girls aged 13-15 increase expenditure by a

[7] Other significant variables include the education of the household head and the proportion of men aged 56-65 in the household, along with a number of province dummy variables. The education of the household head and the proportion of men aged 56-65 both have negative effects on children's educational expenditures. There are numerous possible explanations. Regarding the education of the household head, as expenditure is a proportion of household income if better educated household heads earn more income then education fees form a smaller part of total household income. It is also possible that we have only captured direct expenditure on children's education and not indirect spending. In other words, parents will invest a set amount of time and resources in their children. More educated household heads may spend more time investing in their children by helping them with homework or perhaps spend time and resources on cultivating social networks to further the children's future opportunities. Less educated household heads may not be able to invest in these other respects and thus their spending is direct, while indirect expenditures and time spent are not captured in this estimation. Other factors could also include providing health and support for their children, which could be reflected in parental time and their own forgone consumption. The proportion of men aged 56-65 in the household probably include retirees who are not now earning income but may require additional expenditure on their consumption that will take away from spending on children's education. This corresponds to other studies in which adult men in the household are associated with an increase in spending on alcohol and cigarettes and a decrease in spending on education and health (for example, see Hoddinott and Haddad 1995). Finally, as compared with the omitted province of Jiangsu, poorer provinces such as Liaoning, Anhui, Henan and Yunnan have significantly negative coefficients.

smaller amount (13.17 percentage points).[8] The situation is reversed for boys and girls aged 16-18, in which the effects on household educational expenditure are respectively 14.34 percentage points and 19.98 percentage points. The results of this model suggest that there are differential patterns of household expenditure on the education of boys and girls that are significant for middle school children (ages 13-15 best correspond to lower secondary school while ages 16-18 best correspond to upper secondary school). Household expenditure patterns appear to favour boys aged 13-15, but girls aged 16-18.

We next include proxies for bargaining power as between spouses to determine whether the unitary household decision-making model is the proper specification. None of the proxies for spousal bargaining power is found to be significant (see also IPS 1994[9]). One set of estimations is reported in Table 4.

[TABLE 4]

The results in Table 4 correspond to the unitary household decision-making model (Table 3) in that girls aged 13-15 are associated with a smaller proportion of household educational expenditure than boys of the same age cohort, while girls aged 16-18 receive more expenditure on their education than boys of the same ages. Specifically, the proportion of girls aged 13-15 in the household increases expenditure by 13.14 percentage points, while boys of the same ages increase expenditure by 14.65 percentage points. The proportion of boys aged 16-18 increases household expenditure on education by 14.33 percentage points, while girls aged 16-18 increases household

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[8] Joint F-tests on all of these sets of coefficients reject the null hypothesis that they are equal for boys and girls of the same age groups.

[9] The survey conducted by IPS (1994) finds little difference in responses regarding household expenditure when spousal bargaining power is taken into account. The several measures of bargaining power include spouses' age difference, educational levels and proportion of earned income.

expenditure by 19.98 percentage points. Joint F-tests on these sets of coefficients reject the null hypothesis that they are equal for boys and girls of the same age groups. These findings provide further support that the household spends more on daughters in upper secondary school and sons in lower middle school.

5.1 Accounting for school quality

We attempted to isolate the effects of school quality by disaggregating educational expenditures to the extent permitted by our data. Expenditures on children's education comprise two items – expenditures on tuition and fees, and other expenditures. Tuition and fees serve as our best proxy for school quality, as we do not have data on actual schools in the survey. By separating the two categories, we may find that the differences are a function of school quality insofar as better schools are more costly. The mean value of tuition and fees is 398.80 RMB (with a standard deviation of 1027.85) while it is 153.87 RMB (with a standard deviation of 683.89) for other educational expenditures. We cannot identify these other expenditures, but posit that they include school uniforms, transportation expenses and out-of-school tuition fees. None of the coefficients on the age-gender household composition terms were significant and the link with school quality is not clear cut.

5.2 Implications of the one-child policy

We also explore the implications of the one-child policy implemented in the late 1970s and early 1980s on household expenditure on children's education, *i.e.*, families with one child will spend on their child regardless of his or her gender. The cohort of school-aged children in 1995 is affected by this policy. Table 5 gives the mean values for household expenditure on children's education for single-child, single-boy and single-girl households, as compared with all households with children that include single-child households.

[TABLE 5 HERE]

Single-child households represent 60.3 percent of all households with children in the sample. Of these households, 51.6 percent are single-boy households and the remainder are single-girl households. Single-child households spend 2.55 percent more on children's education than all households with children. Single-girl households spend more, on average, on children's education in both sub-categories than single-boy households. These figures suggest that parents are willing to spend more on education where there is one child, and also that there may be more associated expenses for girls than boys in single-child households, such as clothing, that are captured in the other expenditure category. One possible explanation as to why tuition and school fees are also higher for single-girl households may have to do with girls testing into better schools with higher fees. However, our discussion above indicates that our data set does not permit us to explore school quality. Given these patterns, nevertheless, we may find that the larger educational expenditure associated with the proportion of girls aged 16-18 is explained by single-girl households. Table 6 gives the results of the intrahousehold resource allocation model of expenditure on children's education estimated for the sub-sample of single-child households, and further disaggregated by single-boy and single-girl households.

[TABLE 6 HERE]

The results of Table 6 do not shed further light on the degree to which the age-gender composition of the household affects expenditure on children's education. Although single-child households are a majority of the sample of households with children, the age-gender composition variables are not significant in these estimations. Therefore, the patterns of household expenditure on children's education are not well explained by single-child households. In sum, we find that the proportion of household expenditure on the education of children significantly differs for children aged 13-15 and 16-18, corresponding to the two levels of secondary school.

5.3 Academic versus professional schools

Table 7 shows there are more girls enrolled in middle level professional school than boys, both in absolute numbers and as a percentage of the total aged 16-18.[10] The reverse is true for upper middle school in which there are fewer girls than boys – again both absolutely and as a percentage of total enrolment. It is possible that girls self-select into professional rather than academic upper secondary school. The testing process into upper middle school is another possibility. However, it is difficult to distinguish ability from the influence of examination preparation at lower middle school that may result from more household expenditure on the education of boys aged 13-15.

[TABLE 7 HERE]

Our original estimation of the intrahousehold resource allocation model did not separate children according to whether they attended academic or professional schools. To test for possible differences stemming from the type of school, we re-estimate the household expenditure model.[11] The results are given in Table 8.

[TABLE 8 HERE]

[10] There are 499 boys aged 16-18, making the gender ratio 1.03 for this cohort.

[11] The estimated model is of the unitary household decision-making form since we did not find evidence to support a bargaining model.

As expected, children who are not enrolled in school do not affect the pattern of household expenditure on education (Table 8). A larger proportion of household resources is spent on girls aged 16-18 regardless of the type of school (middle level professional school or upper middle school) than on boys of the same age-group and enrolled in the same schools (all coefficients are significant at the 1 percent level).[12] Joint F-tests on these sets of coefficients reject the null hypothesis that they are equal for boys and girls of the same age groups. We find that the coefficients for each set of boys and girls of the same age groups are statistically different. These results confirm the results of our original estimation in which academic and professional schools are considered together.

