



HAL
open science

Parental Investment in Children's Human Capital in Urban China

Linda Yueh

► **To cite this version:**

Linda Yueh. Parental Investment in Children's Human Capital in Urban China. *Applied Economics*, 2006, 38 (18), pp.2089-2111. 10.1080/00036840500427353 . hal-00581895

HAL Id: hal-00581895

<https://hal.science/hal-00581895>

Submitted on 1 Apr 2011

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Parental Investment in Children's Human Capital in Urban China

Journal:	<i>Applied Economics</i>
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

powered by ScholarOne
Manuscript Central™

Parental Investment in Children's Human Capital in Urban China

Linda Yueh
Pembroke College
Oxford OX1 1DW

Linda.Yueh@economics.ox.ac.uk

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.

1
2
3 The possibility of bias for sons is an often-asked question in China.* The
4
5 one-child policy may have popularised the traditional view of a preference for boys. This
6
7 paper investigates patterns in household expenditure on the education of sons and
8
9 daughters to analyse whether there are such gender biases in contemporary urban China.
10
11 We aim to measure the extent of forgone consumption of parents that is spent instead on
12
13 the education of their children as a test of the models of parental investment in children's
14
15 human capital by using a strand of empirical models known as the intrahousehold
16
17 resource allocation approach. Finally, we will discern whether any such gender
18
19 differences generate effects such as differential school enrolment rates of boys and girls
20
21 with policy implications for gender inequality in China.
22
23
24
25
26

27
28 This paper will first review the educational system of China, focusing on
29
30 gender differences in school enrolment as an indicator of human capital. This is followed
31
32 by a model of parental investment in children's human capital that may result in
33
34 differential spending on the education of sons and daughters if intertemporal
35
36 considerations are taken into account. Section 3 introduces the intrahousehold resource
37
38 allocation model to provide a measure of parental forgone consumption used instead on
39
40 children's education, providing an empirical test of parental investment models. Section
41
42 4 describes the data and Section 5 presents the empirical findings as to whether gender is
43
44 a significant factor in the allocation of household resources toward the education of
45
46 children in urban China. In Section 6, we investigate whether any differential spending is
47
48
49
50
51

52
53
54 * The model of parental investment in children's human capital is Discussion Paper No. 15 in the Centre on
55 Skills, Knowledge and Organisational Performance (SKOPE) series at the Universities of Oxford and
56 Warwick. Kind appreciation is also given to the U.K. Department for International Development for
57 support. Any errors are mine.
58
59
60

1
2
3 due to better returns to education for men. If that is not the entire picture, then we turn to
4
5 examine the potential role of intertemporal considerations such as future transfers or
6
7 financial support for parents in urban China. Finally, we conclude in Section 7 with a
8
9 summary of our findings of gender differences in educational expenditure indicating
10
11 differential investment of parents in their children's human capital. We aim to uncover
12
13 whether the oft-perceived tradition of a preference for boys exists in contemporary urban
14
15 China or whether traditions are changing.
16
17
18
19

20
21 Evidence of pre-labour market gender inequality implies policy
22
23 conclusions that are different from those based on post-entry inequalities in the labour
24
25 market. This provides a useful analytical separation in examining the factors concerning
26
27 gender discrimination, *i.e.*, differentiating between productivity-related differences
28
29 generated by pre-labour market inequality, such as education obtained as a child, and
30
31 those that pertain once men and women enter the labour market. Any evidence would
32
33 also point to the circular nature of gender inequality. In other words, what happens in the
34
35 labour market can affect decisions made prior to entry to the labour market (Rosenzweig
36
37 and Schultz 1982).
38
39
40
41

42 **1 Education in Modern China**

43
44 The modern Chinese educational system is generally comprised of primary
45
46 (six years), secondary (six years, three years of lower and three years of upper middle
47
48 school), and tertiary or higher education (varying between two and five years) (Knight
49
50 and Li 1993). Education is officially compulsory for nine years to the completion of
51
52 lower middle school, though not always in practice (NBS 1997a). However, overall
53
54 school enrolment in China is high in 1995, the year corresponding to the data set used in
55
56
57
58
59
60

1
2
3 this paper. There are costs involved in schooling that fall into two main categories,
4
5 tuition and fees, and other expenditures, which may include school uniforms,
6
7 transportation expenses, and out-of-school or private tuition fees. The mean value of
8
9 tuition and fees is 398 RMB in our representative survey, while it is much less (153
10
11 RMB) for other educational expenditures. In total, these costs are estimated to be less
12
13 than 5% of average household income, so children's primary and secondary education
14
15 will entail some but not great costs. There are some differences in school quality as well
16
17 with the better schools expected to be more expensive.
18
19
20
21

22
23 There are not large gender differences in educational enrolment in urban
24
25 China in the current period (see Knight and Li 1993 for similar findings in 1988). Figure
26
27 1 presents the possible paths in the Chinese school system and partitions enrolment by
28
29 academic and professional schools into gender proportions, as computed from our data
30
31 set discussed in Section 3.
32
33

34
35 [FIGURE 1 HERE]
36

37
38 In the Chinese school system, students attend lower middle school after
39
40 completing primary school. They then test into upper middle school or middle level
41
42 professional school. Middle level professional school generally takes one more year to
43
44 complete than upper middle school and is typically the last level attained. Those who
45
46 complete upper middle school are likely to apply and test into college. Professional
47
48 school is an alternative to college. Those who select into professional schools will likely
49
50 take on administrative or clerical work, and those who do not continue will likely enter
51
52 the labour force as factory or manufacturing workers. Those who opt out of school early
53
54
55
56
57
58
59
60

1
2
3 on are still candidates for factory work in particular, given China's growth in
4
5 manufacturing capacity.
6
7

8 Table 1 gives school enrolment rates for children aged 7-18 in our sample.
9
10 The mean years of education for all full-time students is 8.77 with a standard deviation of
11
12 3.83. For boys, it is 8.86 years of education (with a standard deviation of 3.82), while it
13
14 is 8.66 years of education for girls (with a standard deviation of 3.84).
15
16

17
18 [TABLE 1 HERE]
19

20 The gross enrolment ratio of all school-aged children was 94 percent,
21
22 while it was 91 percent for girls and 96 percent for boys (UNESCO 1999).¹
23
24

25 [TABLE 2]
26

27 Table 2 shows that the ratio of enrolled girls to boys has stayed the same
28
29 or improved from 1980 to 1995 for every level of education, although girls still lag
30
31 behind at the secondary level and substantially behind at the tertiary level.² Using a 1995
32
33 rural household survey, Knight and Song (2000) find that boys are significantly more
34
35 likely to be enrolled in school than girls, with the greater difference for upper middle
36
37 school-aged children. One explanation posited by Broaded and Liu (1996) is that
38
39 educational aspirations are different for boys and girls. In their study of Wuhan, boys are
40
41 more likely to enter into advanced schooling while girls are more likely to enter into
42
43 professional courses. They posit that this is primarily the result of two factors – tradition
44
45 and parents' perception of future discrimination against women. They also find that
46
47
48
49
50
51
52
53

54
55 ¹ UNESCO (1999) uses the definition of school-aged children as given by the country (see NBS 1997*b*).
56

57 ² Figures for rural and urban China separately are not available.
58
59
60

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

1
2
3 in detail later in the paper. Finally, in examining educational enrolment patterns in 1988,
4
5 Knight and Li (1993) find that traditional values favouring the education of boys rather
6
7 than girls appear to have been eroded in urban areas though not in rural areas.
8
9

10
11 We will explore whether a preference for boys exists in urban China, or if
12
13 there are other factors motivating the parental decision to educate their children. To a
14
15 large extent, due to the rural roots and migration patterns of the current cohort of adults in
16
17 urban areas, we expect that rural customs will have an impact on parental attitudes in
18
19 urban China. This is likely to be compounded by the additional linkages of urban with
20
21 rural China through grandparents and the extended family. However, we hypothesise that
22
23 parents are rational investors in their children in both rural and urban China, but face
24
25 different constraints. In other words, there are differences in the economic needs of urban
26
27 and rural households that affect their decisions regarding investment in children. A
28
29 number of institutional factors in rural China may have caused parents to value sons more
30
31 than daughters, giving rise to a tradition of bias toward boys. As the view of China is
32
33 often driven by the view of rural areas where the bulk of the population live, there is a
34
35 perception of pro-boy bias. We posit that tradition is often the historical product of
36
37 practical necessity, and that rational acts under one set of circumstances, such as in rural
38
39 China, will change when the context is altered, as in urban China with a different set of
40
41 household needs and constraints. Our findings may run counter to the perceived
42
43 traditions within China, but might better reflect the practices of an urban population with
44
45 different concerns. In other words, traditions could be changing.
46
47
48
49
50
51
52
53
54
55

56 and board when attending in towns. Thus, she finds that parents educate their sons more than their
57 daughters with the result that more boys are enrolled in school in some rural areas.
58
59
60

1
2
3 Further, in urban China, there is not evidence of two forms of explicit
4 gender bias. Widespread female infanticide has not been documented, perhaps on
5 account on the closer monitoring of neighbourhood committees and the work place
6 related housing arrangements. Housing in 1995 was arranged by the work unit, so
7 members of a work unit tend also to be neighbours. Second, unlike in rural China, there
8 is no observed popular pattern of arranged marriages, perhaps there is less need to secure
9 networks of mutual assistance typically wrought through marriage in agricultural
10 societies. These differences reinforce the notion that gender bias is of a different nature
11 in urban China and our investigation of gender bias is consistently conditional on girls
12 living in their parents' households. Therefore, our study is to discern evidence of gender
13 bias as it manifests in educational expenditure and school enrolment of girls in urban
14 households.
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31

32 Becker (1993) in his book, *A Treatise on the Family*, identified the
33 parental role in developing the human capital of children. The investment in children's
34 human capital, under credit constraints, necessarily entails forgone current consumption
35 for the household. There is a strand of literature – intrahousehold resource allocation
36 models – that could provide an empirical test of the extent to which parents will forgo
37 consumption to spend on children's education through discerning patterns of
38 consumption within households (see Deaton 1989; Behrman 1997; Haddad, Hoddinott
39 and Alderman 1997 for excellent overviews of this approach). The degree of
40 expectations of returns from children will vary among societies; however, we posit that
41 parents invest in their children with an eye toward their own future utility as well as that
42 of their offspring. These intertemporal considerations can generate differential
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

$$U_t = u_t + \delta(W_{t+1}^m + W_{t+1}^f + U_{t+1}), \quad (1)$$

where u_t is their utility this period from consumption, W_{t+1}^m is the future income of their son, W_{t+1}^f 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_{t+1}^m , and from their daughter's future household, B_{t+1}^f .

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_h^m, R_h^f) and the portion of that which will generate transfers to parents in the next period (R_b^m, R_b^f) are given by

$$R_h^m = \partial W_{t+1}^m / \partial \gamma_t^m, R_h^f = \partial W_{t+1}^f / \partial \gamma_t^f, R_b^m = \partial B_{t+1}^m / \partial \gamma_t^m, R_b^f = \partial B_{t+1}^f / \partial \gamma_t^f, \quad (2)$$

where γ_t^m and γ_t^f denote the proportion of household income, Q_t , expended on the human capital of their son and daughter, respectively.

The intertemporal budget constraint is

$$Z_t + \gamma_t^m + \gamma_t^f + A_{t+1}/R_a + B_{t+1}^m/R_b^m + B_{t+1}^f/R_b^f = PV(Q_t), \quad (3)$$

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 (γ_t^m and γ_t^f). Household resources next period (Q_{t+1}) is equal to the discounted value of all expected sources of consumption ($A_{t+1}/R_a + B_{t+1}^m/R_b^m + B_{t+1}^f/R_b^f$), *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:

$$R_h^m = R(\gamma_t^m, H_t^m) \text{ and } R_h^f = R(\gamma_t^f, H_t^f), \quad (4)$$

where a son's income, R_h^m , will be determined by expenditure on education by his parents (γ_t^m) and his ability (H_t^m), 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:

$$\delta A'_{t+1} + \delta B^{m'}_{t+1} + \delta B^f_{t+1} = \lambda_u/R_k = \delta U'_{t+1}, \quad (5a)$$

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:

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

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:

$$\delta R^m_h W^{m'}_{t+1} = \lambda_u, \quad \delta R^f_h W^{f'}_{t+1} = \lambda_u. \quad (5c)$$

Combining the first order conditions gives

$$\lambda_u/R_a = \lambda_u/R^m_b = \lambda_u/R^f_b = \lambda_u/R^m_h = \lambda_u/R^f_h, \quad (6)$$

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.

1
2
3 education of children. There is a strand of empirical literature termed models of
4
5 intrahousehold resource allocation which we propose would provide a direct test of such
6
7 forgone consumption. These models reveal the decision of parents in a household to
8
9 spend on children's education versus own consumption, consistent with the parental
10
11 investment model as outlined above. In so doing, any evidence of differential
12
13 expenditure on the education of sons and daughters can also be discerned. These models
14
15 can be extended to investigate wealth or endowment effects as in Behrman *et al.* (1995)
16
17 and for credit constraints, although we do not currently have data to so. Credit constraints
18
19 certainly exist in China in 1995, a period prior to commercial credit liberalisation
20
21 (Naughton 1996), and is so inferred in interpreting our results. Given these limitations,
22
23 we posit that the intrahousehold resource allocation models provide one type of empirical
24
25 evidence that can provide one measure the extent of forgone consumption by parents,
26
27 albeit imperfectly. At a minimum, they allow for inferences of patterns of gender bias
28
29 among children for a given household's resource allocation decisions, for which these
30
31 models have been widely used in investigating patterns of consumption in developing
32
33 countries (see Doss 1996 for an overview).
34
35
36
37
38
39
40
41

42 The next section outlines the empirical testing we will undertake and how
43
44 the intrahousehold resource allocation models can be utilised to test parents' forgone
45
46 consumption used instead on children's education, consistent with the theoretical models
47
48 which posit that such decisions are taken when parents who decide to invest in children's
49
50 education.
51
52
53
54

55 **3 Differences in Household Expenditure Patterns on Children's Education**

56
57
58
59
60

1
2
3 Intrahousehold resource allocation models seek to disaggregate household
4 expenditure and can determine whether composition of a household affect spending
5 decisions (see Deaton 1997). Studies of developing countries suggest the importance of
6 the age-gender composition of the household in resource allocation decisions. They tend
7 to find that expenditure patterns favour males (see Deaton 1997). Medical care for girls
8 is a luxury good in that it is more income and price elastic than for boys in Pakistan
9 (Alderman and Gertler 1997). Regarding children's education, DeTray (1988) finds in
10 Malaysia that the demand for girls' schooling is more income elastic than for boys.
11 Similarly, the education of girls is a luxury good in Vietnam (Behrman and Knowles
12 1999).

13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28 Household expenditures are also thought to differ with the degree of
29 influence of women, suggesting a joint decision-making model (see Haddad, Hoddinott
30 and Alderman 1997). For instance, Hoddinott and Haddad (1994) find in the Côte
31 d'Ivoire in the 1980s that doubling the cash income of women increases the household
32 budget share of food and reduces the shares of alcohol and cigarettes. Haddad and
33 Hoddinott (1994) also find in the Côte d'Ivoire that increasing women's share of cash
34 income betters the health status of boys relative to girls. For Brazil, Thomas and Strauss
35 (1997) find that increased female earnings are associated with a larger share of the
36 household budget being devoted in human capital – such as health and education – as
37 well as leisure goods, including recreation. Song (2001), in a study of rural China in
38 1995, finds that greater female bargaining power changes expenditure patterns in favour
39 of health care and education, but does not reduce the pro-boy discrimination in these
40 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

$$\gamma_t^e = \beta_0 + \beta_1 \ln[(Z_t + \gamma_t^e)/n] + \beta_2 \ln(n) + \sum_{g=1}^{G-1} \beta_3 (n_g/n) + \beta_4 \mathbf{X}_t + \varepsilon_t, \quad (7)$$

where γ_t^e denotes the share of household expenditures spent on the education of children, $Z_t + \gamma_t^e$ 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, \mathbf{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

$$\gamma_t^e = \beta_0 + \beta_1 \ln[(Z_t + \gamma_t^e)/n] + \beta_2 \ln(n) + \sum_{g=1}^{G-1} \beta_3(n_g/n) + \beta_4 X_t + \beta_5 E_t^m + \varepsilon_t, \quad (8)$$

where E_t^m 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-

1
2
3 generations (78.16 percent), while one-generation households comprise 15.52 percent,
4
5 three-generation households are 5.55 percent, and the remaining 7.65 percent are other
6
7 types of household, defined as those with relatives other than the nuclear family or
8
9 includes non-relatives. The head of household is male in a majority of the sample (65.93
10
11 percent), and just under half of all households (45.64 percent) include a Communist Party
12
13 member.
14
15
16

17 **5 Empirical Findings**

18
19 We first examine whether there are gender differences in parents'
20
21 expenditures on children's education. The results of the two-stage least squares
22
23 estimation of a unitary household decision-making model of resource allocation toward
24
25 children's education are presented in Table 3. The independent variables include
26
27 household level variables as well as the characteristics of the household head in addition
28
29 to city dummy variables. The education variable is a rank variable indicating the level of
30
31 education completed, while the occupation variable is also a rank variable indicating
32
33 professional to unskilled workers. We tested the robustness of the specification by using
34
35 one-generation households as the omitted variable, for instance. Different characteristics
36
37 of the household head were also tried. Our results concerning the significance of the age-
38
39 gender household composition variables do not change.
40
41
42
43
44
45
46

47
48 Given the nature of household consumption studies, there are variables
49
50 which could be endogenous to the system. Accordingly, potentially endogenous variables
51
52 were tested according to the Durbin-Wu-Hausman test (Greene, 1997). Instruments were
53
54 selected according to the criteria specified in Bound *et al.* (1995). Ownership of
55
56 telephone proxied the standard of living of the household and household type ranging
57
58
59
60

1
2
3 from flats to houses validly instrumented household expenditure per capita and the
4
5 number of people in the household, respectively. A detailed discussion of the instruments
6
7 and endogenous variables can be found in the Appendix. The 2SLS estimation is
8
9 properly identified according to the Sargan test, the instruments were jointly significant at
10
11 the 1 percent level and the partial R-squared of the first stage regression is of reasonable
12
13 magnitude. On account of the rich detail in this data set, we were thus able to instrument
14
15 for the endogenous variables to a good level. Further details of the first stage regressions
16
17 are provided in the Appendix.
18
19
20
21

22 [TABLE 3 HERE]
23

24
25 Not surprising, there is a 4.98 percentage point increase in the proportion
26
27 of household resources allocated to children's education associated with two-generation
28
29 households. Turning to the age-gender household composition variables,⁶ we find that
30
31 the proportions of boys and girls aged 13-15 and 16-18 affect the proportion of household
32
33 resources expended on children's education, but not children aged 7-12. As education is
34
35
36
37

38
39 ⁶ Other significant variables include the education of the household head and the proportion of men aged
40 56-65 in the household, along with a number of province dummy variables. The education of the household
41 head and the proportion of men aged 56-65 both have negative effects on children's educational
42 expenditures. There are numerous possible explanations. Regarding the education of the household head,
43 as expenditure is a proportion of household income if better educated household heads earn more income
44 then education fees form a smaller part of total household income. It is also possible that we have only
45 captured direct expenditure on children's education and not indirect spending. In other words, parents will
46 invest a set amount of time and resources in their children. More educated household heads may spend
47 more time investing in their children by helping them with homework or perhaps spend time and resources
48 on cultivating social networks to further the children's future opportunities. Less educated household heads
49 may not be able to invest in these other respects and thus their spending is direct, while indirect
50 expenditures and time spent are not captured in this estimation. Other factors could also include providing
51 health and support for their children, which could be reflected in parental time and their own forgone
52 consumption. The proportion of men aged 56-65 in the household probably include retirees who are not
53 now earning income but may require additional expenditure on their consumption that will take away from
54 spending on children's education. This corresponds to other studies in which adult men in the household
55 are associated with an increase in spending on alcohol and cigarettes and a decrease in spending on
56 education and health (for example, see Hoddinott and Haddad 1995). Finally, as compared with the omitted
57 province of Jiangsu, poorer provinces such as Liaoning, Anhui, Henan and Yunnan have significantly
58 negative coefficients.
59
60

1
2
3 heavily subsidised, this is not surprising for the younger age groups (see Knight and Li
4
5
6 1996). The proportion of boys aged 13-15 increases household expenditure on children's
7
8 education by 14.65 percentage points, while girls aged 13-15 increase expenditure by a
9
10 smaller amount (13.17 percentage points).⁷ The situation is reversed for boys and girls
11
12 aged 16-18, in which the effects on household educational expenditure are respectively
13
14 14.34 percentage points and 19.98 percentage points. The results of this model suggest
15
16 that there are differential patterns of household expenditure on the education of boys and
17
18 girls that are significant for middle school children (ages 13-15 best correspond to lower
19
20 secondary school while ages 16-18 best correspond to upper secondary school).
21
22 Household expenditure patterns appear to favour boys aged 13-15, but girls aged 16-18.
23
24
25
26

27
28 We next include proxies for bargaining power as between spouses to
29
30 determine whether the unitary household decision-making model is the proper
31
32 specification. None of the proxies for spousal bargaining power is found to be significant
33
34 (see also IPS 1994⁸). One set of estimations is reported in Table 4.
35
36

37 [TABLE 4]
38

39
40 The results in Table 4 correspond to the unitary household decision-
41
42 making model (Table 3) in that girls aged 13-15 are associated with a smaller proportion
43
44 of household educational expenditure than boys of the same age cohort, while girls aged
45
46 16-18 receive more expenditure on their education than boys of the same ages.
47
48 Specifically, the proportion of girls aged 13-15 in the household increases expenditure by
49
50
51

52
53
54 ⁷ Joint F-tests on all of these sets of coefficients reject the null hypothesis that they are equal for boys and
55
56 girls of the same age groups.
57
58
59
60

1
2
3 13.14 percentage points, while boys of the same ages increase expenditure by 14.65
4
5 percentage points. The proportion of boys aged 16-18 increases household expenditure
6
7 on education by 14.33 percentage points, while girls aged 16-18 increases household
8
9 expenditure by 19.98 percentage points. Joint F-tests on these sets of coefficients reject
10
11 the null hypothesis that they are equal for boys and girls of the same age groups. These
12
13 findings provide further support that the household spends more on daughters in upper
14
15 secondary school and sons in lower middle school.
16
17
18
19

20 21 *5.1 Accounting for school quality*

22
23 We attempted to isolate the effects of school quality by disaggregating
24
25 educational expenditures to the extent permitted by our data. Expenditures on children's
26
27 education comprise two items – expenditures on tuition and fees, and other expenditures.
28
29 Tuition and fees serve as our best proxy for school quality, as we do not have data on
30
31 actual schools in the survey. By separating the two categories, we may find that the
32
33 differences are a function of school quality insofar as better schools are more costly. The
34
35 mean value of tuition and fees is 398.80 RMB (with a standard deviation of 1027.85)
36
37 while it is 153.87 RMB (with a standard deviation of 683.89) for other educational
38
39 expenditures. We cannot identify these other expenditures, but posit that they include
40
41 school uniforms, transportation expenses and out-of-school tuition fees. None of the
42
43 coefficients on the age-gender household composition terms were significant and the link
44
45 with school quality is not clear cut.
46
47
48
49
50

51 52 *5.2 Implications of the one-child policy*

53
54
55
56 ⁸ The survey conducted by IPS (1994) finds little difference in responses regarding household expenditure
57 when spousal bargaining power is taken into account. The several measures of bargaining power include
58 spouses' age difference, educational levels and proportion of earned income.
59
60

1
2
3 We also explore the implications of the one-child policy implemented in
4 the late 1970s and early 1980s on household expenditure on children's education, *i.e.*,
5 families with one child will spend on their child regardless of his or her gender. The
6 cohort of school-aged children in 1995 is affected by this policy. Table 5 gives the mean
7 values for household expenditure on children's education for single-child, single-boy and
8 single-girl households, as compared with all households with children that include single-
9 child households.
10
11
12
13
14
15
16
17
18
19

20 [TABLE 5 HERE]
21

22 Single-child households represent 60.3 percent of all households with
23 children in the sample. Of these households, 51.6 percent are single-boy households and
24 the remainder are single-girl households. Single-child households spend 2.55 percent
25 more on children's education than all households with children. Single-girl households
26 spend more, on average, on children's education in both sub-categories than single-boy
27 households. These figures suggest that parents are willing to spend more on education
28 where there is one child, and also that there may be more associated expenses for girls
29 than boys in single-child households, such as clothing, that are captured in the other
30 expenditure category. One possible explanation as to why tuition and school fees are also
31 higher for single-girl households may have to do with girls testing into better schools with
32 higher fees. However, our discussion above indicates that our data set does not permit us
33 to explore school quality. Given these patterns, nevertheless, we may find that the larger
34 educational expenditure associated with the proportion of girls aged 16-18 is explained by
35 single-girl households. Table 6 gives the results of the intrahousehold resource allocation
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 model of expenditure on children's education estimated for the sub-sample of single-child
4
5 households, and further disaggregated by single-boy and single-girl households.
6
7

8 [TABLE 6 HERE]
9

10 The results of Table 6 do not shed further light on the degree to which the
11 age-gender composition of the household affects expenditure on children's education.
12

13 Although single-child households are a majority of the sample of households with
14 children, the age-gender composition variables are not significant in these estimations.
15

16 Therefore, the patterns of household expenditure on children's education are not well
17 explained by single-child households. In sum, we find that the proportion of household
18 expenditure on the education of children significantly differs for children aged 13-15 and
19 16-18, corresponding to the two levels of secondary school.
20

21 5.3 *Academic versus professional schools*

22 Table 7 shows there are more girls enrolled in middle level professional
23 school than boys, both in absolute numbers and as a percentage of the total aged 16-18.⁹
24 The reverse is true for upper middle school in which there are fewer girls than boys –
25 again both absolutely and as a percentage of total enrolment. It is possible that girls self-
26 select into professional rather than academic upper secondary school. The testing process
27 into upper middle school is another possibility. However, it is difficult to distinguish
28 ability from the influence of examination preparation at lower middle school that may
29 result from more household expenditure on the education of boys aged 13-15.
30

31 [TABLE 7 HERE]
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50

51
52
53
54
55
56
57 ⁹ There are 499 boys aged 16-18, making the gender ratio 1.03 for this cohort.
58
59
60

1
2
3
4 Our original estimation of the intrahousehold resource allocation model
5
6 did not separate children according to whether they attended academic or professional
7
8 schools. To test for possible differences stemming from the type of school, we re-
9
10 estimate the household expenditure model.¹⁰ The results are given in Table 8.

11
12 [TABLE 8 HERE]

13
14
15 As expected, children who are not enrolled in school do not affect the
16
17 pattern of household expenditure on education (Table 8). A larger proportion of
18
19 household resources is spent on girls aged 16-18 regardless of the type of school (middle
20
21 level professional school or upper middle school) than on boys of the same age-group and
22
23 enrolled in the same schools (all coefficients are significant at the 1 percent level).¹¹ Joint
24
25 F-tests on these sets of coefficients reject the null hypothesis that they are equal for boys
26
27 and girls of the same age groups. We find that the coefficients for each set of boys and
28
29 girls of the same age groups are statistically different. These results confirm the results of
30
31 our original estimation in which academic and professional schools are considered
32
33 together.
34
35
36
37
38
39

40 Therefore, our findings reveal that there is more spending on boys aged
41
42 13-15 but more on girls aged 16-18, suggesting that standard human capital theories and
43
44

45
46 ¹⁰ The estimated model is of the unitary household decision-making form since we did not find evidence to
47 support a bargaining model.

48
49 ¹¹ In order not to omit observations, we include those children aged 16-18 enrolled in college and in
50 professional school. There are 11 men enrolled in college and above and another 11 in professional school.
51 There are 12 women enrolled in college and above and 19 in professional school. Despite their small
52 numbers, the coefficients on educational expenditure on sons and daughters who are enrolled in college are
53 positive and significant (at the 5 percent and 1 percent levels, respectively). The coefficient for girls in
54 college is almost twice as large than that of boys. For those attending professional school, we find that the
55 coefficient on girls is positive and significant (at the 1 percent level), but not significant for boys. This
56 lends additional evidence that more is spent on girls than boys aged 16-18 regardless of the type of school.
57
58
59
60

1
2
3 traditional perceptions of gender bias do not completely explain the educational
4
5 expenditure decision. We next turn to examine whether these findings are consistent with
6
7 models which consider parents' intertemporal preferences.
8
9

10 **6 Returns to Parental Investment**

11
12 Standard human capital theory would suggest that the current educational
13
14 attainment of the adult population and their earnings affect the current expenditure on
15
16 education and enrolment of children? Table 9 and Figure 2 depict the educational
17
18 attainment of the adult population, divided into working-aged men and women (19-55)
19
20 and those aged 56 and over.
21
22
23

24
25 [TABLE 9 HERE]

26
27 [FIGURE 2 HERE]

28
29 Using the earnings data in the survey, we predict mean annual income for
30
31 men and women with each level of educational attainment standardising for the
32
33 characteristics of their respective samples (see the Appendix for the earnings functions).
34
35 These findings are consistent with studies of returns to education in China and in
36
37 particular with the results of other researchers using this data set specifically to
38
39 investigate returns to education (*e.g.*, Knight and Li 1996). Predicted mean annual
40
41 income is higher for sons than daughters with the average characteristics of the sample for
42
43 all educational levels (Table 10).
44
45
46
47
48

49 [TABLE 10]

50
51 We conclude that parents spend more on the education of sons than
52
53 daughters who are aged 13-15 on account of men receiving higher rates of return to
54
55 education. However, parents spend more on daughters than sons aged 16-18 in both types
56
57
58
59
60

1
2
3 of upper secondary school. The evidence suggests that higher rates of return to education
4 cannot be the motivation in the latter case because men earn higher returns than women in
5 upper middle school. Of the possible explanations, it is also plausible that there are
6 different kinds of families in the sample. The parents who spend more on daughters aged
7 16-18 may have also spent more on daughters at the time when they were aged 13-15 than
8 on sons of the same age groups. However, we are unable to test this outcome without
9 data for the same families from previous years. We turn to another possible explanation
10 which is that there are future transfers to consider when parents make investment
11 decisions that are based not just on the standard returns to education for the child but on
12 his or her future expected household income. Because we do not have two generations of
13 data on transfers to parents, we will estimate expected future transfers to parents based on
14 assessing children's future household income, which is consistent with the theories of
15 parental investment when parents look ahead to expected returns in making current
16 investment decisions.
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35

36
37 To obtain the expected household income of a child, we need to
38 incorporate theories of assortative mating to predict the likely income of a child's future
39 potential spouse. The predicted annual mean income of the children's likely future
40 spouse is the predicted annual mean income of men and women weighted by the
41 probabilities of marrying a spouse who has attained each educational level based on Table
42 11.
43
44
45
46
47
48
49
50

51 [TABLE 11]
52

53
54 Table 11 shows that 82.3 percent of women of each level of educational
55 attainment marry at or above their own educational level, while it is less (55.5 percent)
56
57
58
59
60

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

20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44 [TABLE 12 HERE]