Therefore, our findings reveal that there is more spending on boys aged 13-15 but more on girls aged 16-18, suggesting that standard human capital theories and traditional perceptions of gender bias do not completely explain the educational expenditure decision. We next turn to examine whether these findings are consistent with models which consider parents' intertemporal preferences.

6 Returns to Parental Investment

Standard human capital theory would suggest that the current educational attainment of the adult population and their earnings affect the current expenditure on

[12] In order not to omit observations, we include those children aged 16-18 enrolled in college and in professional school. There are 11 men enrolled in college and above and another 11 in professional school. There are 12 women enrolled in college and above and 19 in professional school. Despite their small numbers, the coefficients on educational expenditure on sons and daughters who are enrolled in college are positive and significant (at the 5 percent and 1 percent levels, respectively). The coefficient for girls in college is almost twice as large than that of boys. For those attending professional school, we find that the coefficient on girls is positive and significant (at the 1 percent level), but not significant for boys. This lends additional evidence that more is spent on girls than boys aged 16-18 regardless of the type of school.

education and enrolment of children? Table 9 and Figure 2 depict the educational attainment of the adult population, divided into working-aged men and women (19-55) and those aged 56 and over.

[TABLE 9 HERE]

[FIGURE 2 HERE]

Using the earnings data in the survey, we predict mean annual income for men and women with each level of educational attainment standardising for the characteristics of their respective samples (see the Appendix for the earnings functions). These findings are consistent with studies of returns to education in China and in particular with the results of other researchers using this data set specifically to investigate returns to education (*e.g.,* Knight and Li 1996). Predicted mean annual income is higher for sons than daughters with the average characteristics of the sample for all educational levels (Table 10).

[TABLE 10]

We conclude that parents spend more on the education of sons than daughters who are aged 13-15 on account of men receiving higher rates of return to education. However, parents spend more on daughters than sons aged 16-18 in both types of upper secondary school. The evidence suggests that higher rates of return to education cannot be the motivation in the latter case because men earn higher returns than women in upper middle school. Of the possible explanations, it is also plausible that there are different kinds of families in the sample. The parents who spend more on daughters aged 16-18 may have also spent more on daughters at the time when they were aged 13-15 than on sons of the same age groups. However, we are unable to test this outcome without data for the same families from previous years. We turn to another possible explanation which is that there are future transfers to consider when parents make investment decisions that are based not just on the standard returns to education for the child but on his or her future expected household income. Because we do not have two generations of data on transfers to parents, we will estimate expected future transfers to parents based on assessing children's future household income, which is consistent with the theories of parental investment when parents look ahead to expected returns in making current investment decisions.

To obtain the expected household income of a child, we need to incorporate theories of assortative mating to predict the likely income of a child's future potential spouse. The predicted annual mean income of the children's likely future spouse is the predicted annual mean income of men and women weighted by the probabilities of marrying a spouse who has attained each educational level based on Table 11.

[TABLE 11]

Table 11 shows that 82.3 percent of women of each level of educational attainment marry at or above their own educational level, while it is less (55.5 percent) for men. In the absence of perfect assortative mating, parents have only a probabilistic expectation that a child will marry a spouse with comparable education based on the distribution of the educational attainment of spouses in the current cohort of married couples. In other words, a woman with educational attainment at or above the college level has a 60.47 percent chance of marrying a man who has attained the same level of education, a 15.28 percent chance of marrying a man with a professional school education, a 7.31 percent chance of marrying a man of middle level professional school educational attainment, a 7.64 percent chance of marrying a man who has completed upper middle school, a 3.65 percent chance of marrying a man who has completed lower middle school, a 0.66 percent chance of marrying a man with a primary school education and probability of naught of marrying a man with less than primary school education. These weights are multiplied by the respective predicted annual mean income of men who have completed each level of education. If there were perfect assortative mating, then column (1) would equal column (4) and columns (2) and (3) would be equal in Table 12. The combined income of the child and that of their likely future spouse's generates an expectation of the child's future household income from which parents may obtain transfers, shown in Table 12.

[TABLE 12 HERE]

Table 13 gives the predicted mean annual income for the future households of daughters and sons based on their respective expected mean income and that of their likely spouse [column (1) in Table 13 is the sum of columns (1) and (4) in Table 12, while column (2) in Table 13 is the sum of columns (2) and (3) in Table 12]. Expected mean annual household income is higher for daughters than sons for each level of educational attainment. These are static expectations and may not accurately reflect the rapid economic changes taking place in China in 1995. However, to the extent that parents act on available information, this exercise is useful in attempting to gain an understanding of parental expectations of future transfers.

[TABLE 13 HERE]

We find that the smallest difference between the expected future household income of sons and daughters is for those who have completed lower middle school, while the largest difference is for those who have completed middle level professional school. This coincides with our finding that parents invest more in sons than daughters aged 13-15 (corresponding to lower middle school) but more in daughters than sons aged 16-18 (corresponding to upper secondary school).

Finally, by law children have an obligation to support their parents.[13] In addition, approximately 80 percent of all persons are employed in the state sector in urban China that provides pensions.[14] This may reduce some of the tendency to favour sons over daughters that arises in rural China, which lacks pension schemes and has a greater adherence to traditional preferences for boys discussed earlier. When also considered in light of the large number of families with one child, there may also be a diminished expectation of relying on sons in old age. This could reinforce the interpretation that there intertemporal concerns are strong, and there are indeed future transfers to consider. These explanations are also consistent with a degree of altruism in China, heightened by the one-child policy, which suggests changing traditions in urban areas.

7 Conclusion

This paper used a strand of models – intrahousehold resource allocation approach – to test the extent to which parents forgo current consumption to invest in their children's human capital. Utilising these models, we were able to measure parental

[13] See The Protection of the Rights and Interests of Old People Law (October 1, 1996), particularly Article 11: "Children and their spouses are both to support their parents both financially, spiritually and of their particular needs." There is a counterpart in the criminal law providing for sanctions.

[14] Of the 15,233 employed individuals, the workplace is SOEs for 12,157 persons.

expenditure on children's education rather than own consumption, providing a test of parental investment models for urban China.

Our findings were that the proportion of household resources allocated to children's education in urban China in 1995 is not well explained by examining only returns to education or a preference for boys. If a bias for sons were the governing motivation, then we would not expect to find more expenditure on the education of daughters aged 16-18. Rather, the evidence suggests otherwise.

Insofar as expenditures on children's education entail forgone consumption, parents are likely to be efficient as well as altruistic in their decisions. This is reinforced by specific intertemporal considerations found in China, such as the expectation that parents in retirement will depend on transfers from children, as well as on assets, for consumption in an imperfect credit market and pensions system. Moreover, the circular nature of perceived future labour market discrimination will affect the investment decision in counteracting ways.

Future labour market discrimination will cause investment to differ for sons and daughters. Given perceived gender earnings differentials, parents will invest more in the human capital of sons, in accordance with standard returns to education analyses. A second consideration in our adapted model is expected transfers. Favourable assortative mating will generate higher returns from investments in daughters than in sons. This is owing to the same gender earning differentials that will cause daughters to marry spouses with higher returns to human capital and augment their future household income more than for sons. We thus expect that parents will invest more in the human capital of daughters. These two effects are endogenous and co-exist. For urban China, we find evidence consistent with these two effects. With some limitations to the interpretation of the results, the empirical data calibrating household consumption provides some evidence of the human capital models.