45
46
47 Table 13 gives the predicted mean annual income for the future
48 households of daughters and sons based on their respective expected mean income and
49 that of their likely spouse [column (1) in Table 13 is the sum of columns (1) and (4) in
50 Table 12, while column (2) in Table 13 is the sum of columns (2) and (3) in Table 12].
51 Expected mean annual household income is higher for daughters than sons for each level
52
53
54
55
56
57
58
59
60

1
2
3 of educational attainment. These are static expectations and may not accurately reflect
4
5 the rapid economic changes taking place in China in 1995. However, to the extent that
6
7 parents act on available information, this exercise is useful in attempting to gain an
8
9 understanding of parental expectations of future transfers.
10
11

12 [TABLE 13 HERE]
13
14

15 We find that the smallest difference between the expected future
16
17 household income of sons and daughters is for those who have completed lower middle
18
19 school, while the largest difference is for those who have completed middle level
20
21 professional school. This coincides with our finding that parents invest more in sons than
22
23 daughters aged 13-15 (corresponding to lower middle school) but more in daughters than
24
25 sons aged 16-18 (corresponding to upper secondary school).
26
27

28 Finally, by law children have an obligation to support their parents.¹² In
29
30 addition, approximately 80 percent of all persons are employed in the state sector in urban
31
32 China that provides pensions.¹³ This may reduce some of the tendency to favour sons
33
34 over daughters that arises in rural China, which lacks pension schemes and has a greater
35
36 adherence to traditional preferences for boys discussed earlier. When also considered in
37
38 light of the large number of families with one child, there may also be a diminished
39
40 expectation of relying on sons in old age. This could reinforce the interpretation that
41
42 there intertemporal concerns are strong, and there are indeed future transfers to consider.
43
44
45
46
47
48
49
50
51
52

53
54 ¹² See The Protection of the Rights and Interests of Old People Law (October 1, 1996), particularly Article
55 11: "Children and their spouses are both to support their parents both financially, spiritually and of their
56 particular needs." There is a counterpart in the criminal law providing for sanctions.
57

58 ¹³ Of the 15,233 employed individuals, the workplace is SOEs for 12,157 persons.
59
60

1
2
3 These explanations are also consistent with a degree of altruism in China, heightened by
4 the one-child policy, which suggests changing traditions in urban areas.
5
6

7 **Conclusion**

8
9
10 This paper used a strand of models – intrahousehold resource allocation
11 approach – to test the extent to which parents forgo current consumption to invest in their
12 children’s human capital. Utilising these models, we were able to measure parental
13 expenditure on children’s education rather than own consumption, providing a test of
14 parental investment models for urban China.
15
16
17

18 Our findings were that the proportion of household resources allocated to
19 children’s education in urban China in 1995 is not well explained by examining only
20 returns to education or a preference for boys. If a bias for sons were the governing
21 motivation, then we would not expect to find more expenditure on the education of
22 daughters aged 16-18. Rather, the evidence suggests otherwise.
23
24
25

26 Insofar as expenditures on children’s education entail forgone
27 consumption, parents are likely to be efficient as well as altruistic in their decisions. This
28 is reinforced by specific intertemporal considerations found in China, such as the
29 expectation that parents in retirement will depend on transfers from children, as well as
30 on assets, for consumption in an imperfect credit market and pensions system. Moreover,
31 the circular nature of perceived future labour market discrimination will affect the
32 investment decision in counteracting ways.
33
34
35

36 Future labour market discrimination will cause investment to differ for
37 sons and daughters. Given perceived gender earnings differentials, parents will invest
38 more in the human capital of sons, in accordance with standard returns to education
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 analyses. A second consideration in our adapted model is expected transfers. Favourable
4 assortative mating will generate higher returns from investments in daughters than in
5 sons. This is owing to the same gender earning differentials that will cause daughters to
6 marry spouses with higher returns to human capital and augment their future household
7 income more than for sons. We thus expect that parents will invest more in the human
8 capital of daughters. These two effects are endogenous and co-exist. For urban China,
9 we find evidence consistent with these two effects. With some limitations to the
10 interpretation of the results, the empirical data calibrating household consumption
11 provides some evidence of the human capital models.
12
13
14
15
16
17
18
19
20
21
22
23

24
25 In conclusion, there are some – but not large – gender differences in the
26 educational enrolment of school-aged children in urban China. Despite more expenditure
27 on the education of girls than boys aged 16-18, there is evidence that girls have higher
28 attrition rates beyond lower middle school, are more likely to be enrolled in professional
29 than academic schools, and expect lower returns to this education than boys. Therefore,
30 we find gender differences in urban China are the likely result of perceived earnings
31 inequality that may in turn cause these children to receive unequal investment in their
32 human capital prior to entering the labour market.
33
34
35
36
37
38
39
40
41
42
43

44 [APPENDIX TABLES A1-3 HERE]

45 46 47 **References**

48
49 Alderman, H. and P. Gertler. 1997. Family Resources and Gender Differences in Human
50 Capital Investments: The Demand for Children's Medical Care in Pakistan.
51 *Intrahousehold Resource Allocation in Developing Countries: Models, Methods*
52 *and Policy*. L. Haddad, J. Hoddinott and H. Alderman, eds. Baltimore: The
53 Johns Hopkins University Press.
54
55

56
57 Becker, G.S. 1993 [1964]. *Human Capital*. Chicago: University of Chicago Press.
58
59
60

- 1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
- Becker, G.S. 1981. *A Treatise on the Family*. Cambridge, Massachusetts: Harvard University Press.
- Becker, G.S. 1993. Nobel Lecture: The Economic Way of Looking at Behavior. *The Journal of Political Economy* 101(3), 385-409.
- Becker, G.S. and G.H. Lewis. 1973. On the Interaction between the Quantity and Quality of Children. *Journal of Political Economy* 81(2:2), S279-S288.
- Behrman, J.R. 1997. Intrahousehold Distribution and the Family. *Handbook of Population and Family Economics*. M.R. Rosenzweig and O. Stark, eds. Amsterdam: North-Holland.
- Behrman, J.R. and J.C. Knowles. 1999. Household Income and Child Schooling in Vietnam. *The World Bank Economic Review* 13(2): 211-256.
- Behrman, J.R., R.A. Pollak, P. Taubman. 1995. The Wealth Model: Efficiency in Education and Equity in the Family. *From Parent to Child: Intrahousehold Resource Allocations and Intergenerational Relations in the United States*. J.R. Behrman, R.A. Pollak, P. Taubman, ed. Chicago: University of Chicago Press.
- Behrman, J.R. and M.R. Rosenzweig. 2002. Does Increasing Women's Schooling Raise the Schooling of the Next Generation? *American Economic Review* 92(1), 323-334.
- Borjas, G.J. 1992. Ethnic Capital and Intergenerational Income Mobility. *The Quarterly Journal of Economics* 107(1), 123-150.
- Bound, J., D.A. Jaeger, and R.M. Baker. 1995. Problems with Instrumental Variables Estimation When the Correlation between the Instruments and the Endogenous Explanatory Variable is Weak. *Journal of the American Statistical Association* 90(430), 443-450.
- Croll, E. 1994. *From Heaven to Earth*. London: Routledge.
- Deaton, A. 1989. Looking for Boy-Girl Discrimination in Household Expenditure Data. *The World Bank Economic Review* 3(1), 1-15.
- Deaton, A. 1997. *The Analysis of Household Surveys*. Baltimore: The Johns Hopkins University Press for The World Bank.
- DeTray, D. 1988. Government Policy, Household Behavior, and the Distribution of Schooling: A Case Study of Malaysia. *Research in Population Economics* 6, 303-336.

- 1
2
3
4
5 Doss, C.R. 1996. Testing Among Models of Intrahousehold Resource Allocation.
6 *World Development* 24(10), 1597-1609.
7
- 8
9
10
11
12 Haddad, L., J. Hoddinott and H. Alderman, eds. 1997. *Intrahousehold Resource*
13 *Allocation in Developing Countries: Models, Methods and Policy*. Baltimore:
14 The Johns Hopkins University Press.
15
- 16
17
18 Haddad, L. and J. Hoddinott. 1994. Women's Income and Boy-Girl Anthropometric
19 Status in the Côte d'Ivoire. *World Development* 22(4), 543-553.
20
- 21
22 Knight, J.B. and S. Li. 1996. Educational Attainment and the Rural-Urban Divide in
23 China. *Oxford Bulletin of Economics and Statistics* 58(1), 83-117.
24
- 25
26 Knight, J.B. and L. Song. 2000. Differences in Educational Access in Rural China.
27 Presented at the American Economics Association Annual Meeting, 7-9 January
28 2000. Boston, Massachusetts, USA.
29
- 30
31 Lee, C.K. 1998. The Labor Politics of Market Socialism: Collective Inaction and Class
32 Experiences Among State Workers in Guangzhou. *Modern China* 24(1), 3-33.
33
- 34
35 Lundberg, S. and R.A. Pollack. 1996. Bargaining and Distribution in Marriage. *The*
36 *Journal of Economic Perspectives* 10(4), 139-158.
37
- 38
39 Mincer, J. 1974. *Schooling, Experience, and Earnings*. New York: Columbia
40 University Press.
41
- 42
43 National Bureau of Statistics (NBS). 1997a. *China: Facts and Figures*. Beijing: China
44 Statistics Press (in Chinese).
45
- 46
47 National Bureau of Statistics (NBS). 1997b. *Gender Statistics in China (1990-1995)*.
48 Beijing: China Statistics Press (in Chinese).
49
- 50
51 Naughton, B. 1996. *Growing out of the Plan*. Cambridge: Cambridge University Press.
52
- 53
54 Parish, W.L. and R.J. Willis. 1993. Daughters, Education, and Family Budgets: Taiwan
55 Experiences. *The Journal of Human Resources* 28(4): 863-898.
56
- 57
58 Rosenweig, M.T. and T.P. Schultz. 1982. Market Opportunities, Genetic Endowments,
59 and Intrafamily Resource Distribution: Child Survival in Rural India. *American*
60 *Economic Review* 72(4), 803-815.

1
2
3 Song, L. 2001. Gender Effects on Household Resource Allocation in Rural China.
4 *Equality in Retreat*. C. Riskin, R. Zhao and S. Li, eds. Armonk, New York: M.E.
5 Sharpe.
6

7
8 Thomas, D. and J. Strauss. 1997. Health and Wages: Evidence on Men and Women in
9 Urban Brazil. *Journal of Econometrics* 77, 159-185.
10

11 United Nations Organization for Education, Science and Culture (UNESCO). 1999.
12 *UNESCO Statistical Yearbook 1999*. Paris: UNESCO.
13

14
15 World Bank. 2000a. *Gender Statistics: China*. Washington DC: The World Bank.
16

17
18 World Bank. 2000b. *World Development Report 1999/2000*. Washington DC: The
19 World Bank.
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

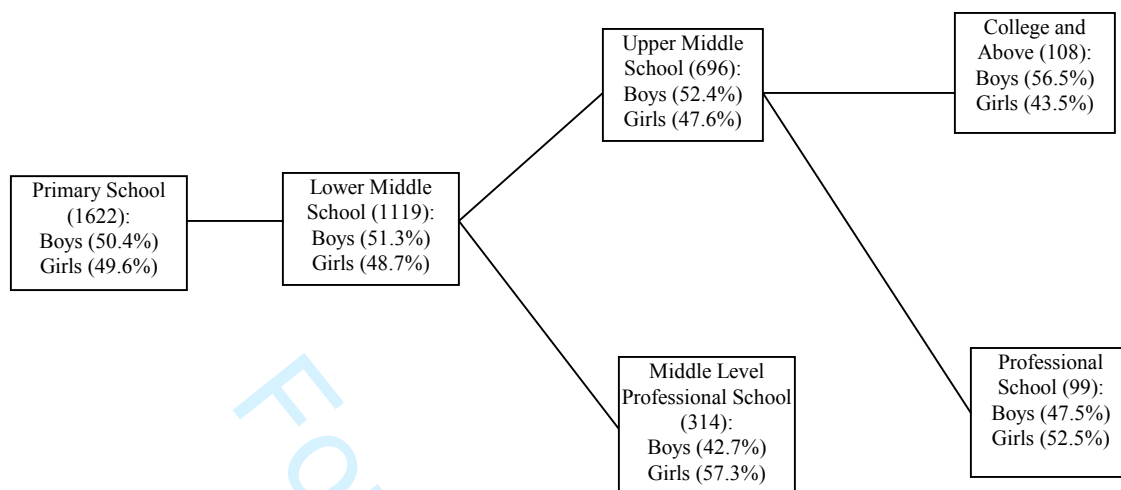


Figure 1

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

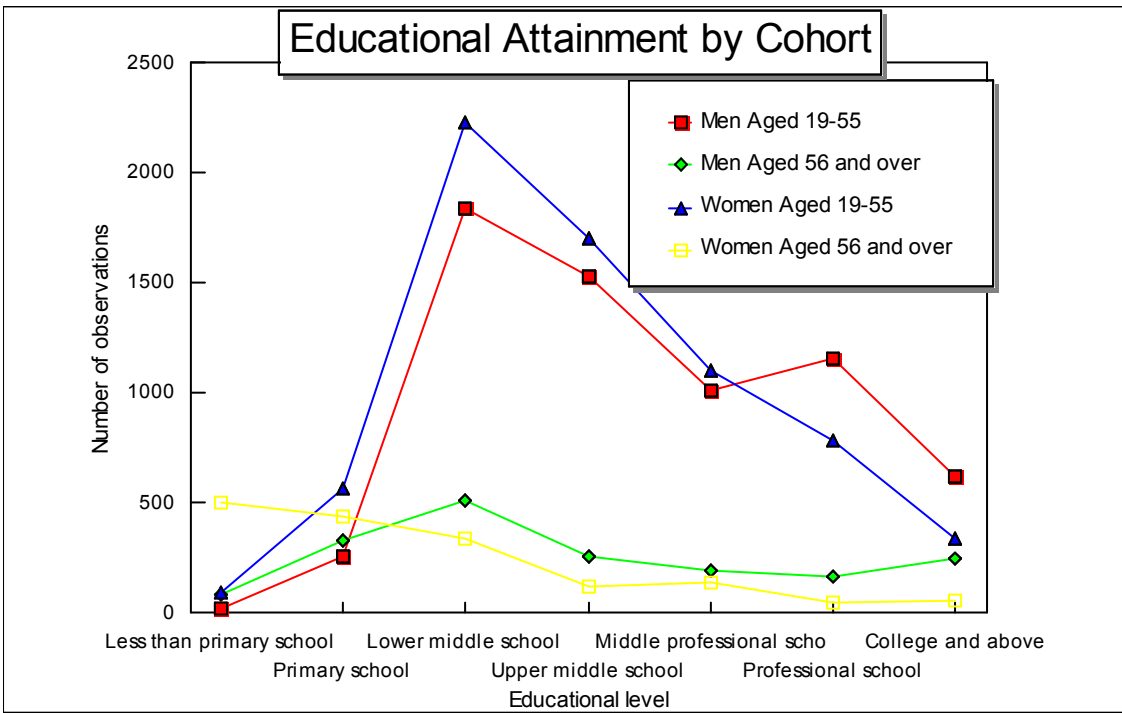


Figure 2

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 (1997b), UNESCO (1999) and World Bank (2000a, 2000b).

- 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

<u>Dependent Variable:</u> Proportion of Household Resources Expended on Children's Education	Coefficient (t-statistic)	Mean Value or Percentage (standard deviation)
Intercept	-0.0776 (-0.374)	0.0469 ¹⁴ (0.0898)
<u>Household Characteristics:</u>		
Log of household expenditure per capita (predicted)	-0.0088 (-1.119)	8.1370 ¹⁵ (0.3157)
Log of number of household members (predicted) ¹⁶	0.1366 (1.119)	1.1062 ¹⁷ (0.2016)
Communist Party membership of any member of the household	0.0051 (1.135)	0.4564 (0.4981)
One-generation household	0.1186 (1.291)	0.1552 (0.0871)
Two-generation household	0.0498 (1.706)*	0.7816 (0.3622)
Three-generation household	0.0052 (0.377)	0.0555 (0.2291)
<u>Characteristics of Household Head:</u>		
Male	-0.0072 (-1.548)	0.6593 (0.4740)
Educational level	-0.0033 (-3.373)***	3.8015 (1.5173)
Occupation	-0.0012 (-1.631)	5.5657 (1.9401)
<u>Age-Gender Composition of Household:</u>		
Male aged 0-6	-0.0096 (-0.233)	0.0256 (0.0862)
Male aged 7-12	0.0583 (1.349)	0.0382 (0.1046)
Male aged 13-15	0.1465 (3.719)***	0.0270 (0.0894)
Male aged 16-18	0.1434 (6.180)***	0.0209 (0.0785)
Male aged 19-55	-0.0027 (-0.147)	0.2893 (0.1711)
Male aged 56-65	-0.0440 (-2.061)**	0.0653 (0.1503)
Male aged 66 and over	-0.0404 (-1.398)	0.0299 (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 (-0.466)	0.0235 (0.0831)
Female aged 7-12	0.0636 (1.418)	0.0402 (0.1071)
Female aged 13-15	0.1317 (3.852)***	0.0237 (0.0844)
Female aged 16-18	0.1998 (9.348)***	0.0212 (0.0780)
Female aged 19-55	0.0136 (0.589)	0.3094 (0.1634)
Female aged 56-65	0.0052 (0.168)	0.0593 (0.1492)
<u>Provinces:</u>		
Beijing	-0.00004 (-0.007)	0.0721 (0.2587)
Shanxi	-0.0106 (-1.324)	0.0937 (0.2915)
Liaoning	-0.0207 (-4.242)***	0.1010 (0.3013)
Anhui	-0.0095 (-1.695)*	0.0721 (0.2587)
Henan	-0.0265 (-3.465)***	0.0865 (0.2812)
Hubei	0.0018 (0.391)	0.1070 (0.3091)
Guangdong	-0.0070 (-0.875)	0.0787 (0.2694)
Sichuan	-0.0049 (-1.261)	0.1223 (0.3277)
Yunnan	-0.0100 (-2.021)**	0.0935 (0.2911)
Gansu	-0.0040 (-0.616)	0.0577 (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

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

<u>Provinces:</u>		
Beijing	-0.0001 (-0.009)	0.0721 (0.2587)
Shanxi	-0.0106 (-1.338)	0.0937 (0.2915)
Liaoning	-0.0207 (-4.269)***	0.1010 (0.3013)
Anhui	-0.0096 (-1.691)*	0.0721 (0.2587)
Henan	-0.0265 (-3.489)***	0.0865 (0.2812)
Hubei	0.0018 (0.389)	0.1070 (0.3091)
Guangdong	-0.0070 (-0.877)	0.0787 (0.2694)
Sichuan	-0.0062 (-1.256)	0.1223 (0.3277)
Yunnan	-0.0100 (-2.023)**	0.0935 (0.2911)
Gansu	-0.0040 (-0.615)	0.0577 (0.2331)
<u>Proxy for Bargaining Power:</u>		
Wife's years of education as a proportion of the husband's and wife's combined years of education	0.0014 (0.106)	0.6259 (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

<u>Dependent Variable:</u> 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)
<u>Household Characteristics:</u>						
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)
<u>Characteristics of Household Head:</u>						
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)
<u>Age-Gender Composition of Household:</u>						
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 (-1.095)	-0.0676 (-0.686)	-0.0647 (-0.608)	0.0101 (0.0506)	0.0099 (0.0496)	0.0102 (0.0517)
Female aged 0-6	0.1971 (0.315)	---	0.6192 (0.531)	0.0346 (0.1006)	0.00 (0.00)	0.0716 (0.1352)
Female aged 7-12	0.2771 (0.439)	---	0.7007 (0.594)	0.0598 (0.1284)	0.00 (0.00)	0.1236 (0.1618)
Female aged 13-15	0.3512 (0.572)	---	0.7593 (0.661)	0.0332 (0.1008)	0.00 (0.00)	0.0685 (0.1362)
Female aged 16-18	0.4056 (0.678)	---	0.8011 (0.718)	0.0284 (0.0873)	0.00 (0.00)	0.0587 (0.1249)
Female aged 19-55	-0.0010 (-0.016)	-0.0288 (-0.310)	0.0394 (0.362)	0.3195 (0.0653)	0.3216 (0.0850)	0.3173 (0.0897)
Female aged 56-65	-0.0085 (-0.143)	-0.0241 (-0.361)	0.0433 (0.316)	0.0164 (0.0603)	0.0166 (0.0648)	0.0162 (0.0659)
<u>Provinces:</u>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>			
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)

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

Female aged 13-15	0.1080 (3.126)***	0.0237 (0.0844)
Female aged 16-18 enrolled in upper middle school	0.1885 (6.954)***	0.0093 (0.0530)
Female aged 16-18 enrolled in middle level professional school	0.2595 (7.598)***	0.0049 (0.0385)
Female aged 16-18 enrolled in college and above	0.4370 (4.846)***	0.0005 (0.0133)
Female aged 16-18 enrolled in professional school	0.2446 (3.121)***	0.0009 (0.0164)
Female aged 16-18 not enrolled in school	-0.0243 (-0.529)	0.0025 (0.0264)
Female aged 19-55	-0.0036 (-0.153)	0.3094 (0.1634)
Female aged 56-65	-0.0107 (-0.340)	0.0593 (0.1492)
<u>Provinces:</u>	<i>Yes</i>	<i>Yes</i>
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.

For Peer Review

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

Men \ Women	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 Middle Level	6,622.82	6,302.31	5.09%	5,701.34	6,242.95
Professional School Upper Middle School	5,994.66	5,812.54	3.13%	5,492.40	6,220.49
Lower Middle School	5,528.95	5,423.29	1.95%	5,368.68	5,729.30
Primary School	5,575.43	5,359.46	4.03%	5,206.68	5,641.78
	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 Intra-household 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 (81.160)***	8.1366 (0.7323)
<u>Household Characteristics:</u>		
Ownership of telephone ¹⁸	0.1330 (14.762)***	1.7277 (0.9265)
One-generation household	0.6610 (7.094)***	0.1552 (0.3622)
Two-generation household	0.1917 (2.099)**	0.7816 (0.4132)
Three-generation household	0.0262 (0.270)	0.0556 (0.2291)
<u>Provinces:</u>		
Beijing	0.2075 (5.437)***	0.0721 (0.2587)
Shanxi	-0.4150 (-11.743)***	0.0937 (0.2915)
Liaoning	-0.1107 (-3.211)***	0.1010 (0.3013)
Anhui	-0.2582 (-6.830)***	0.0721 (0.2587)
Henan	-0.3637 (-10.081)***	0.0865 (0.2812)
Hubei	-0.0910 (-2.671)***	0.1070 (0.3091)
Guangdong	0.3609 (9.367)***	0.0787 (0.2694)
Sichuan	-0.0865 (-2.616)***	0.1223 (0.3277)
Yunnan	-0.1260 (-3.587)***	0.0935 (0.2911)
Gansu	-0.3327 (-8.113)***	0.0577 (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.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

For Peer Review

Table A2
Instrumenting for the Number of Household Members

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

<u>Dependent Variable:</u> 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 (26.366)***	6.3827 (26.574)***	1.0595 (0.867)	6.3395 (30.116)***	6.2928 (29.818)***	8.7290 (0.6015)	8.5094 (0.6671)
<u>Education Level Completed:</u>								
College and above	-3.5194 (-2.799)***	0.6015 (3.910)***	0.5968 (3.873)***	0.4258 (0.806)	0.5803 (5.734)***	0.5901 (5.829)***	0.0968 (0.2957)	0.0500 (0.2181)
Professional school	-3.4707 (-2.736)***	0.5079 (3.324)***	0.5042 (3.294)***	0.8892 (1.638)	0.5287 (5.440)***	0.5384 (5.537)***	0.1792 (0.3836)	0.1148 (0.3188)
Middle level professional school	-3.6339 (-2.978)***	0.4400 (2.883)***	0.4352 (2.847)***	0.5049 (1.059)	0.4587 (4.761)***	0.4681 (4.857)***	0.1577 (0.3644)	0.1620 (0.3685)
Upper middle school	-3.6631 (-2.928)***	0.4199 (2.766)***	0.4161 (2.736)***	0.3382 (0.737)	0.3147 (3.306)***	0.3226 (3.387)***	0.2372 (0.4254)	0.2495 (0.4327)
Lower middle school	-3.9632 (-3.139)***	0.3309 (2.197)**	0.3272 (2.169)**	0.3480 (0.772)	0.1987 (2.100)**	0.2062 (2.179)**	0.2856 (0.4518)	0.3270 (0.4691)
Primary school	-4.0891 (-3.159)***	0.2403 (1.559)	0.2359 (1.528)	5.3015 (---)	0.1050 (1.080)	0.1135 (1.168)	0.0401 (0.1961)	0.0829 (0.2758)
<u>Personal Characteristics:</u>								
Age	0.0892 (1.331)	0.0865 (9.817)***	0.0844 (9.602)***	0.0397 (0.681)	0.0912 (10.477)***	0.0930 (10.659)***	37.8879 (9.7425)	37.6909 (9.5860)
Age squared	-0.0015 (-1.635)	-0.0010 (-9.730)***	-0.0010 (-9.502)***	-0.0008 (-1.092)	-0.0013 (-12.134)***	-0.0013 (-12.317)***	1530.3910 (726.3334)	1512.4850 (715.1966)
Experience	0.0370 (1.833)*	0.0118 (4.424)***	0.0120 (4.457)***	0.0343 (2.562)***	0.0248 (10.333)***	0.0249 (10.349)***	19.6987 (9.5261)	18.4391 (9.04993)
Occupation	0.0502 (1.355)	-0.0171 (-2.795)***	-0.0174 (-2.841)***	0.0559 (1.827)*	-0.0265 (-3.911)***	-0.0260 (-3.827)***	5.7091 (1.9060)	6.0445 (2.0866)
Communist Party member	4.8251 (---)	0.0941 (6.254)***	0.0948 (6.288)***	4.8998 (---)	0.1135 (5.852)***	0.1136 (5.848)***	0.2967 (0.4568)	0.1327 (0.3392)
Have children	-0.7163 (-2.675)***	---	---	-0.6401 (-3.120)***	---	---	0.2165 (0.4119)	0.1752 (0.3802)
<u>Provinces:</u>								
Beijing	4.5410 (---)	0.2956 (7.277)***	0.2954 (7.264)***	-0.1185 (-0.284)	0.2035 (4.376)***	0.2032 (4.367)***	0.0249 (0.1556)	0.0219 (0.1463)
Shanxi	4.4274 (---)	0.2506 (6.412)***	0.2515 (6.423)***	4.4978 (---)	0.2505 (8.092)***	0.2511 (8.103)***	0.0281 (0.1653)	0.0277 (0.1642)
Liaoning	0.0019 (0.004)	0.1953 (3.721)***	0.1951 (3.712)***	0.0932 (0.231)	0.1877 (5.144)***	0.1877 (5.138)***	0.0317 (0.1752)	0.0305 (0.1720)
Anhui	0.0150 (0.034)	-0.0942 (-2.250)**	-0.0943 (-2.249)**	-0.3659 (-1.246)	-0.2046 (-3.532)***	-0.2053 (-3.538)***	0.0248 (0.1557)	0.0241 (0.1533)
Henan	-0.3038 (-0.764)	-0.3192 (-7.748)***	-0.3197 (-7.741)***	-0.0483 (-0.114)	-0.4266 (-8.471)***	-0.4261 (-8.449)***	0.0278 (0.1644)	0.0264 (0.1604)
Hubei	-0.5016 (-1.855)*	-0.0921 (-3.033)***	-0.0929 (-3.054)***	-0.0416 (-0.118)	-0.0358 (-1.225)	-0.0363 (-1.239)	0.0407 (0.1976)	0.0379 (0.1909)
Guangdong	4.7400 (---)	0.1027 (2.959)***	0.1040 (2.992)***	4.5054 (---)	0.0009 (0.018)	0.0009 (0.019)	0.0235 (0.1514)	0.0217 (0.1458)
Sichuan	0.1293 (0.317)	-0.0946 (-2.074)**	-0.0946 (-2.071)**	-0.3896 (-1.659)*	-0.3216 (-6.914)***	-0.3226 (-6.928)***	0.0395 (0.1947)	0.0374 (0.1898)
Yunnan	4.3650 (---)	0.1445 (4.142)***	0.1451 (4.150)***	4.5103 (---)	0.1288 (3.580)***	0.1290 (3.578)***	0.0287 (0.1671)	0.0283 (0.1659)
Gansu	4.5275	0.1716	0.1725	4.4911	0.2262	0.2265	0.0163	0.0160

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

	(---)	(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	---	---		
χ^2 (22)	92.07***	---	---	90.98***	---	---		
Wald χ^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

Linda Yueh
Pembroke College, University of Oxford
Department of Economics, London School of Economics and Political Science

Pembroke College
Oxford OX1 1DW
Linda.Yueh@economics.ox.ac.uk

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.