In conclusion, there are some – but not large – gender differences in the educational enrolment of school-aged children in urban China. Despite more expenditure on the education of girls than boys aged 16-18, there is evidence that girls have higher attrition rates beyond lower middle school, are more likely to be enrolled in professional than academic schools, and expect lower returns to this education than boys. Therefore, we find gender differences in urban China are the likely result of perceived earnings inequality that may in turn cause these children to receive unequal investment in their human capital prior to entering the labour market.

[APPENDIX TABLES A1-3 HERE]

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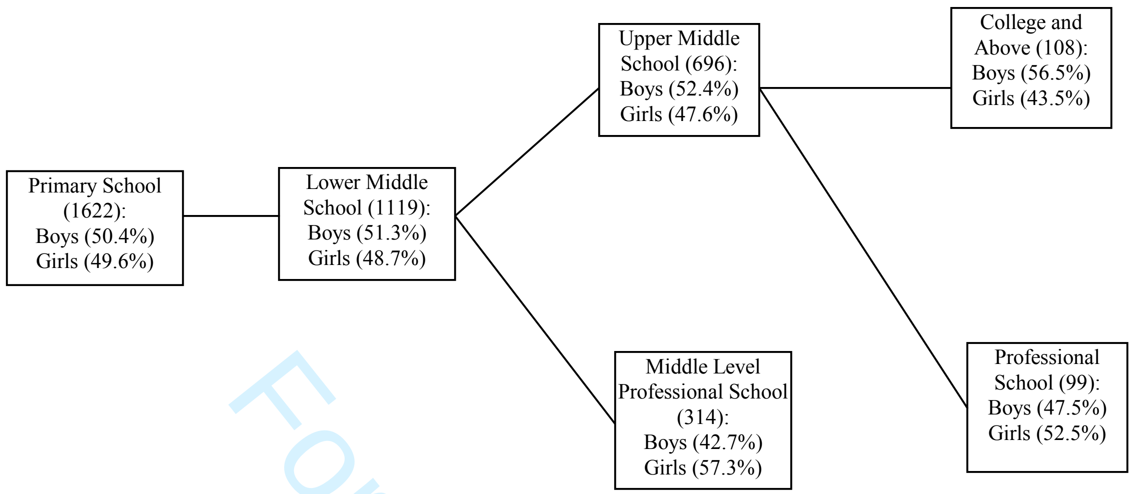
Primary School (1622):
Boys (50.4%)
Girls (49.6%)
Lower Middle School (1119):
Boys (51.3%)
Girls (48.7%)
Upper Middle School (696):
Boys (52.4%)
Girls (47.6%)
College and Above (108):
Boys (56.5%)
Girls (43.5%)
Middle Level Professional School (314):
Boys (42.7%)
Girls (57.3%)
Professional School (99):
Boys (47.5%)
Girls (52.5%)

Figure 1

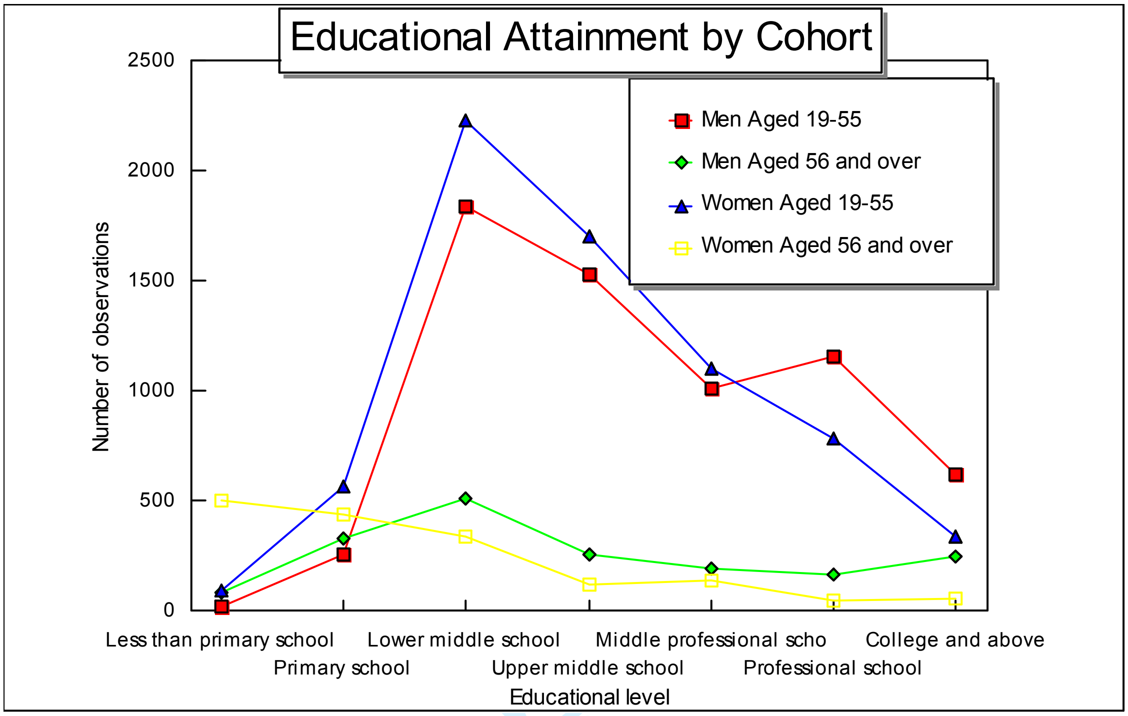
Educational Attainment by Cohort
Men Aged 19-55
Men Aged 56 and over
Women Aged 19-55
Women Aged 56 and over
Number of observations
2500
2000
1500
1000
500
0
Less than primary school
Primary school
Lower middle school
Upper middle school
Middle professional scho
Professional school
College and above
Educational level

Figure 2

Table 1
School Enrolment Rates (%) for Children Aged 7-18
(total number of boys and girls)

Age	Boys	Girls
7	87.5 (144)	89.4 (142)
8	97.2 (145)	95.3 (150)
9	99.1 (111)	99.3 (140)
10	96.1 (153)	96.2 (133)
11	98.5 (137)	96.3 (136)
12	97.0 (168)	96.8 (189)
13	99.5 (199)	99.0 (193)
14	98.1 (206)	95.8 (166)
15	98.0 (198)	97.8 (181)
16	93.8 (160)	94.4 (196)
17	91.5 (176)	90.1 (152)
18	84.0 (163)	75.0 (164)
Total Enrolment Rate	94.6 (1960)	93.9 (1942)

Source: Urban Household Survey, 1995.

Table 2
Gross Enrolment Ratios of Girls in Selected Years
(gender ratio of girls to boys)

	1980	1985	1990	1995
All School-Aged Children	71 (0.81)	70 (0.82)	79 (0.87)	91 (0.95)
Primary	104 (0.86)	114 (0.86)	120 (0.93)	117 (0.99)
Secondary	37 (0.69)	33 (0.70)	42 (0.75)	62 (0.89)
Tertiary	0.8 (0.32)	1.7 (0.44)	2.0 (0.51)	3.9 (0.53)

Sources: NBS (1997*b*), UNESCO (1999) and World Bank (2000*a*, 2000*b*).

Notes: (1) The data on net enrolment ratios (NER), which would compute the ratio of the number of children of official school age enrolled in school to the number of children school age in the population, is not available for secondary and tertiary education nor is it complete for primary school in China (UNESCO 1999). We report gross enrolment ratios (GER), defined as the total enrolment in a specific level of education, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education in a given school year (UNESCO 1999). As noted earlier, the GER is widely used as an alternative indicator to the NER when data on enrolment by single years of age are not available. NER for primary education is reported in Note (2) to this table.

(2) For primary education, NER for girls was 89 and the gender ratio was 0.92 in 1986, as figures for 1985 were not available. In 1990, NER for girls was 95 and the gender ratio was 0.96. In 1995, NER for girls was 98 and the gender ratio was 1.00.

(3) For tertiary education, the figures are for 1996, as 1995 figures were not available.

Table 3
Two Stage Least Squares Unitary Intrahousehold Resource Allocation Model
Regarding the Proportion of Household Expenditure on Children's Education

Dependent Variable: Proportion of Household Resources Expended on Children's Education	Coefficient (t-statistic)	Mean Value or Percentage (standard deviation)
Intercept	-0.0776	0.0469[15]
	(-0.374)	(0.0898)
Household Characteristics:		
Log of household expenditure per capita (predicted)	-0.0088	8.1370[16]
	(-1.119)	(0.3157)
Log of number of household members (predicted)[17]	0.1366	1.1062[18]
	(1.119)	(0.2016)
Communist Party membership of any member of the household	0.0051	0.4564
	(1.135)	(0.4981)
One-generation household	0.1186	0.1552
	(1.291)	(0.0871)
Two-generation household	0.0498	0.7816
	(1.706)*	(0.3622)
Three-generation household	0.0052	0.0555
	(0.377)	(0.2291)
Characteristics of Household Head:		
Male	-0.0072	0.6593
	(-1.548)	(0.4740)
Educational level	-0.0033	3.8015
	(-3.373)***	(1.5173)
Occupation	-0.0012	5.5657
	(-1.631)	(1.9401)
Age-Gender Composition of Household:		
Male aged 0-6	-0.0096	0.0256
	(-0.233)	(0.0862)
Male aged 7-12	0.0583	0.0382
	(1.349)	(0.1046)
Male aged 13-15	0.1465	0.0270
	(3.719)***	(0.0894)
Male aged 16-18	0.1434	0.0209
	(6.180)***	(0.0785)
Male aged 19-55	-0.0027	0.2893
	(-0.147)	(0.1711)
Male aged 56-65	-0.0440	0.0653
	(-2.061)**	(0.1503)
Male aged 66 and over	-0.0404	0.0299
	(-1.398)	(0.1101)

[15] Mean value and standard deviation of the dependent variable are reported, and similarly in each table in the paper.

[16] The mean of the natural logarithm of household expenditure per capita (actual) is 8.1366 with a standard deviation of 0.7323.

[17] We use the logarithm of number of household members to better correspond with the proportion of household expenditure and age-gender composition variables (see also Song 1999).

[18] The mean of log of number of household members (actual) is 1.1063 with a standard deviation of 0.2682.

Female aged 0-6	-0.0191	0.0235
	(-0.466)	(0.0831)
Female aged 7-12	0.0636	0.0402
	(1.418)	(0.1071)
Female aged 13-15	0.1317	0.0237
	(3.852)***	(0.0844)
Female aged 16-18	0.1998	0.0212
	(9.348)***	(0.0780)
Female aged 19-55	0.0136	0.3094
	(0.589)	(0.1634)
Female aged 56-65	0.0052	0.0593
	(0.168)	(0.1492)
Provinces:		
Beijing	-0.00004	0.0721
	(-0.007)	(0.2587)
Shanxi	-0.0106	0.0937
	(-1.324)	(0.2915)
Liaoning	-0.0207	0.1010
	(-4.242)***	(0.3013)
Anhui	-0.0095	0.0721
	(-1.695)*	(0.2587)
Henan	-0.0265	0.0865
	(-3.465)***	(0.2812)
Hubei	0.0018	0.1070
	(0.391)	(0.3091)
Guangdong	-0.0070	0.0787
	(-0.875)	(0.2694)
Sichuan	-0.0049	0.1223
	(-1.261)	(0.3277)
Yunnan	-0.0100	0.0935
	(-2.021)**	(0.2911)
Gansu	-0.0040	0.0577
	(-0.616)	(0.2331)
R^2	0.0905	
Adjusted R^2	0.0861	
F(32, 6555)	26.17***	
Number of observations	6588	

Source: Urban Household Survey, 1995.

Notes: (1) Omitted dummy variables are: female household head, households without any Communist Party members, females aged 66 and over, Jiangsu province and other types of households.

(2) *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.

(3) Instruments are ownership of telephone and type of house; see Appendix for first stage regression results.

Table 4
Two Stage Least Squares Joint Household Decision-making Model
Regarding the Proportion of Household Expenditure on Children's Education

Dependent Variable: Proportion of Household Resources Expended on Children's Education	Coefficient (t-statistic)	Mean Value or Percentage (standard deviation)
Intercept	-0.0794	0.0551
	(-0.407)	(0.0899)
Household Characteristics:		
Log of household expenditure per capita (predicted)	-0.0088	8.1370
	(-1.118)	(0.3157)
Log of number of household members (predicted)	0.1369	1.1062
	(1.145)	(0.2016)
Communist Party membership of any member of the household	0.0051	0.4564
	(0.0045)	(0.4981)
One-generation household	0.1187	0.1552
	(1.313)	(0.0871)
Two-generation household	0.0499	0.7816
	(1.718)*	(0.3622)
Three-generation household	0.0052	0.0555
	(0.378)	(0.2291)
Characteristics of Household Head:		
Male	-0.0065	0.6593
	(-0.611)	(0.4740)
Educational level	-0.0033	3.8015
	(-3.366)***	(1.5173)
Occupation	-0.0012	5.5657
	(-1.641)	(1.9401)
Age-Gender Composition of Household:		
Male aged 0-6	-0.0096	0.0256
	(-0.232)	(0.0862)
Male aged 7-12	0.0583	0.0382
	(1.340)	(0.1046)
Male aged 13-15	0.1465	0.0270
	(3.714)***	(0.0894)
Male aged 16-18	0.1433	0.0209
	(6.120)***	(0.0785)
Male aged 19-55	-0.0026	0.2893
	(-0.145)	(0.1711)
Male aged 56-65	-0.0437	0.0653
	(-2.146)**	(0.1503)
Male aged 66 and over	-0.0400	0.0299
	(-1.466)	(0.1101)
Female aged 0-6	-0.0191	0.0235
	(-0.464)	(0.0831)
Female aged 7-12	0.0636	0.0402
	(1.407)	(0.1071)
Female aged 13-15	0.1314	0.0237
	(3.847)***	(0.0844)
Female aged 16-18	0.1998	0.0212
	(9.305)***	(0.0780)
Female aged 19-55	0.0135	0.3094
	(0.565)	(0.1634)
Female aged 56-65	0.0051	0.0593
	(0.162)	(0.1492)