1
2
3 The possibility of bias for sons is an often-asked question in China.* The
4
5 one-child policy may have popularised the traditional view of a preference for boys. This
6
7 paper investigates patterns in household expenditure on the education of sons and
8
9 daughters to analyse whether there are such gender biases in contemporary urban China.
10
11 We aim to measure the extent of forgone consumption of parents that is spent instead on
12
13 the education of their children as a test of the models of parental investment in children's
14
15 human capital by using a strand of empirical models known as the intrahousehold
16
17 resource allocation approach. Finally, we will discern whether any such gender
18
19 differences generate effects such as differential school enrolment rates of boys and girls
20
21 with policy implications for gender inequality in China.
22
23
24
25
26

27
28 This paper will first review the educational system of China, focusing on
29
30 gender differences in school enrolment as an indicator of human capital. This is followed
31
32 by a model of parental investment in children's human capital that may result in
33
34 differential spending on the education of sons and daughters if intertemporal
35
36 considerations are taken into account. Section 3 introduces the intrahousehold resource
37
38 allocation model to provide a measure of parental forgone consumption used instead on
39
40 children's education, providing an empirical test of parental investment models. Section
41
42 4 describes the data and Section 5 presents the empirical findings as to whether gender is
43
44 a significant factor in the allocation of household resources toward the education of
45
46 children in urban China. In Section 6, we investigate whether any differential spending is
47
48
49
50
51

52
53
54 * The model of parental investment in children's human capital is Discussion Paper No. 15 in the Centre on
55 Skills, Knowledge and Organisational Performance (SKOPE) series at the Universities of Oxford and
56 Warwick. Kind appreciation is also given to the U.K. Department for International Development for
57 support. Any errors are mine.
58
59
60

1
2
3 due to better returns to education for men. If that is not the entire picture, then we turn to
4
5 examine the potential role of intertemporal considerations such as future transfers or
6
7 financial support for parents in urban China. Finally, we conclude in Section 7 with a
8
9 summary of our findings of gender differences in educational expenditure indicating
10
11 differential investment of parents in their children's human capital. We aim to uncover
12
13 whether the oft-perceived tradition of a preference for boys exists in contemporary urban
14
15 China or whether traditions are changing.
16
17
18
19

20
21 Evidence of pre-labour market gender inequality implies policy
22
23 conclusions that are different from those based on post-entry inequalities in the labour
24
25 market. This provides a useful analytical separation in examining the factors concerning
26
27 gender discrimination, *i.e.*, differentiating between productivity-related differences
28
29 generated by pre-labour market inequality, such as education obtained as a child, and
30
31 those that pertain once men and women enter the labour market. Any evidence would
32
33 also point to the circular nature of gender inequality. In other words, what happens in the
34
35 labour market can affect decisions made prior to entry to the labour market (Rosenzweig
36
37 and Schultz 1982; Sicilian and Grossberg 2001¹).
38
39
40
41

42 **1 Education in Modern China**

43
44 The modern Chinese educational system is generally comprised of primary
45
46 (six years), secondary (six years, three years of lower and three years of upper middle
47
48 school), and tertiary or higher education (varying between two and five years) (Knight
49
50 and Li 1993). Education is officially compulsory for nine years to the completion of
51
52
53
54

55
56 ¹ Sicilian and Grossberg (2001) find that the most important factors affecting gender wage differentials in
57
58 the U.S. are differences in human capital stock and occupational distribution.
59
60

1
2
3 lower middle school, though not always in practice (NBS 1997a). However, overall
4 school enrolment in China is high in 1995, the year corresponding to the data set used in
5 this paper. There are costs involved in schooling that fall into two main categories,
6 tuition and fees, and other expenditures, which may include school uniforms,
7
8 transportation expenses, and out-of-school or private tuition fees. The mean value of
9
10 tuition and fees is 398 RMB in our representative survey, while it is much less (153
11
12 RMB) for other educational expenditures. In total, these costs are estimated to be less
13
14 than 5% of average household income, so children's primary and secondary education
15
16 will entail some but not great costs. There are some differences in school quality as well
17
18 with the better schools expected to be more expensive.
19
20
21
22
23
24
25
26

27
28 There are not large gender differences in educational enrolment in urban
29
30 China in the current period (see Knight and Li 1993 for similar findings in 1988). Figure
31
32 1 presents the possible paths in the Chinese school system and partitions enrolment by
33
34 academic and professional schools into gender proportions, as computed from our data
35
36 set discussed in Section 3.
37
38

39
40 [FIGURE 1 HERE]
41

42
43 In the Chinese school system, students attend lower middle school after
44
45 completing primary school. They then test into upper middle school or middle level
46
47 professional school. Middle level professional school generally takes one more year to
48
49 complete than upper middle school and is typically the last level attained. Those who
50
51 complete upper middle school are likely to apply and test into college. Professional
52
53 school is an alternative to college. Those who select into professional schools will likely
54
55 take on administrative or clerical work, and those who do not continue will likely enter
56
57
58
59
60

1
2
3 the labour force as factory or manufacturing workers. Those who opt out of school early
4
5 on are still candidates for factory work in particular, given China's growth in
6
7 manufacturing capacity.
8
9

10
11 Table 1 gives school enrolment rates for children aged 7-18 in our sample.
12
13 The mean years of education for all full-time students is 8.77 with a standard deviation of
14
15 3.83. For boys, it is 8.86 years of education (with a standard deviation of 3.82), while it
16
17 is 8.66 years of education for girls (with a standard deviation of 3.84).
18
19

20 [TABLE 1 HERE]
21

22
23 The gross enrolment ratio of all school-aged children was 94 percent,
24
25 while it was 91 percent for girls and 96 percent for boys (UNESCO 1999).²
26
27

28 [TABLE 2]
29

30 Table 2 shows that the ratio of enrolled girls to boys has stayed the same
31
32 or improved from 1980 to 1995 for every level of education, although girls still lag
33
34 behind at the secondary level and substantially behind at the tertiary level.³ Using a 1995
35
36 rural household survey, Knight and Song (2000) find that boys are significantly more
37
38 likely to be enrolled in school than girls, with the greater difference for upper middle
39
40 school-aged children. One explanation posited by Broaded and Liu (1996) is that
41
42 educational aspirations are different for boys and girls. In their study of Wuhan, boys are
43
44 more likely to enter into advanced schooling while girls are more likely to enter into
45
46 professional courses. They posit that this is primarily the result of two factors – tradition
47
48 and parents' perception of future discrimination against women. They also find that
49
50
51
52
53

54
55 ² UNESCO (1999) uses the definition of school-aged children as given by the country (see NBS 1997b).
56

57 ³ Figures for rural and urban China separately are not available.
58
59
60

1
2
3 women are reluctant to be better educated than any likely future spouse for fear that they
4
5 might risk limiting their marriage prospects.
6
7

8
9 This customary reliance on sons and the argument concerning the role of
10
11 tradition in fostering gender inequalities in education may hold for rural China. In rural
12
13 China, Gao (1994) argues that patrilocal marriage and patrilineal inheritance are
14
15 important aspects of the structure of patriarchal society that did not change in the course
16
17 of economic transformation.⁴ Even though marriage and inheritance in China are
18
19 legislated to give daughters and sons equal privileges as heirs, patrilineal inheritance
20
21 continues to be practised in rural areas with the result that sons are preferred to daughters
22
23 (Lee 1998).⁵ Sons inherit property, live near their parents and support them in old age. In
24
25 a household survey conducted in the early 1990s, the Institute of Population Studies of
26
27 the Chinese Academy of Social Sciences (IPS) finds that rural, but not urban, households
28
29 show a preference for sons in the distribution of family property. We discuss this survey
30
31
32
33
34
35

36
37 ⁴ Rural residences, for example, have traditionally been passed to sons and not daughters. The introduction
38
39 of cooperatives abolished private ownership of land, but it did not significantly affect patrilocal residence
40
41 patterns, argues Gao (1994). The government advocated men moving to their wives' home at marriage, but
42
43 there are very few instances of this occurrence in rural areas. China's rural villages are usually made up of
44
45 several large single-surname lineages. Because land is limited, villages restrict outsiders from moving in.
46
47 Rural residents see women who move in to marry as effectively of their lineage and their descendants are
48
49 welcomed as part of the lineage. Men who move in to marry are seen as outside the lineage and are
50
51 excluded because all their descendants will belong to a differently surnamed lineage. The great majority of
52
53 rural Chinese women must marry or they will not have a home of their own (Gao 1994). Most do not have
54
55 the privilege of choosing to remain at their natal home because their village is unwilling to distribute land or
56
57 residence to their husbands and children. In this respect, daughters are unable to benefit their natal families,
58
59 while a son, aside from having his own land, gains another portion when he takes a wife. The periodic
60
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

1
2
3 in detail later in the paper. Finally, in examining educational enrolment patterns in 1988,
4
5 Knight and Li (1993) find that traditional values favouring the education of boys rather
6
7 than girls appear to have been eroded in urban areas though not in rural areas.
8
9

10
11 We will explore whether a preference for boys exists in urban China, or if
12
13 there are other factors motivating the parental decision to educate their children. To a
14
15 large extent, due to the rural roots and migration patterns of the current cohort of adults in
16
17 urban areas, we expect that rural customs will have an impact on parental attitudes in
18
19 urban China. This is likely to be compounded by the additional linkages of urban with
20
21 rural China through grandparents and the extended family. However, we hypothesise that
22
23 parents are rational investors in their children in both rural and urban China, but face
24
25 different constraints. In other words, there are differences in the economic needs of urban
26
27 and rural households that affect their decisions regarding investment in children. A
28
29 number of institutional factors in rural China may have caused parents to value sons more
30
31 than daughters, giving rise to a tradition of bias toward boys. As the view of China is
32
33 often driven by the view of rural areas where the bulk of the population live, there is a
34
35 perception of pro-boy bias. We posit that tradition is often the historical product of
36
37 practical necessity, and that rational acts under one set of circumstances, such as in rural
38
39 China, will change when the context is altered, as in urban China with a different set of
40
41 household needs and constraints. Our findings may run counter to the perceived
42
43 traditions within China, but might better reflect the practices of an urban population with
44
45 different concerns. In other words, traditions could be changing.
46
47
48
49
50
51
52
53
54
55

56 and board when attending in towns. Thus, she finds that parents educate their sons more than their
57 daughters with the result that more boys are enrolled in school in some rural areas.
58
59
60

1
2
3 Further, in urban China, there is not evidence of two forms of explicit
4 gender bias. Widespread female infanticide has not been documented, perhaps on
5 account on the closer monitoring of neighbourhood committees and the work place
6 related housing arrangements. Housing in 1995 was arranged by the work unit, so
7 members of a work unit tend also to be neighbours. Second, unlike in rural China, there
8 is no observed popular pattern of arranged marriages, perhaps there is less need to secure
9 networks of mutual assistance typically wrought through marriage in agricultural
10 societies. These differences reinforce the notion that gender bias is of a different nature
11 in urban China and our investigation of gender bias is consistently conditional on girls
12 living in their parents' households. Therefore, our study is to discern evidence of gender
13 bias as it manifests in educational expenditure and school enrolment of girls in urban
14 households.
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31

32 Becker (1993) in his book, *A Treatise on the Family*, identified the
33 parental role in developing the human capital of children. The investment in children's
34 human capital, under credit constraints, necessarily entails forgone current consumption
35 for the household. There is a strand of literature – intrahousehold resource allocation
36 models – that could provide an empirical test of the extent to which parents will forgo
37 consumption to spend on children's education through discerning patterns of
38 consumption within households (see Deaton 1989; Behrman 1997; Haddad, Hoddinott
39 and Alderman 1997 for excellent overviews of this approach). The degree of
40 expectations of returns from children will vary among societies; however, we posit that
41 parents invest in their children with an eye toward their own future utility as well as that
42 of their offspring. These intertemporal considerations can generate differential
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

$$U_t = u_t + \delta(W_{t+1}^m + W_{t+1}^f + U_{t+1}), \quad (1)$$

where u_t is their utility this period from consumption, W_{t+1}^m is the future income of their son, W_{t+1}^f 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_{t+1}^m , and from their daughter's future household, B_{t+1}^f .

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_h^m, R_h^f) and the portion of that which will generate transfers to parents in the next period (R_b^m, R_b^f) are given by

$$R_h^m = \partial W_{t+1}^m / \partial \gamma_t^m, R_h^f = \partial W_{t+1}^f / \partial \gamma_t^f, R_b^m = \partial B_{t+1}^m / \partial \gamma_t^m, R_b^f = \partial B_{t+1}^f / \partial \gamma_t^f, \quad (2)$$

where γ_t^m and γ_t^f denote the proportion of household income, Q_t , expended on the human capital of their son and daughter, respectively.

The intertemporal budget constraint is

$$Z_t + \gamma_t^m + \gamma_t^f + A_{t+1}/R_a + B_{t+1}^m/R_b^m + B_{t+1}^f/R_b^f = PV(Q_t), \quad (3)$$

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 (γ_t^m and γ_t^f). Household resources next period (Q_{t+1}) is equal to the discounted value of all expected sources of consumption ($A_{t+1}/R_a + B_{t+1}^m/R_b^m + B_{t+1}^f/R_b^f$), *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:

$$R_h^m = R(\gamma_t^m, H_t^m) \text{ and } R_h^f = R(\gamma_t^f, H_t^f), \quad (4)$$

where a son's income, R_h^m , will be determined by expenditure on education by his parents (γ_t^m) and his ability (H_t^m), 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:

$$\delta A'_{t+1} + \delta B^{m'}_{t+1} + \delta B^f_{t+1} = \lambda_u/R_k = \delta U'_{t+1}, \quad (5a)$$

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:

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

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:

$$\delta R^m_h W^{m'}_{t+1} = \lambda_u, \quad \delta R^f_h W^f_{t+1} = \lambda_u. \quad (5c)$$

Combining the first order conditions gives

$$\lambda_u/R_a = \lambda_u/R^m_b = \lambda_u/R^f_b = \lambda_u/R^m_h = \lambda_u/R^f_h, \quad (6)$$

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.

1
2
3 education of children. There is a strand of empirical literature termed models of
4
5 intrahousehold resource allocation which we propose would provide a direct test of such
6
7 forgone consumption. These models reveal the decision of parents in a household to
8
9 spend on children's education versus own consumption, consistent with the parental
10
11 investment model as outlined above. In so doing, any evidence of differential
12
13 expenditure on the education of sons and daughters can also be discerned. These models
14
15 can be extended to investigate wealth or endowment effects as in Behrman *et al.* (1995)
16
17 and for credit constraints, although we do not currently have data to do so. Credit
18
19 constraints certainly exist in China in 1995, a period prior to commercial credit
20
21 liberalisation (Naughton 1996), and is so inferred in interpreting our results. Given these
22
23 limitations, we posit that the intrahousehold resource allocation models provide one type
24
25 of empirical evidence that can provide one measure the extent of forgone consumption by
26
27 parents, albeit imperfectly. At a minimum, they allow for inferences of patterns of gender
28
29 bias among children for a given household's resource allocation decisions, for which
30
31 these models have been widely used in investigating patterns of consumption in
32
33 developing countries (see Doss 1996 for an overview).
34
35
36
37
38
39
40
41

42 The next section outlines the empirical testing we will undertake and how
43
44 the intrahousehold resource allocation models can be utilised to test parents' forgone
45
46 consumption used instead on children's education, consistent with the theoretical models
47
48 which posit that such decisions are taken when parents who decide to invest in children's
49
50 education.
51
52
53
54

55 **3 Differences in Household Expenditure Patterns on Children's Education**

56
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

1
2
3 Malaysia that the demand for girls' schooling is more income elastic than for boys.
4
5
6 Similarly, the education of girls is a luxury good in Vietnam (Behrman and Knowles
7
8 1999).
9

10
11 Household expenditures are also thought to differ with the degree of
12
13 influence of women, suggesting a joint decision-making model (see Haddad, Hoddinott
14
15 and Alderman 1997). For instance, Hoddinott and Haddad (1994) find in the Côte
16
17 d'Ivoire in the 1980s that doubling the cash income of women increases the household
18
19 budget share of food and reduces the shares of alcohol and cigarettes. Haddad and
20
21 Hoddinott (1994) also find in the Côte d'Ivoire that increasing women's share of cash
22
23 income betters the health status of boys relative to girls. For Brazil, Thomas and Strauss
24
25 (1997) find that increased female earnings are associated with a larger share of the
26
27 household budget being devoted in human capital – such as health and education – as
28
29 well as leisure goods, including recreation. Song (2001), in a study of rural China in
30
31 1995, finds that greater female bargaining power changes expenditure patterns in favour
32
33 of health care and education, but does not reduce the pro-boy discrimination in these
34
35 expenditures (for an overview of bargaining theories, see Lundberg and Pollack 1996).
36
37
38
39
40
41

42 We use this approach to measure the decision of parents to forgo
43
44 consumption to spend on education as a measure of direct investment in children's human
45
46 capital and also investigating any gender differences posited in the theoretical model. We
47
48 propose that this is a useful direct test of this genre of parental investment models where
49
50 parents decide to give up current consumption in order to spend on their children's human
51
52 capital.
53
54
55
56
57
58
59
60

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

$$\gamma_t^e = \beta_0 + \beta_1 \ln[(Z_t + \gamma_t^e)/n] + \beta_2 \ln(n) + \sum_{g=1}^{G-1} \beta_3(n_g/n) + \beta_4 \mathbf{X}_t + \varepsilon_t, \quad (7)$$

where γ_t^e denotes the share of household expenditures spent on the education of children, $Z_t + \gamma_t^e$ 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, \mathbf{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

$$\gamma_t^e = \beta_0 + \beta_1 \ln[(Z_t + \gamma_t^e)/n] + \beta_2 \ln(n) + \sum_{g=1}^{G-1} \beta_3(n_g/n) + \beta_4 \mathbf{X}_t + \beta_5 E_t^m + \varepsilon_t, \quad (8)$$