Provinces:		
Beijing	-0.0001	0.0721
	(-0.009)	(0.2587)
Shanxi	-0.0106	0.0937
	(-1.338)	(0.2915)
Liaoning	-0.0207	0.1010
	(-4.269)***	(0.3013)
Anhui	-0.0096	0.0721
	(-1.691)*	(0.2587)
Henan	-0.0265	0.0865
	(-3.489)***	(0.2812)
Hubei	0.0018	0.1070
	(0.389)	(0.3091)
Guangdong	-0.0070	0.0787
	(-0.877)	(0.2694)
Sichuan	-0.0062	0.1223
	(-1.256)	(0.3277)
Yunnan	-0.0100	0.0935
	(-2.023)**	(0.2911)
Gansu	-0.0040	0.0577
	(-0.615)	(0.2331)
Proxy for Bargaining Power:		
Wife's years of education as a proportion of the husband's and wife's combined years of education	0.0014	0.6259
	(0.106)	(0.2997)
R^2	0.0903	
Adjusted R^2	0.0857	
F(33, 6554)	25.45***	
Number of observations	6588	

Source: Urban Household Survey, 1995.

Notes: (1) Omitted dummy variables are: female household head, households without any Communist Party members, females aged 66 and over, Jiangsu province and other types of households.
(2) *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.
(3) Instruments are ownership of telephone and type of house; see Appendix for first stage regression results.

Table 5
Mean Household Expenditure on Children's Education for All and Single-Child Households
(in yuan with standard deviation and maximums, respectively, in parentheses)

Children's Educational Expenditure	All Households with Children	Single-Child Households	Single-Boy Households	Single-Girl Households
Number of Households	5802	4181	2158	2023
Total Educational Expenditure	602.11 (1278.74; 33,033)	617.85 (1177.98; 33,033)	610.46 (1244.29; 33,033)	625.75 (1103.12; 12,683)
Sub-category: Tuition and School Fees	411.28 (1063.94; 40,000)	409.61 (1092.57; 40,000)	404.25 (1168.71; 40,000)	415.32 (1005.28; 17,010)
Sub-category: Other Expenditures	161.77 (709.31; 25,000)	158.86 (636.62; 17,400)	151.03 (517.05; 6,500)	167.21 (743.32; 17,400)

Source: Urban Household Survey, 1995.

Table 6
Two Stage Least Squares Unitary Intrahousehold Resource Allocation Model
Regarding the Proportion of Expenditure on Children's Education in Single-Child Households

Dependent Variable: Proportion of Household Resources Spent on Children's Education	Coefficient (t-statistic)			Mean Value or Percentage (standard deviation)		
	Single-Child (1)	Single-Boy (2)	Single-Girl (3)	Single-Child	Single-Boy	Single-Girl
Intercept	-0.0865 (-0.148)	0.1830 (0.249)	-0.5014 (-0.467)	0.0551 (0.0889)	0.0550 (0.0909)	0.0551 (0.0868)
Household Characteristics:						
Log of household expenditure per capita (predicted)	-0.0162 (-1.603)	-0.0196 (-1.374)	-0.0106 (-0.699)	8.0814 (0.6959)	8.0730 (0.6742)	8.0902 (0.7182)
Log of number of household members (predicted)	0.1370 (0.543)	0.0200 (0.065)	0.3236 (0.671)	1.1637 (0.1759)	1.1669 (0.1759)	1.1602 (0.1758)
Communist Party membership of any member of the household	0.0059 (1.371)	0.0101 (1.654)*	0.0012 (0.180)	0.4138 (0.4926)	0.4194 (0.4936)	0.4078 (0.4915)
Two-generation household	0.0482 (1.242)	0.0267 (0.423)	0.0627 (1.393)	0.9132 (0.2816)	0.9133 (0.2814)	0.9130 (0.2819)
Three-generation household	0.0237 (1.011)	0.0118 (0.271)	0.0185 (0.599)	0.0813 (0.2734)	0.0816 (0.2738)	0.0811 (0.2730)
Characteristics of Household Head:						
Male	-0.0068 (-1.887)*	-0.0058 (-1.205)	-0.0087 (-1.370)	0.639 (0.4803)	0.6362 (0.4812)	0.6423 (0.4795)
Educational level	-0.0026 (-2.039)**	-0.0036 (-2.130)**	-0.0024 (-0.946)	3.7016 (1.4291)	3.6724 (1.4440)	3.7328 (1.4128)
Occupation	-0.0010 (-1.165)	-0.0003 (-0.247)	-0.0018 (-1.475)	5.6737 (1.9232)	5.6312 (1.9236)	5.7186 (1.9223)
Age-Gender Composition of Household:						
Male aged 0-6	0.2094 (0.335)	-0.0559 (-0.072)	---	0.0390 (0.1052)	0.0756 (0.1367)	0.00 (0.00)
Male aged 7-12	0.2721 (0.434)	0.0072 (0.009)	---	0.0566 (0.1253)	0.1097 (0.1568)	0.00 (0.00)
Male aged 13-15	0.3673 (0.586)	0.1077 (0.138)	---	0.0395 (0.1078)	0.0766 (0.1402)	0.00 (0.00)
Male aged 16-18	0.3639 (0.617)	0.1201 (0.163)	---	0.0301 (0.0944)	0.0582 (0.1250)	0.00 (0.00)
Male aged 19-55	0.0130 (0.218)	0.0079 (0.090)	0.0234 (0.245)	0.3026 (0.0983)	0.3021 (0.0986)	0.3032 (0.0981)
Male aged 56-65	-0.0484 (-0.917)	-0.0275 (-0.386)	-0.0563 (-0.603)	0.0158 (0.0634)	0.0163 (0.0642)	0.0152 (0.626)

Male aged 66 and over	-0.0724	-0.0676	-0.0647	0.0101	0.0099	0.0102
	(-1.095)	(-0.686)	(-0.608)	(0.0506)	(0.0496)	(0.0517)
Female aged 0-6	0.1971	---	0.6192	0.0346	0.00	0.0716
	(0.315)		(0.531)	(0.1006)	(0.00)	(0.1352)
Female aged 7-12	0.2771	---	0.7007	0.0598	0.00	0.1236
	(0.439)		(0.594)	(0.1284)	(0.00)	(0.1618)
Female aged 13-15	0.3512	---	0.7593	0.0332	0.00	0.0685
	(0.572)		(0.661)	(0.1008)	(0.00)	(0.1362)
Female aged 16-18	0.4056	---	0.8011	0.0284	0.00	0.0587
	(0.678)		(0.718)	(0.0873)	(0.00)	(0.1249)
Female aged 19-55	-0.0010	-0.0288	0.0394	0.3195	0.3216	0.3173
	(-0.016)	(-0.310)	(0.362)	(0.0653)	(0.0850)	(0.0897)
Female aged 56-65	-0.0085	-0.0241	0.0433	0.0164	0.0166	0.0162
	(-0.143)	(-0.361)	(0.316)	(0.0603)	(0.0648)	(0.0659)
Provinces:	*Yes*	*Yes*	*Yes*			
R^2	0.1003	0.1039	0.0429			
Adjusted R^2	0.0933	0.0919	0.0295			
F(31, 3976)	13.47***	---	---			
F(27, 2029)	---	7.07***	---			
F(27, 1923)	---	---	8.87***			
Number of observations	4008	2057	1951			

Source: Urban Household Survey, 1995.