1
2
3 where E^m_t denotes the years of education of the mother as a ratio of the total years of
4 education of both spouses, which is a proxy for female bargaining power. We tried
5
6 alternative proxies, such as women's share of earned income to that of both spouses (see
7
8 the proxies used by Hoddinott and Haddad 1994 for the Côte d'Ivoire and Song 2001 for
9
10 rural China).
11
12
13
14
15

16 3.3 *Interpreting Patterns of Intrahousehold Resource Allocation*

17
18 As explained by Deaton (1989, 1997), because we do not have data
19
20 regarding actual expenditure on the education of boys and girls but only on all the
21
22 children in the household, the analysis is based on a correlation between the number of
23
24 boys and girls in the household and the amount of forgone consumption. This is
25
26 evidenced through the variable, $\sum n_g/n$. From both the unitary and the joint decision-
27
28 making formulations of the model, the coefficient β_3 indicates the relationship between
29
30 educational expenditure and the age-composition of the household. If β_3 are significant
31
32 and different for boys and girls, then there is evidence of differential investment in
33
34 children's human capital as seen through forgone consumption of parents. Again, this is
35
36 a direct test of parents forgoing consumption to spend on children's education as well as a
37
38 method to discern whether such forgone consumption and expenditure differ by gender.
39
40
41
42
43
44
45

46 4 **Data**

47
48 We tested our hypotheses using an unusually comprehensive and
49
50 representative urban household survey conducted in China and related to 1995. The
51
52 survey has rich data on consumption and income for each household. The survey was
53
54 designed by the Institute of Economics, Chinese Academy of Social Sciences, in
55
56
57
58
59
60

1
2
3 consultation with international scholars. The households are drawn from a sub-sample of
4
5 the NBS annual household income and expenditure survey. Eleven of the 30 provinces of
6
7 China are included. For details, see Riskin, Zhao and Li (2001).
8
9

10
11 The pertinent descriptives are as follows. There are 6,594 households and
12
13 21,697 individuals, of whom 70.3 percent are aged 19 and over, and primary and
14
15 secondary school-aged children (7-18 years of age) are approximately 17.12 percent. Of
16
17 such children, boys are slightly more numerous than girls (8.61 percent and 8.51 percent,
18
19 respectively), and the gender ratio of girls to boys is 98.84. In terms of age-gender
20
21 demographics, boys aged 7-12 are 3.82 percent of household members, boys aged 13-15
22
23 are 2.70 percent, boys aged 16-18 are 2.09 percent, while girls aged 7-12 are 4.02 percent,
24
25 girls aged 13-15 are 2.37 percent and girls aged 16-18 are 2.12 percent.
26
27
28
29

30
31 The mean proportion of annual household resources expended on
32
33 children's education is 4.69 percent (with a standard deviation of 0.09). In absolute
34
35 figures, it is 573 yuan or RMB (with a standard deviation of 1,219). Total mean
36
37 household expenditure is 12,222 yuan (with a standard deviation of 10,365), while mean
38
39 household income is 14,290 yuan (with a standard deviation of 8,591). As expected
40
41 under the one-child policy, the mean number of household members is 3.13 (with a
42
43 standard deviation of 0.83). More than three-quarters of the households are two-
44
45 generations (78.16 percent), while one-generation households comprise 15.52 percent,
46
47 three-generation households are 5.55 percent, and the remaining 7.65 percent are other
48
49 types of household, defined as those with relatives other than the nuclear family or
50
51 includes non-relatives. The head of household is male in a majority of the sample (65.93
52
53
54
55
56
57
58
59
60

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

1
2
3 the 1 percent level and the partial R-squared of the first stage regression is of reasonable
4
5 magnitude. On account of the rich detail in this data set, we were thus able to instrument
6
7 for the endogenous variables to a good level. Further details of the first stage regressions
8
9 are provided in the Appendix.
10
11

12 [TABLE 3 HERE]
13

14
15 Not surprising, there is a 4.98 percentage point increase in the proportion
16
17 of household resources allocated to children's education associated with two-generation
18
19 households. Turning to the age-gender household composition variables,⁷ we find that
20
21 the proportions of boys and girls aged 13-15 and 16-18 affect the proportion of household
22
23 resources expended on children's education, but not children aged 7-12. As education is
24
25 heavily subsidised, this is not surprising for the younger age groups (see Knight and Li
26
27 1996). The proportion of boys aged 13-15 increases household expenditure on children's
28
29 education by 14.65 percentage points, while girls aged 13-15 increase expenditure by a
30
31
32
33
34
35
36
37

38 ⁷ Other significant variables include the education of the household head and the proportion of men aged
39 56-65 in the household, along with a number of province dummy variables. The education of the household
40 head and the proportion of men aged 56-65 both have negative effects on children's educational
41 expenditures. There are numerous possible explanations. Regarding the education of the household head,
42 as expenditure is a proportion of household income if better educated household heads earn more income
43 then education fees form a smaller part of total household income. It is also possible that we have only
44 captured direct expenditure on children's education and not indirect spending. In other words, parents will
45 invest a set amount of time and resources in their children. More educated household heads may spend
46 more time investing in their children by helping them with homework or perhaps spend time and resources
47 on cultivating social networks to further the children's future opportunities. Less educated household heads
48 may not be able to invest in these other respects and thus their spending is direct, while indirect
49 expenditures and time spent are not captured in this estimation. Other factors could also include providing
50 health and support for their children, which could be reflected in parental time and their own forgone
51 consumption. The proportion of men aged 56-65 in the household probably include retirees who are not
52 now earning income but may require additional expenditure on their consumption that will take away from
53 spending on children's education. This corresponds to other studies in which adult men in the household
54 are associated with an increase in spending on alcohol and cigarettes and a decrease in spending on
55 education and health (for example, see Hoddinott and Haddad 1995). Finally, as compared with the omitted
56 province of Jiangsu, poorer provinces such as Liaoning, Anhui, Henan and Yunnan have significantly
57 negative coefficients.
58
59
60

1
2
3 smaller amount (13.17 percentage points).⁸ The situation is reversed for boys and girls
4 aged 16-18, in which the effects on household educational expenditure are respectively
5 14.34 percentage points and 19.98 percentage points. The results of this model suggest
6 that there are differential patterns of household expenditure on the education of boys and
7 girls that are significant for middle school children (ages 13-15 best correspond to lower
8 secondary school while ages 16-18 best correspond to upper secondary school).
9

10
11
12
13
14
15
16
17
18 Household expenditure patterns appear to favour boys aged 13-15, but girls aged 16-18.

19
20 We next include proxies for bargaining power as between spouses to
21 determine whether the unitary household decision-making model is the proper
22 specification. None of the proxies for spousal bargaining power is found to be significant
23 (see also IPS 1994⁹). One set of estimations is reported in Table 4.
24
25
26
27
28

29
30 [TABLE 4]
31

32
33 The results in Table 4 correspond to the unitary household decision-
34 making model (Table 3) in that girls aged 13-15 are associated with a smaller proportion
35 of household educational expenditure than boys of the same age cohort, while girls aged
36 16-18 receive more expenditure on their education than boys of the same ages.
37 Specifically, the proportion of girls aged 13-15 in the household increases expenditure by
38 13.14 percentage points, while boys of the same ages increase expenditure by 14.65
39 percentage points. The proportion of boys aged 16-18 increases household expenditure
40 on education by 14.33 percentage points, while girls aged 16-18 increases household
41
42
43
44
45
46
47
48
49
50
51

52
53
54 ⁸ Joint F-tests on all of these sets of coefficients reject the null hypothesis that they are equal for boys and
55 girls of the same age groups.

56 ⁹ The survey conducted by IPS (1994) finds little difference in responses regarding household expenditure
57 when spousal bargaining power is taken into account. The several measures of bargaining power include
58 spouses' age difference, educational levels and proportion of earned income.
59
60

1
2
3 expenditure by 19.98 percentage points. Joint F-tests on these sets of coefficients reject
4
5 the null hypothesis that they are equal for boys and girls of the same age groups. These
6
7 findings provide further support that the household spends more on daughters in upper
8
9 secondary school and sons in lower middle school.
10
11

12 13 *5.1 Accounting for school quality* 14

15 We attempted to isolate the effects of school quality by disaggregating
16
17 educational expenditures to the extent permitted by our data. Expenditures on children's
18
19 education comprise two items – expenditures on tuition and fees, and other expenditures.
20
21 Tuition and fees serve as our best proxy for school quality, as we do not have data on
22
23 actual schools in the survey. By separating the two categories, we may find that the
24
25 differences are a function of school quality insofar as better schools are more costly. The
26
27 mean value of tuition and fees is 398.80 RMB (with a standard deviation of 1027.85)
28
29 while it is 153.87 RMB (with a standard deviation of 683.89) for other educational
30
31 expenditures. We cannot identify these other expenditures, but posit that they include
32
33 school uniforms, transportation expenses and out-of-school tuition fees. None of the
34
35 coefficients on the age-gender household composition terms were significant and the link
36
37 with school quality is not clear cut.
38
39
40
41
42
43

44 45 *5.2 Implications of the one-child policy* 46

47 We also explore the implications of the one-child policy implemented in
48
49 the late 1970s and early 1980s on household expenditure on children's education, *i.e.*,
50
51 families with one child will spend on their child regardless of his or her gender. The
52
53 cohort of school-aged children in 1995 is affected by this policy. Table 5 gives the mean
54
55 values for household expenditure on children's education for single-child, single-boy and
56
57
58
59
60

1
2
3 single-girl households, as compared with all households with children that include single-
4
5 child households.
6
7

8 [TABLE 5 HERE]
9

10 Single-child households represent 60.3 percent of all households with
11 children in the sample. Of these households, 51.6 percent are single-boy households and
12 the remainder are single-girl households. Single-child households spend 2.55 percent
13 more on children's education than all households with children. Single-girl households
14 spend more, on average, on children's education in both sub-categories than single-boy
15 households. These figures suggest that parents are willing to spend more on education
16 where there is one child, and also that there may be more associated expenses for girls
17 than boys in single-child households, such as clothing, that are captured in the other
18 expenditure category. One possible explanation as to why tuition and school fees are also
19 higher for single-girl households may have to do with girls testing into better schools with
20 higher fees. However, our discussion above indicates that our data set does not permit us
21 to explore school quality. Given these patterns, nevertheless, we may find that the larger
22 educational expenditure associated with the proportion of girls aged 16-18 is explained by
23 single-girl households. Table 6 gives the results of the intrahousehold resource allocation
24 model of expenditure on children's education estimated for the sub-sample of single-child
25 households, and further disaggregated by single-boy and single-girl households.
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48

49 [TABLE 6 HERE]
50

51 The results of Table 6 do not shed further light on the degree to which the
52 age-gender composition of the household affects expenditure on children's education.
53
54 Although single-child households are a majority of the sample of households with
55
56
57
58
59
60

1
2
3 children, the age-gender composition variables are not significant in these estimations.
4
5
6 Therefore, the patterns of household expenditure on children's education are not well
7
8 explained by single-child households. In sum, we find that the proportion of household
9
10 expenditure on the education of children significantly differs for children aged 13-15 and
11
12 16-18, corresponding to the two levels of secondary school.
13
14

15 5.3 *Academic versus professional schools*

16
17
18 Table 7 shows there are more girls enrolled in middle level professional
19
20 school than boys, both in absolute numbers and as a percentage of the total aged 16-18.¹⁰
21
22 The reverse is true for upper middle school in which there are fewer girls than boys –
23
24 again both absolutely and as a percentage of total enrolment. It is possible that girls self-
25
26 select into professional rather than academic upper secondary school. The testing process
27
28 into upper middle school is another possibility. However, it is difficult to distinguish
29
30 ability from the influence of examination preparation at lower middle school that may
31
32 result from more household expenditure on the education of boys aged 13-15.
33
34
35

36
37 [TABLE 7 HERE]
38

39
40 Our original estimation of the intrahousehold resource allocation model
41
42 did not separate children according to whether they attended academic or professional
43
44 schools. To test for possible differences stemming from the type of school, we re-
45
46 estimate the household expenditure model.¹¹ The results are given in Table 8.
47
48

49 [TABLE 8 HERE]
50

51
52
53
54 ¹⁰ There are 499 boys aged 16-18, making the gender ratio 1.03 for this cohort.

55
56 ¹¹ The estimated model is of the unitary household decision-making form since we did not find evidence to
57 support a bargaining model.
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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.

1
2
3 education and enrolment of children? Table 9 and Figure 2 depict the educational
4 attainment of the adult population, divided into working-aged men and women (19-55)
5
6 and those aged 56 and over.
7
8

9
10
11 [TABLE 9 HERE]

12
13 [FIGURE 2 HERE]

14
15
16 Using the earnings data in the survey, we predict mean annual income for
17 men and women with each level of educational attainment standardising for the
18 characteristics of their respective samples (see the Appendix for the earnings functions).
19
20 These findings are consistent with studies of returns to education in China and in
21 particular with the results of other researchers using this data set specifically to
22 investigate returns to education (*e.g.*, Knight and Li 1996). Predicted mean annual
23 income is higher for sons than daughters with the average characteristics of the sample for
24 all educational levels (Table 10).
25
26
27
28
29
30
31
32
33

34
35 [TABLE 10]

36
37 We conclude that parents spend more on the education of sons than
38 daughters who are aged 13-15 on account of men receiving higher rates of return to
39 education. However, parents spend more on daughters than sons aged 16-18 in both types
40 of upper secondary school. The evidence suggests that higher rates of return to education
41 cannot be the motivation in the latter case because men earn higher returns than women in
42 upper middle school. Of the possible explanations, it is also plausible that there are
43 different kinds of families in the sample. The parents who spend more on daughters aged
44 16-18 may have also spent more on daughters at the time when they were aged 13-15 than
45 on sons of the same age groups. However, we are unable to test this outcome without
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 data for the same families from previous years. We turn to another possible explanation
4
5 which is that there are future transfers to consider when parents make investment
6
7 decisions that are based not just on the standard returns to education for the child but on
8
9 his or her future expected household income. Because we do not have two generations of
10
11 data on transfers to parents, we will estimate expected future transfers to parents based on
12
13 assessing children's future household income, which is consistent with the theories of
14
15 parental investment when parents look ahead to expected returns in making current
16
17 investment decisions.
18
19
20
21

22
23 To obtain the expected household income of a child, we need to
24
25 incorporate theories of assortative mating to predict the likely income of a child's future
26
27 potential spouse. The predicted annual mean income of the children's likely future
28
29 spouse is the predicted annual mean income of men and women weighted by the
30
31 probabilities of marrying a spouse who has attained each educational level based on Table
32
33 11.
34
35
36

37 [TABLE 11]
38

39
40 Table 11 shows that 82.3 percent of women of each level of educational
41
42 attainment marry at or above their own educational level, while it is less (55.5 percent)
43
44 for men. In the absence of perfect assortative mating, parents have only a probabilistic
45
46 expectation that a child will marry a spouse with comparable education based on the
47
48 distribution of the educational attainment of spouses in the current cohort of married
49
50 couples. In other words, a woman with educational attainment at or above the college
51
52 level has a 60.47 percent chance of marrying a man who has attained the same level of
53
54 education, a 15.28 percent chance of marrying a man with a professional school
55
56
57
58
59
60

1
2
3 education, a 7.31 percent chance of marrying a man of middle level professional school
4
5 educational attainment, a 7.64 percent chance of marrying a man who has completed
6
7 upper middle school, a 3.65 percent chance of marrying a man who has completed lower
8
9 middle school, a 0.66 percent chance of marrying a man with a primary school education
10
11 and probability of naught of marrying a man with less than primary school education.
12

13
14 These weights are multiplied by the respective predicted annual mean income of men
15
16 who have completed each level of education. If there were perfect assortative mating,
17
18 then column (1) would equal column (4) and columns (2) and (3) would be equal in Table
19
20 12. The combined income of the child and that of their likely future spouse's generates
21
22 an expectation of the child's future household income from which parents may obtain
23
24 transfers, shown in Table 12.
25
26
27
28