Notes: (1) Omitted dummy variables are: female household head, households without any Communist Party members, females aged 66 and over, Jiangsu province and other types of households.

(2) *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.

(3) Instruments are ownership of telephone and type of house; see Appendix for first stage regression results.

Table 7
Enrolment of Children Aged 16-18 in Upper Secondary Schools
(number of observations)

	Male (499)	Female (512)
Upper Middle School	51.3% (256)	43.16% (221)
Middle Level Professional School	17.03% (85)	23.05% (118)
Not Enrolled in School	12.22% (61)	13.09% (67)
Total Enrolment	68.34% (341)	66.21% (339)

Source: Urban Household Survey, 1995.

Table 8
Two Stage Least Squares Unitary Intrahousehold Resource Allocation Model
Regarding the Proportion of Expenditure on Children's Education (by Type of School)

Dependent Variable: Proportion of Household Resources Expended on Education	Coefficient (t-statistic)	Mean Value or Percentage (standard deviation)
Intercept	-0.0367	0.0551
	(-0.176)	(0.0889)
Household Characteristics:		
Log of household expenditure per capita (predicted)	-0.0109	8.1370
	(-1.386)	(0.3157)
Log of number of household members (predicted)	0.1338	1.1062
	(1.086)	(0.2016)
Communist Party membership of any member of the household	0.0044	0.4564
	(0.969)	(0.4981)
One-generation household	0.1151	0.1552
	(1.246)	(0.0871)
Two-generation household	0.0487	0.7816
	(1.678)*	(0.3622)
Three-generation household	0.0033	0.0555
	(0.236)	(0.2291)
Characteristics of Household Head:		
Male	-0.0068	0.6593
	(-1.474)	(0.4740)
Educational level	-0.0031	3.8015
	(-3.237)***	(1.5173)
Occupation	-0.0011	5.5657
	(-1.482)	(1.9401)
Age-Gender Composition of Household:		
Male aged 0-6	-0.0349	0.0256
	(-0.839)	(0.0862)
Male aged 7-12	0.0342	0.0382
	(0.778)	(0.1046)
Male aged 13-15	0.1218	0.0270
	(3.048)***	(0.0894)
Male aged 16-18 enrolled in upper middle school	0.1510	0.0108
	(5.352)***	(0.0566)
Male aged 16-18 enrolled in middle level professional school	0.1584	0.0034
	(4.466)***	(0.0325)
Male aged 16-18 enrolled in college and above	0.2349	0.0004
	(2.402)**	(0.0114)
Male aged 16-18 enrolled in professional school	0.0193	0.0005
	(0.195)	(0.0140)
Male aged 16-18 not enrolled in school	-0.0051	0.0026
	(-0.117)	(0.0283)
Male aged 19-55	-0.0245	0.2893
	(-1.367)	(0.1711)
Male aged 56-65	-0.0674	0.0653
	(-3.243)***	(0.1503)
Male aged 66 and over	-0.0699	0.0299
	(-2.459)**	(0.1101)
Female aged 0-6	-0.0436	0.0235
	(-1.053)	(0.0831)
Female aged 7-12	0.0389	0.0402
	(0.851)	(0.1071)

Female aged 13-15	0.1080	0.0237
	(3.126)***	(0.0844)
Female aged 16-18 enrolled in upper middle school	0.1885	0.0093
	(6.954)***	(0.0530)
Female aged 16-18 enrolled in middle level professional school	0.2595	0.0049
	(7.598)***	(0.0385)
Female aged 16-18 enrolled in college and above	0.4370	0.0005
	(4.846)***	(0.0133)
Female aged 16-18 enrolled in professional school	0.2446	0.0009
	(3.121)***	(0.0164)
Female aged 16-18 not enrolled in school	-0.0243	0.0025
	(-0.529)	(0.0264)
Female aged 19-55	-0.0036	0.3094
	(-0.153)	(0.1634)
Female aged 56-65	-0.0107	0.0593
	(-0.340)	(0.1492)
Provinces:	*Yes*	*Yes*
R^2	0.1008	
Adjusted R^2	0.0953	
F(40, 6547)	22.29***	
Number of observations	6588	

Source: Urban Household Survey, 1995.

Notes: (1) Omitted dummy variables are: female household head, households without any Communist Party members, females aged 66 and over, Jiangsu province and other types of households.

(2) *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.

(3) Instruments are ownership of telephone and type of house; see Appendix for first stage regression results.

Table 9
Educational Attainment for Adult Men and Women
(number of observations)

	Men		Women	
	19-55 (6438)	56 and over (1774)	19-55 (6814)	56 and over (1635)
College and Above	9.68% (623)	13.7% (243)	5.00% (341)	3.55% (58)
Professional School	17.92% (1154)	9.13% (162)	11.48% (782)	2.63% (43)
Middle Level Professional School	15.77% (1015)	10.71% (190)	16.20% (1104)	8.44% (138)
Upper Middle School	23.72% (1527)	14.43% (256)	24.95% (1700)	7.03% (115)
Lower Middle School	28.56% (1839)	28.86% (512)	32.70% (2228)	20.85% (341)
Primary School	4.01% (258)	18.49% (328)	8.29% (565)	26.54% (434)
Less than Primary School	0.34% (22)	4.68% (83)	1.38% (94)	30.89% (505)

Source: Urban Household Survey, 1995.

Table 10
Predicted Mean Annual Income of Children in Yuan

Children's Educational Attainment	Sons	Daughters	Earnings Differential
College and Above	7,528.38	7,028.11	7.12%
Professional School	6,622.82	6,302.31	5.09%
Middle Level Professional School	5,994.66	5,812.54	3.13%
Upper Middle School	5,528.95	5,423.29	1.95%
Lower Middle School	5,575.43	5,359.46	4.03%
Primary School	5,487.37	5,091.43	7.78%

Source: Urban Household Survey, 1995.