29
30 [TABLE 12 HERE]
31

32
33 Table 13 gives the predicted mean annual income for the future
34
35 households of daughters and sons based on their respective expected mean income and
36
37 that of their likely spouse [column (1) in Table 13 is the sum of columns (1) and (4) in
38
39 Table 12, while column (2) in Table 13 is the sum of columns (2) and (3) in Table 12].
40
41 Expected mean annual household income is higher for daughters than sons for each level
42
43 of educational attainment. These are static expectations and may not accurately reflect
44
45 the rapid economic changes taking place in China in 1995. However, to the extent that
46
47 parents act on available information, this exercise is useful in attempting to gain an
48
49 understanding of parental expectations of future transfers.
50
51
52

53
54 [TABLE 13 HERE]
55
56
57
58
59
60

1
2
3 We find that the smallest difference between the expected future
4 household income of sons and daughters is for those who have completed lower middle
5 school, while the largest difference is for those who have completed middle level
6 professional school. This coincides with our finding that parents invest more in sons than
7 daughters aged 13-15 (corresponding to lower middle school) but more in daughters than
8 sons aged 16-18 (corresponding to upper secondary school).
9
10
11
12
13
14
15
16

17
18 Finally, by law children have an obligation to support their parents.¹³ In
19 addition, approximately 80 percent of all persons are employed in the state sector in urban
20 China that provides pensions.¹⁴ This may reduce some of the tendency to favour sons
21 over daughters that arises in rural China, which lacks pension schemes and has a greater
22 adherence to traditional preferences for boys discussed earlier. When also considered in
23 light of the large number of families with one child, there may also be a diminished
24 expectation of relying on sons in old age. This could reinforce the interpretation that
25 there intertemporal concerns are strong, and there are indeed future transfers to consider.
26 These explanations are also consistent with a degree of altruism in China, heightened by
27 the one-child policy, which suggests changing traditions in urban areas.
28
29
30
31
32
33
34
35
36
37
38
39
40
41

42 **7 Conclusion**

43
44 This paper used a strand of models – intrahousehold resource allocation
45 approach – to test the extent to which parents forgo current consumption to invest in their
46 children’s human capital. Utilising these models, we were able to measure parental
47
48
49
50
51
52

53
54 ¹³ See The Protection of the Rights and Interests of Old People Law (October 1, 1996), particularly Article
55 11: “Children and their spouses are both to support their parents both financially, spiritually and of their
56 particular needs.” There is a counterpart in the criminal law providing for sanctions.
57

58 ¹⁴ Of the 15,233 employed individuals, the workplace is SOEs for 12,157 persons.
59
60

1
2
3 expenditure on children's education rather than own consumption, providing a test of
4
5
6 parental investment models for urban China.
7

8 Our findings were that the proportion of household resources allocated to
9
10 children's education in urban China in 1995 is not well explained by examining only
11
12 returns to education or a preference for boys. If a bias for sons were the governing
13
14 motivation, then we would not expect to find more expenditure on the education of
15
16 daughters aged 16-18. Rather, the evidence suggests otherwise.
17
18

19
20 Insofar as expenditures on children's education entail forgone
21
22 consumption, parents are likely to be efficient as well as altruistic in their decisions. This
23
24 is reinforced by specific intertemporal considerations found in China, such as the
25
26 expectation that parents in retirement will depend on transfers from children, as well as
27
28 on assets, for consumption in an imperfect credit market and pensions system. Moreover,
29
30 the circular nature of perceived future labour market discrimination will affect the
31
32 investment decision in counteracting ways.
33
34
35
36

37 Future labour market discrimination will cause investment to differ for
38
39 sons and daughters. Given perceived gender earnings differentials, parents will invest
40
41 more in the human capital of sons, in accordance with standard returns to education
42
43 analyses. A second consideration in our adapted model is expected transfers. Favourable
44
45 assortative mating will generate higher returns from investments in daughters than in
46
47 sons. This is owing to the same gender earning differentials that will cause daughters to
48
49 marry spouses with higher returns to human capital and augment their future household
50
51 income more than for sons. We thus expect that parents will invest more in the human
52
53 capital of daughters. These two effects are endogenous and co-exist. For urban China,
54
55
56
57
58
59
60

1
2
3 we find evidence consistent with these two effects. With some limitations to the
4
5 interpretation of the results, the empirical data calibrating household consumption
6
7 provides some evidence of the human capital models.
8
9

10
11 In conclusion, there are some – but not large – gender differences in the
12
13 educational enrolment of school-aged children in urban China. Despite more expenditure
14
15 on the education of girls than boys aged 16-18, there is evidence that girls have higher
16
17 attrition rates beyond lower middle school, are more likely to be enrolled in professional
18
19 than academic schools, and expect lower returns to this education than boys. Therefore,
20
21 we find gender differences in urban China are the likely result of perceived earnings
22
23 inequality that may in turn cause these children to receive unequal investment in their
24
25 human capital prior to entering the labour market.
26
27
28

29
30 [APPENDIX TABLES A1-3 HERE]
31

32 **References**

- 33
34
35 Alderman, H. and P. Gertler. 1997. Family Resources and Gender Differences in Human
36 Capital Investments: The Demand for Children's Medical Care in Pakistan. *Intrahousehold Resource Allocation in Developing Countries: Models, Methods and Policy*. L. Haddad, J. Hoddinott and H. Alderman, eds. Baltimore: The Johns Hopkins University Press.
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
- Becker, G.S. 1993 [1964]. *Human Capital*. Chicago: University of Chicago Press.
- Becker, G.S. 1981. *A Treatise on the Family*. Cambridge, Massachusetts: Harvard University Press.
- Becker, G.S. 1993. Nobel Lecture: The Economic Way of Looking at Behavior. *The Journal of Political Economy* 101(3), 385-409.
- Becker, G.S. and G.H. Lewis. 1973. On the Interaction between the Quantity and Quality of Children. *Journal of Political Economy* 81(2:2), S279-S288.

- 1
2
3 Behrman, J.R. 1997. Intrahousehold Distribution and the Family. *Handbook of*
4 *Population and Family Economics*. M.R. Rosenzweig and O. Stark, eds.
5 Amsterdam: North-Holland.
6
7
8 Behrman, J.R. and J.C. Knowles. 1999. Household Income and Child Schooling in
9 Vietnam. *The World Bank Economic Review* 13(2): 211-256.
10
11 Behrman, J.R., R.A. Pollak, P. Taubman. 1995. The Wealth Model: Efficiency in
12 Education and Equity in the Family. *From Parent to Child: Intrahousehold*
13 *Resource Allocations and Intergenerational Relations in the United States*. J.R.
14 Behrman, R.A. Pollak, P. Taubman, ed. Chicago: University of Chicago Press.
15
16
17 Behrman, J.R. and M.R. Rosenzweig. 2002. Does Increasing Women's Schooling Raise
18 the Schooling of the Next Generation? *American Economic Review* 92(1), 323-
19 334.
20
21
22 Beneito, P., J. Ferri, M. Luisa Moltó, E. Uriel. 2001. Determinants of the Demand for
23 Education in Spain. *Applied Economics* 33(12), 1541-1551.
24
25
26 Borjas, G.J. 1992. Ethnic Capital and Intergenerational Income Mobility. *The Quarterly*
27 *Journal of Economics* 107(1), 123-150.
28
29
30 Bound, J., D.A. Jaeger, and R.M. Baker. 1995. Problems with Instrumental Variables
31 Estimation When the Correlation between the Instruments and the Endogenous
32 Explanatory Variable is Weak. *Journal of the American Statistical Association*
33 90(430), 443-450.
34
35
36 Croll, E. 1994. *From Heaven to Earth*. London: Routledge.
37
38 Deaton, A. 1989. Looking for Boy-Girl Discrimination in Household Expenditure Data.
39 *The World Bank Economic Review* 3(1), 1-15.
40
41
42 Deaton, A. 1997. *The Analysis of Household Surveys*. Baltimore: The Johns Hopkins
43 University Press for The World Bank.
44
45
46 DeTray, D. 1988. Government Policy, Household Behavior, and the Distribution of
47 Schooling: A Case Study of Malaysia. *Research in Population Economics* 6, 303-
48 336.
49
50
51 Doss, C.R. 1996. Testing Among Models of Intrahousehold Resource Allocation.
52 *World Development* 24(10), 1597-1609.
53
54
55 Greene, W.H. 1997 [1993]. *Econometric Analysis*. New Jersey: Prentice-Hall, Inc.
56
57
58
59
60

- 1
2
3 Haddad, L., J. Hoddinott and H. Alderman, eds. 1997. *Intrahousehold Resource*
4 *Allocation in Developing Countries: Models, Methods and Policy*. Baltimore:
5 The Johns Hopkins University Press.
6
7
8
9 Haddad, L. and J. Hoddinott. 1994. Women's Income and Boy-Girl Anthropometric
10 Status in the Côte d'Ivoire. *World Development* 22(4), 543-553.
11
12
13 Knight, J.B. and S. Li. 1996. Educational Attainment and the Rural-Urban Divide in
14 China. *Oxford Bulletin of Economics and Statistics* 58(1), 83-117.
15
16
17 Knight, J.B. and L. Song. 2000. Differences in Educational Access in Rural China.
18 Presented at the American Economics Association Annual Meeting, 7-9 January
19 2000. Boston, Massachusetts, USA.
20
21
22 Lee, C.K. 1998. The Labor Politics of Market Socialism: Collective Inaction and Class
23 Experiences Among State Workers in Guangzhou. *Modern China* 24(1), 3-33.
24
25 Lundberg, S. and R.A. Pollack. 1996. Bargaining and Distribution in Marriage. *The*
26 *Journal of Economic Perspectives* 10(4), 139-158.
27
28 Mincer, J. 1974. *Schooling, Experience, and Earnings*. New York: Columbia
29 University Press.
30
31 National Bureau of Statistics (NBS). 1997a. *China: Facts and Figures*. Beijing: China
32 Statistics Press (in Chinese).
33
34
35 National Bureau of Statistics (NBS). 1997b. *Gender Statistics in China (1990-1995)*.
36 Beijing: China Statistics Press (in Chinese).
37
38
39 Naughton, B. 1996. *Growing out of the Plan*. Cambridge: Cambridge University Press.
40
41
42 Parish, W.L. and R.J. Willis. 1993. Daughters, Education, and Family Budgets: Taiwan
43 Experiences. *The Journal of Human Resources* 28(4): 863-898.
44
45
46 Rosenweig, M.T. and T.P. Schultz. 1982. Market Opportunities, Genetic Endowments,
47 and Intrafamily Resource Distribution: Child Survival in Rural India. *American*
48 *Economic Review* 72(4), 803-815.
49
50
51 Salm, D.E. and A. Gerstle. 2004. Child Allowances and Allocative Decisions in
52 Romanian Households. *Applied Economics* 36(14), 1513-1521.
53
54
55 Sicilian, P. and A.J. Grossberg. 2001. Investment in Human Capital and Gender Wage
56 Differences: Evidence from the NLSY. *Applied Economics* 33(4), 463-471.
57
58
59
60

1
2
3 Song, L. 2001. Gender Effects on Household Resource Allocation in Rural China.
4 *Equality in Retreat*. C. Riskin, R. Zhao and S. Li, eds. Armonk, New York: M.E.
5 Sharpe.
6

7
8 Thomas, D. and J. Strauss. 1997. Health and Wages: Evidence on Men and Women in
9 Urban Brazil. *Journal of Econometrics* 77, 159-185.
10

11 United Nations Organization for Education, Science and Culture (UNESCO). 1999.
12 *UNESCO Statistical Yearbook 1999*. Paris: UNESCO.
13

14
15 World Bank. 2000a. *Gender Statistics: China*. Washington DC: The World Bank.
16

17
18 World Bank. 2000b. *World Development Report 1999/2000*. Washington DC: The
19 World Bank.
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

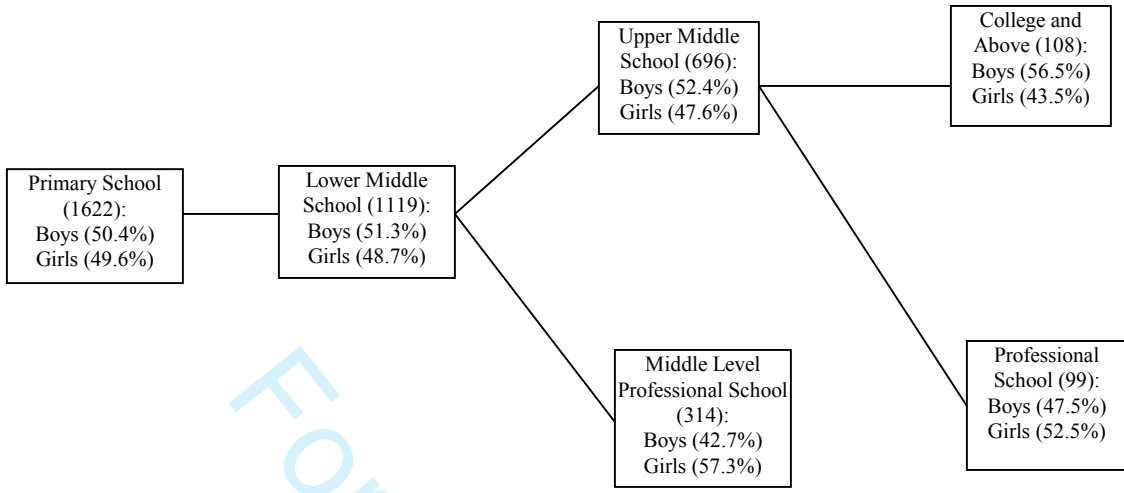


Figure 1

For Peer Review

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

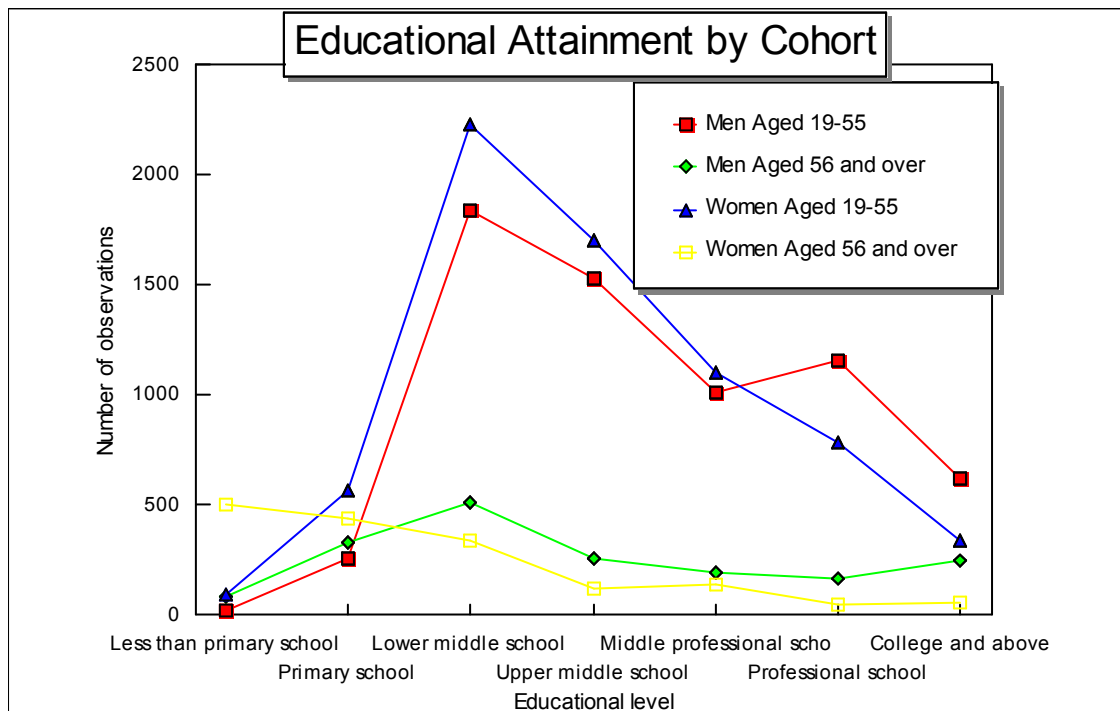


Figure 2

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 (1997b), UNESCO (1999) and World Bank (2000a, 2000b).

- 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

<u>Dependent Variable:</u> Proportion of Household Resources Expended on Children's Education	Coefficient (t-statistic)	Mean Value or Percentage (standard deviation)
Intercept	-0.0776 (-0.374)	0.0469 ¹⁵ (0.0898)
<u>Household Characteristics:</u>		
Log of household expenditure per capita (predicted)	-0.0088 (-1.119)	8.1370 ¹⁶ (0.3157)
Log of number of household members (predicted) ¹⁷	0.1366 (1.119)	1.1062 ¹⁸ (0.2016)
Communist Party membership of any member of the household	0.0051 (1.135)	0.4564 (0.4981)
One-generation household	0.1186 (1.291)	0.1552 (0.0871)
Two-generation household	0.0498 (1.706)*	0.7816 (0.3622)
Three-generation household	0.0052 (0.377)	0.0555 (0.2291)
<u>Characteristics of Household Head:</u>		
Male	-0.0072 (-1.548)	0.6593 (0.4740)
Educational level	-0.0033 (-3.373)***	3.8015 (1.5173)
Occupation	-0.0012 (-1.631)	5.5657 (1.9401)
<u>Age-Gender Composition of Household:</u>		
Male aged 0-6	-0.0096 (-0.233)	0.0256 (0.0862)
Male aged 7-12	0.0583 (1.349)	0.0382 (0.1046)
Male aged 13-15	0.1465 (3.719)***	0.0270 (0.0894)
Male aged 16-18	0.1434 (6.180)***	0.0209 (0.0785)
Male aged 19-55	-0.0027 (-0.147)	0.2893 (0.1711)
Male aged 56-65	-0.0440 (-2.061)**	0.0653 (0.1503)
Male aged 66 and over	-0.0404 (-1.398)	0.0299 (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 (-0.466)	0.0235 (0.0831)
Female aged 7-12	0.0636 (1.418)	0.0402 (0.1071)
Female aged 13-15	0.1317 (3.852)***	0.0237 (0.0844)
Female aged 16-18	0.1998 (9.348)***	0.0212 (0.0780)
Female aged 19-55	0.0136 (0.589)	0.3094 (0.1634)
Female aged 56-65	0.0052 (0.168)	0.0593 (0.1492)
<u>Provinces:</u>		
Beijing	-0.00004 (-0.007)	0.0721 (0.2587)
Shanxi	-0.0106 (-1.324)	0.0937 (0.2915)
Liaoning	-0.0207 (-4.242)***	0.1010 (0.3013)
Anhui	-0.0095 (-1.695)*	0.0721 (0.2587)
Henan	-0.0265 (-3.465)***	0.0865 (0.2812)
Hubei	0.0018 (0.391)	0.1070 (0.3091)
Guangdong	-0.0070 (-0.875)	0.0787 (0.2694)
Sichuan	-0.0049 (-1.261)	0.1223 (0.3277)
Yunnan	-0.0100 (-2.021)**	0.0935 (0.2911)
Gansu	-0.0040 (-0.616)	0.0577 (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

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

<u>Provinces:</u>		
Beijing	-0.0001 (-0.009)	0.0721 (0.2587)
Shanxi	-0.0106 (-1.338)	0.0937 (0.2915)
Liaoning	-0.0207 (-4.269)***	0.1010 (0.3013)
Anhui	-0.0096 (-1.691)*	0.0721 (0.2587)
Henan	-0.0265 (-3.489)***	0.0865 (0.2812)
Hubei	0.0018 (0.389)	0.1070 (0.3091)
Guangdong	-0.0070 (-0.877)	0.0787 (0.2694)
Sichuan	-0.0062 (-1.256)	0.1223 (0.3277)
Yunnan	-0.0100 (-2.023)**	0.0935 (0.2911)
Gansu	-0.0040 (-0.615)	0.0577 (0.2331)
<u>Proxy for Bargaining Power:</u>		
Wife's years of education as a proportion of the husband's and wife's combined years of education	0.0014 (0.106)	0.6259 (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

<u>Dependent Variable:</u> 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)
<u>Household Characteristics:</u>						
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)
<u>Characteristics of Household Head:</u>						
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)
<u>Age-Gender Composition of Household:</u>						
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 (-1.095)	-0.0676 (-0.686)	-0.0647 (-0.608)	0.0101 (0.0506)	0.0099 (0.0496)	0.0102 (0.0517)
Female aged 0-6	0.1971 (0.315)	---	0.6192 (0.531)	0.0346 (0.1006)	0.00 (0.00)	0.0716 (0.1352)
Female aged 7-12	0.2771 (0.439)	---	0.7007 (0.594)	0.0598 (0.1284)	0.00 (0.00)	0.1236 (0.1618)
Female aged 13-15	0.3512 (0.572)	---	0.7593 (0.661)	0.0332 (0.1008)	0.00 (0.00)	0.0685 (0.1362)
Female aged 16-18	0.4056 (0.678)	---	0.8011 (0.718)	0.0284 (0.0873)	0.00 (0.00)	0.0587 (0.1249)
Female aged 19-55	-0.0010 (-0.016)	-0.0288 (-0.310)	0.0394 (0.362)	0.3195 (0.0653)	0.3216 (0.0850)	0.3173 (0.0897)
Female aged 56-65	-0.0085 (-0.143)	-0.0241 (-0.361)	0.0433 (0.316)	0.0164 (0.0603)	0.0166 (0.0648)	0.0162 (0.0659)
<u>Provinces:</u>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>			
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)

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

Female aged 13-15	0.1080 (3.126)***	0.0237 (0.0844)
Female aged 16-18 enrolled in upper middle school	0.1885 (6.954)***	0.0093 (0.0530)
Female aged 16-18 enrolled in middle level professional school	0.2595 (7.598)***	0.0049 (0.0385)
Female aged 16-18 enrolled in college and above	0.4370 (4.846)***	0.0005 (0.0133)
Female aged 16-18 enrolled in professional school	0.2446 (3.121)***	0.0009 (0.0164)
Female aged 16-18 not enrolled in school	-0.0243 (-0.529)	0.0025 (0.0264)
Female aged 19-55	-0.0036 (-0.153)	0.3094 (0.1634)
Female aged 56-65	-0.0107 (-0.340)	0.0593 (0.1492)
<u>Provinces:</u>	<i>Yes</i>	<i>Yes</i>
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.

For Peer Review

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

Men \ Women	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 Middle Level	6,622.82	6,302.31	5.09%	5,701.34	6,242.95
Professional School Upper Middle School	5,994.66	5,812.54	3.13%	5,492.40	6,220.49
Lower Middle School	5,528.95	5,423.29	1.95%	5,368.68	5,729.30
Primary School	5,575.43	5,359.46	4.03%	5,206.68	5,641.78
	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 Intra-household 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 (81.160)***	8.1366 (0.7323)
<u>Household Characteristics:</u>		
Ownership of telephone ¹⁹	0.1330 (14.762)***	1.7277 (0.9265)
One-generation household	0.6610 (7.094)***	0.1552 (0.3622)
Two-generation household	0.1917 (2.099)**	0.7816 (0.4132)
Three-generation household	0.0262 (0.270)	0.0556 (0.2291)
<u>Provinces:</u>		
Beijing	0.2075 (5.437)***	0.0721 (0.2587)
Shanxi	-0.4150 (-11.743)***	0.0937 (0.2915)
Liaoning	-0.1107 (-3.211)***	0.1010 (0.3013)
Anhui	-0.2582 (-6.830)***	0.0721 (0.2587)
Henan	-0.3637 (-10.081)***	0.0865 (0.2812)
Hubei	-0.0910 (-2.671)***	0.1070 (0.3091)
Guangdong	0.3609 (9.367)***	0.0787 (0.2694)
Sichuan	-0.0865 (-2.616)***	0.1223 (0.3277)
Yunnan	-0.1260 (-3.587)***	0.0935 (0.2911)
Gansu	-0.3327 (-8.113)***	0.0577 (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.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

For Peer Review

Table A2
Instrumenting for the Number of Household Members

<u>Dependent Variable:</u> Log of Number of Household Members	Coefficient (t-statistic)	Mean Value or Percentage (standard deviation)
Intercept	1.3758 (53.586)***	1.1063 (0.2683)
<u>Household Characteristics:</u>		
Type of house ²⁰	0.0053 (4.228)***	4.3238 (1.7279)
One-generation household	-0.7434 (-29.789)***	0.1552 (0.3622)
Two-generation household	-0.2357 (-9.631)***	0.7816 (0.4132)
Three-generation household	0.0071 (0.272)	0.0556 (0.2291)
<u>Provinces:</u>		
Beijing	-0.0246 (-2.431)**	0.0721 (0.2587)
Shanxi	0.0384 (4.093)***	0.0937 (0.2915)
Liaoning	0.0072 (0.776)	0.1010 (0.3013)
Anhui	-0.0113 (-1.122)	0.0721 (0.2587)
Henan	0.399 (4.163)***	0.0865 (0.2812)
Hubei	-0.0004 (-0.039)	0.1070 (0.3091)
Guangdong	0.0414 (4.195)***	0.0787 (0.2694)
Sichuan	-0.0186 (-2.119)**	0.1223 (0.3277)
Yunnan	-0.0049 (-0.519)	0.0935 (0.2911)
Gansu	0.0190 (-1.743)*	0.0577 (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 (26.366)***	6.3827 (26.574)***	1.0595 (0.867)	6.3395 (30.116)***	6.2928 (29.818)***	8.7290 (0.6015)	8.5094 (0.6671)
<u>Education Level Completed:</u>								
College and above	-3.5194 (-2.799)***	0.6015 (3.910)***	0.5968 (3.873)***	0.4258 (0.806)	0.5803 (5.734)***	0.5901 (5.829)***	0.0968 (0.2957)	0.0500 (0.2181)
Professional school	-3.4707 (-2.736)***	0.5079 (3.324)***	0.5042 (3.294)***	0.8892 (1.638)	0.5287 (5.440)***	0.5384 (5.537)***	0.1792 (0.3836)	0.1148 (0.3188)
Middle level professional school	-3.6339 (-2.978)***	0.4400 (2.883)***	0.4352 (2.847)***	0.5049 (1.059)	0.4587 (4.761)***	0.4681 (4.857)***	0.1577 (0.3644)	0.1620 (0.3685)
Upper middle school	-3.6631 (-2.928)***	0.4199 (2.766)***	0.4161 (2.736)***	0.3382 (0.737)	0.3147 (3.306)***	0.3226 (3.387)***	0.2372 (0.4254)	0.2495 (0.4327)
Lower middle school	-3.9632 (-3.139)***	0.3309 (2.197)**	0.3272 (2.169)**	0.3480 (0.772)	0.1987 (2.100)**	0.2062 (2.179)**	0.2856 (0.4518)	0.3270 (0.4691)
Primary school	-4.0891 (-3.159)***	0.2403 (1.559)	0.2359 (1.528)	5.3015 (---)	0.1050 (1.080)	0.1135 (1.168)	0.0401 (0.1961)	0.0829 (0.2758)
<u>Personal Characteristics:</u>								
Age	0.0892 (1.331)	0.0865 (9.817)***	0.0844 (9.602)***	0.0397 (0.681)	0.0912 (10.477)***	0.0930 (10.659)***	37.8879 (9.7425)	37.6909 (9.5860)
Age squared	-0.0015 (-1.635)	-0.0010 (-9.730)***	-0.0010 (-9.502)***	-0.0008 (-1.092)	-0.0013 (-12.134)***	-0.0013 (-12.317)***	1530.3910 (726.3334)	1512.4850 (715.1966)
Experience	0.0370 (1.833)*	0.0118 (4.424)***	0.0120 (4.457)***	0.0343 (2.562)***	0.0248 (10.333)***	0.0249 (10.349)***	19.6987 (9.5261)	18.4391 (9.04993)
Occupation	0.0502 (1.355)	-0.0171 (-2.795)***	-0.0174 (-2.841)***	0.0559 (1.827)*	-0.0265 (-3.911)***	-0.0260 (-3.827)***	5.7091 (1.9060)	6.0445 (2.0866)
Communist Party member	4.8251 (---)	0.0941 (6.254)***	0.0948 (6.288)***	4.8998 (---)	0.1135 (5.852)***	0.1136 (5.848)***	0.2967 (0.4568)	0.1327 (0.3392)
Have children	-0.7163 (-2.675)***	---	---	-0.6401 (-3.120)***	---	---	0.2165 (0.4119)	0.1752 (0.3802)
<u>Provinces:</u>								
Beijing	4.5410 (---)	0.2956 (7.277)***	0.2954 (7.264)***	-0.1185 (-0.284)	0.2035 (4.376)***	0.2032 (4.367)***	0.0249 (0.1556)	0.0219 (0.1463)
Shanxi	4.4274 (---)	0.2506 (6.412)***	0.2515 (6.423)***	4.4978 (---)	0.2505 (8.092)***	0.2511 (8.103)***	0.0281 (0.1653)	0.0277 (0.1642)
Liaoning	0.0019 (0.004)	0.1953 (3.721)***	0.1951 (3.712)***	0.0932 (0.231)	0.1877 (5.144)***	0.1877 (5.138)***	0.0317 (0.1752)	0.0305 (0.1720)
Anhui	0.0150 (0.034)	-0.0942 (-2.250)**	-0.0943 (-2.249)**	-0.3659 (-1.246)	-0.2046 (-3.532)***	-0.2053 (-3.538)***	0.0248 (0.1557)	0.0241 (0.1533)
Henan	-0.3038 (-0.764)	-0.3192 (-7.748)***	-0.3197 (-7.741)***	-0.0483 (-0.114)	-0.4266 (-8.471)***	-0.4261 (-8.449)***	0.0278 (0.1644)	0.0264 (0.1604)
Hubei	-0.5016 (-1.855)*	-0.0921 (-3.033)***	-0.0929 (-3.054)***	-0.0416 (-0.118)	-0.0358 (-1.225)	-0.0363 (-1.239)	0.0407 (0.1976)	0.0379 (0.1909)
Guangdong	4.7400 (---)	0.1027 (2.959)***	0.1040 (2.992)***	4.5054 (---)	0.0009 (0.018)	0.0009 (0.019)	0.0235 (0.1514)	0.0217 (0.1458)
Sichuan	0.1293 (0.317)	-0.0946 (-2.074)**	-0.0946 (-2.071)**	-0.3896 (-1.659)*	-0.3216 (-6.914)***	-0.3226 (-6.928)***	0.0395 (0.1947)	0.0374 (0.1898)
Yunnan	4.3650 (---)	0.1445 (4.142)***	0.1451 (4.150)***	4.5103 (---)	0.1288 (3.580)***	0.1290 (3.578)***	0.0287 (0.1671)	0.0283 (0.1659)
Gansu	4.5275 (---)	0.1716 (4.386)***	0.1725 (4.398)***	4.4911 (---)	0.2262 (5.986)***	0.2265 (5.978)***	0.0163 (0.1267)	0.0160 (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	---	---		
χ^2 (22)	92.07***	---	---	90.98***	---	---		
Wald χ^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.