Table 11
Educational Attainment of Spouses in Urban China, 1995
(number of observations of married couples)

Women \ Men	College and Above	Professional School	Middle Level Professional School	Upper Middle School	Lower Middle School	Primary School	Less than Primary School
College and Above	**60.47/24.76** (182)	15.28/4.22 (46)	7.31/2.30 (22)	7.64/1.79 (23)	3.65/0.55 (11)	0.66/0.39 (2)	0.00/0.00 (0)
Professional School	18.51/16.87 (124)	**41.04/25.25** (275)	15.07/10.55 (101)	12.23/6.37 (82)	8.51/2.83 (57)	1.19/1.54 (8)	0.30/3.33 (2)
Middle Level Professional School	18.51/16.87 (148)	23.69/21.21 (231)	**22.97**/23.41 (224)	15.08/11.41 (147)	16.92/8.18 (165)	1.74/3.28 (17)	0.21/3.33 (2)
Upper Middle School	8.04/15.51 (114)	16.57/21.58 (235)	13.61/20.17 (193)	**34.70/38.20** (492)	21.72/15.27 (308)	1.48/4.07 (21)	0.00/0.00 (0)
Lower Middle School	4.92/15.10 (111)	10.34/21.40 (233)	12.69/**29.89** (286)	16.90/29.58 (381)	**45.70/51.07** (1030)	5.90/25.63 (133)	0.49/18.33 (11)
Primary School	4.20/5.03 (37)	5.44/4.41 (48)	11.45/10.55 (101)	12.47/8.54 (110)	**35.60**/15.57 (314)	25.17/**42.77** (222)	1.13/16.67 (10)
Less than Primary School	2.67/1.09 (8)	3.67/1.01 (11)	6.00/1.88 (18)	9.67/2.25 (29)	27.33/4.07 (82)	**32.67**/18.88 (98)	10.00/**50.00** (30)

Source: Urban Household Survey, 1995.
Note: The largest percentage within each educational level is in bold type, where the percentage of women of each level of educational attainment in rows that marry men of the educational level corresponding to each column is denoted first. The percentage of men by educational attainment in columns that marry women of each educational level corresponding to each row is denoted second. The notation is the percentage of women of each educational level that marry men of each educational level/percentage of men of each educational level that marry women of each educational level.

Table 12
Predicted Mean Annual Income of Children and of their Likely Future Spouses in Yuan

Children's Level of Educational Attainment	Sons (1)	Daughters (2)	Male-Female Earnings Differential	Sons' Future Spouse (3)	Daughters' Future Spouse (4)
College and Above	7,528.38	7,028.11	7.12%	5,732.31	6,664.72
Professional School	6,622.82	6,302.31	5.09%	5,701.34	6,242.95
Middle Level Professional School	5,994.66	5,812.54	3.13%	5,492.40	6,220.49
Upper Middle School	5,528.95	5,423.29	1.95%	5,368.68	5,729.30
Lower Middle School	5,575.43	5,359.46	4.03%	5,206.68	5,641.78
Primary School	5,487.37	5,091.43	7.78%	4,811.91	5,463.87

Source: Urban Household Survey, 1995.
Note: Author's calculations based on Tables 10 and 11.

Table 13
Predicted Mean Annual Household Income of Children in Yuan

Children's Level of Educational Attainment	Sons' Future Household (1)	Daughters' Future Household (2)	Daughters'-Sons' Household Income Difference (2)-(1)
College and Above	13,260.69	13,692.83	432.14
Professional School	12,324.15	12,545.25	221.10
Middle Level Professional School	11,487.05	12,033.03	545.98
Upper Middle School	10,897.64	11,152.58	254.95
Lower Middle School	10,782.10	11,001.24	219.14
Primary School	10,299.27	10,555.30	256.03

Source: Urban Household Survey, 1995.
Note: Author's calculations based on Tables 10, 11 and 12.

Appendix: First-Stage Regression Results for the Two-Stage Least Squares Intrahousehold Resource Allocation Models (Tables A1-2) and Estimated Earnings Functions for the Urban Sample (Table A3)

Table A1
Instrumenting for Household Expenditure Per Capita

Dependent Variable: Log of Household Expenditure Per Capita	Coefficient (t-statistic)	Mean Value or Percentage (standard deviation)
Intercept	7.7613	8.1366
	(81.160)***	(0.7323)
Household Characteristics:		
Ownership of telephone[19]	0.1330	1.7277
	(14.762)***	(0.9265)
One-generation household	0.6610	0.1552
	(7.094)***	(0.3622)
Two-generation household	0.1917	0.7816
	(2.099)**	(0.4132)
Three-generation household	0.0262	0.0556
	(0.270)	(0.2291)
Provinces:		
Beijing	0.2075	0.0721
	(5.437)***	(0.2587)
Shanxi	-0.4150	0.0937
	(-11.743)***	(0.2915)
Liaoning	-0.1107	0.1010
	(-3.211)***	(0.3013)
Anhui	-0.2582	0.0721
	(-6.830)***	(0.2587)
Henan	-0.3637	0.0865
	(-10.081)***	(0.2812)
Hubei	-0.0910	0.1070
	(-2.671)***	(0.3091)
Guangdong	0.3609	0.0787
	(9.367)***	(0.2694)
Sichuan	-0.0865	0.1223
	(-2.616)***	(0.3277)
Yunnan	-0.1260	0.0935
	(-3.587)***	(0.2911)
Gansu	-0.3327	0.0577
	(-8.113)***	(0.2331)
R^2	0.1860	
Adjusted R^2	0.1843	
F(33, 6854)	112.15***	
Number of observations	6888	

Source: Urban Household Survey, 1995.
Notes: (1) Omitted dummy variables are: female household head, households without any Communist Party members, females aged 66 and over, Jiangsu province and other types of households. Not all variables are reported for brevity.
(2) *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.
(3) Heteroskedasticity-consistent robust standard errors are computed.

[19] There are four outcomes for ownership of telephone, ranked as follows: no telephone, telephone publicly paid for, private telephone and public telephone.

Table A2
Instrumenting for the Number of Household Members

Dependent Variable: Log of Number of Household Members	Coefficient (t-statistic)	Mean Value or Percentage (standard deviation)
Intercept	1.3758	1.1063
	(53.586)***	(0.2683)
Household Characteristics:		
Type of house[20]	0.0053	4.3238
	(4.228)***	(1.7279)
One-generation household	-0.7434	0.1552
	(-29.789)***	(0.3622)
Two-generation household	-0.2357	0.7816
	(-9.631)***	(0.4132)
Three-generation household	0.0071	0.0556
	(0.272)	(0.2291)
Provinces:		
Beijing	-0.0246	0.0721
	(-2.431)**	(0.2587)
Shanxi	0.0384	0.0937
	(4.093)***	(0.2915)
Liaoning	0.0072	0.1010
	(0.776)	(0.3013)
Anhui	-0.0113	0.0721
	(-1.122)	(0.2587)
Henan	0.399	0.0865
	(4.163)***	(0.2812)
Hubei	-0.0004	0.1070
	(-0.039)	(0.3091)
Guangdong	0.0414	0.0787
	(4.195)***	(0.2694)
Sichuan	-0.0186	0.1223
	(-2.119)**	(0.3277)
Yunnan	-0.0049	0.0935
	(-0.519)	(0.2911)
Gansu	0.0190	0.0577
	(-1.743)*	(0.2331)
R^2	0.1340	
Adjusted R^2	0.1297	
F(33, 6897)	30.74***	
Number of observations	6931	

Source: Urban Household Survey, 1995.

Notes: (1) Omitted dummy variables are: female household head, households without any Communist Party members, females aged 66 and over, Jiangsu province and other types of households. Not all variables are reported for brevity.

(2) *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.

(3) Heteroskedasticity-consistent robust standard errors are computed.

[20] There are seven outcomes for the type of house, ranked as follows: single family unit with auxiliary rooms, one bedroom apartment, two bedroom apartment, three bedroom apartment, four bedroom apartment, ordinary apartment unit without or with shared kitchen and toilet, and single storey house or rooms without auxiliary rooms.

Table A3
The Determinants of Income for All Working-Aged Men and Women (by Educational Levels)

Dependent Variable: Log of Annual Income	Coefficient (t-statistic)						Mean Value or Percentage (standard deviation)	
	Men			Women			Men	Women
	Probit	Corrected MLE	Uncorrected OLS	Probit	Corrected MLE	Uncorrected OLS		
Intercept	4.5525	6.3397	6.3827	1.0595	6.3395	6.2928	8.7290	8.5094
	(---)	(26.366)***	(26.574)***	(0.867)	(30.116)***	(29.818)***	(0.6015)	(0.6671)
Education Level Completed:								
College and above	-3.5194	0.6015	0.5968	0.4258	0.5803	0.5901	0.0968	0.0500
	(-2.799)***	(3.910)***	(3.873)***	(0.806)	(5.734)***	(5.829)***	(0.2957)	(0.2181)
Professional school	-3.4707	0.5079	0.5042	0.8892	0.5287	0.5384	0.1792	0.1148
	(-2.736)***	(3.324)***	(3.294)***	(1.638)	(5.440)***	(5.537)***	(0.3836)	(0.3188)
Middle level professional school	-3.6339	0.4400	0.4352	0.5049	0.4587	0.4681	0.1577	0.1620
	(-2.978)***	(2.883)***	(2.847)***	(1.059)	(4.761)***	(4.857)***	(0.3644)	(0.3685)
Upper middle school	-3.6631	0.4199	0.4161	0.3382	0.3147	0.3226	0.2372	0.2495
	(-2.928)***	(2.766)***	(2.736)***	(0.737)	(3.306)***	(3.387)***	(0.4254)	(0.4327)
Lower middle school	-3.9632	0.3309	0.3272	0.3480	0.1987	0.2062	0.2856	0.3270
	(-3.139)***	(2.197)**	(2.169)**	(0.772)	(2.100)**	(2.179)**	(0.4518)	(0.4691)
Primary school	-4.0891	0.2403	0.2359	5.3015	0.1050	0.1135	0.0401	0.0829
	(-3.159)***	(1.559)	(1.528)	(---)	(1.080)	(1.168)	(0.1961)	(0.2758)
Personal Characteristics:								
Age	0.0892	0.0865	0.0844	0.0397	0.0912	0.0930	37.8879	37.6909
	(1.331)	(9.817)***	(9.602)***	(0.681)	(10.477)***	(10.659)***	(9.7425)	(9.5860)
Age squared	-0.0015	-0.0010	-0.0010	-0.0008	-0.0013	-0.0013	1530.3910	1512.4850
	(-1.635)	(-9.730)***	(-9.502)***	(-1.092)	(-12.134)***	(-12.317)***	(726.3334)	(715.1966)
Experience	0.0370	0.0118	0.0120	0.0343	0.0248	0.0249	19.6987	18.4391
	(1.833)*	(4.424)***	(4.457)***	(2.562)***	(10.333)***	(10.349)***	(9.5261)	(9.04993)
Occupation	0.0502	-0.0171	-0.0174	0.0559	-0.0265	-0.0260	5.7091	6.0445
	(1.355)	(-2.795)***	(-2.841)***	(1.827)*	(-3.911)***	(-3.827)***	(1.9060)	(2.0866)
Communist Party member	4.8251	0.0941	0.0948	4.8998	0.1135	0.1136	0.2967	0.1327
	(---)	(6.254)***	(6.288)***	(---)	(5.852)***	(5.848)***	(0.4568)	(0.3392)
Have children	-0.7163	---	---	-0.6401	---	---	0.2165	0.1752
	(-2.675)***			(-3.120)***			(0.4119)	(0.3802)
Provinces:								
Beijing	4.5410	0.2956	0.2954	-0.1185	0.2035	0.2032	0.0249	0. 0219
	(---)	(7.277)***	(7.264)***	(-0.284)	(4.376)***	(4.367)***	(0. 1556)	(0. 1463)
Shanxi	4.4274	0.2506	0.2515	4.4978	0.2505	0.2511	0. 0281	0. 0277
	(---)	(6.412)***	(6.423)***	(---)	(8.092)***	(8.103)***	(0. 1653)	(0. 1642)
Liaoning	0.0019	0.1953	0.1951	0.0932	0.1877	0.1877	0. 0317	0. 0305
	(0.004)	(3.721)***	(3.712)***	(0.231)	(5.144)***	(5.138)***	(0. 1752)	(0. 1720)
Anhui	0.0150	-0.0942	-0.0943	-0.3659	-0.2046	-0.2053	0. 0248	0. 0241
	(0.034)	(-2.250)**	(-2.249)**	(-1.246)	(-3.532)***	(-3.538)***	(0. 1557)	(0. 1533)
Henan	-0.3038	-0.3192	-0.3197	-0.0483	-0.4266	-0.4261	0. 0278	0. 0264
	(-0.764)	(-7.748)***	(-7.741)***	(-0.114)	(-8.471)***	(-8.449)***	(0. 1644)	(0. 1604)
Hubei	-0.5016	-0.0921	-0.0929	-0.0416	-0.0358	-0.0363	0. 0407	0. 0379
	(-1.855)*	(-3.033)***	(-3.054)***	(-0.118)	(-1.225)	(-1.239)	(0. 1976)	(0. 1909)
Guangdong	4.7400	0.1027	0.1040	4.5054	0.0009	0.0009	0. 0235	0. 0217
	(---)	(2.959)***	(2.992)***	(---)	(0.018)	(0.019)	(0. 1514)	(0. 1458)
Sichuan	0.1293	-0.0946	-0.0946	-0.3896	-0.3216	-0.3226	0. 0395	0. 0374
	(0.317)	(-2.074)**	(-2.071)**	(-1.659)*	(-6.914)***	(-6.928)***	(0. 1947)	(0. 1898)
Yunnan	4.3650	0.1445	0.1451	4.5103	0.1288	0.1290	0. 0287	0. 0283
	(---)	(4.142)***	(4.150)***	(---)	(3.580)***	(3.578)***	(0. 1671)	(0. 1659)
Gansu	4.5275	0.1716	0.1725	4.4911	0.2262	0.2265	0. 0163	0. 0160
	(---)	(4.386)***	(4.398)***	(---)	(5.986)***	(5.978)***	(0. 1267)	(0. 1254)

Inverse Mills Ratio	---	-0.0566 (-2.822)***	---	---	-0.0448 (-2.552)**	---	0.0128 (0.0274)	0.0171 (0.0286)
R^2	---	---	0.2127	---	---	0.2382		
Pseudo R^2	0.2375	---	---	0.1814	---	---		
X^2 (22)	92.07***	---	---	90.98***	---	---		
Wald X^2 (21)	---	1410.91***	---	---	1728.86***	---		
F(21, 5389)	---	---	67.11***	---	---			
F(21, 6014)	---	---	---	---	---	82.28***		
Number of observations	5938	5907	5907	6078	6036	6036		

Source: Urban Household Survey, 1995.

Notes: (1) Omitted dummy variables are: less than primary school education, non-Communist Party members, and Jiangsu province.

(2) *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.

(3) Heteroskedasticity-consistent robust standard errors adjusted for clustering at the household level are computed.

(4) Joint F-tests on the coefficients for returns to schooling reject the null hypothesis that the difference between men and women are equal for each level of education attained.