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In 1987, 4 per cent of girls were adopted within China. Why? Unlike infanticide, abandonment rids parents of daughters while preserving the supply of potential brides. In fact, an erstwhile tradition common in Fujian and Jiangxi provinces had parents of sons adopting an infant girl to serve as a future daughter-in-law and household help. Analysing a nationally representative 1992 survey of children, we found that: (1) girl adoptions were concentrated in the above-mentioned provinces; (2) girls were predominantly adopted by families with sons; (3) adopted girls faced substantial disadvantage as measured by school attendance at ages 8–13. In the 1990s, as the sex ratio at birth climbed, were girls aborted rather than abandoned? Observing that in the 2000 census too many girls appear in families with older sons, we estimated that at least 1/25 girls were abandoned in the 1990s, a proportion that in Fujian and Jiangxi may have peaked at 1/ 10 in 1994.

1. Introduction

In 1987 alone, some 440,000 girls were adopted in China (Johansson and Nygren 1991, Table 4), seemingly providing a counterpoint to son preference as evidenced by millions of 'missing' girls. However, demand for a son in Chinese culture is demand for a son who marries. A son who does not jeopardizes the continuation of the family line, the most unfilial of acts. Unmarried men go by the derogatory term 'bare branches'. Thus there is demand for daughters-in-law, just not daughters.

However, daughters-in-law do not grow on trees. They start as somebody's daughter. The Chinese developed an ingenious solution to this problem. Late Imperial China knew three forms of marriage: major, minor, and uxoriloca (Cheung 1972). Uxorilocal marriage aside, both major and minor marriage entailed acquiring a bride. The difference lay in how and when she was procured. In major marriage, a bride price was paid and the bride entered her new household as an adult. In minor marriage, by contrast, the girl was 'adopted' by her future in-laws as an infant and brought up in their household. While minor marriage incurred the cost of raising the girl, it was generally considered cheaper than major marriage. Still, it was not exclusively chosen by the poor. For better-off families, the greater submissiveness of a 'little-daughter-in-law' (*t'ung-yang-hsi* (or pinyin: tong yang xi), or *sim-pua*) groomed from an early age, and the domestic labour she could provide, were key advantages. This marriage form has received relatively little attention despite being commonly practised. Commenting on this, Wolf (1968, p. 864) wrote: 'The slight attention paid to this form of marriage in general books on the Chinese family creates the impression that such marriages are rare. This may be true of the North China Plain, Manchuria, and the Shantung Peninsula, but it is certainly not true of the lower Yangtze delta, the south-eastern hills and the Hokkien-speaking areas of *Fukien* [Fujian] and Taiwan. An article printed in a number of provincial newspapers tells us that 16,454 t'ung-yang-hsi were "freed" in *Kiangsi* [Jiangxi] province in the first two years following the promulgation of new marriage laws in May of 1950'.

While the erstwhile little-daughter-in-law tradition is unlikely to translate literally to the present day, parents of sons may still find a girl useful. The looming bride shortage has rekindled concerns about a son's chance of marrying (e.g., Greenhalgh

et al. 1994; Wei and Zhang 2011). A girl provides insurance to families with only sons. The addition of a girl ensures that the family appears on both sides of future marriage transactions. Until then, she can help with household chores (Chu 2001) and provide companionship.

In fact, families have been found to adopt 'the missing sex' (Johnson et al. 1998; Liu et al. 2004a; Zhang 2006b) (which, incidentally, suggests that childlessness is not the main driver of adoption in China). Families with girls adopt boys, families with boys adopt girls, a pattern that can be interpreted in diametrically opposed ways. It could be the result of a 'gender neutral' desire for a mix. It is also consistent with son preference.

Traditionally, families lacking a son could adopt one so as to ensure the continuation of the family line; and families with boys only could adopt girls to serve as future daughters-in-law. Adoption elevated boys and demoted girls. Adoption transformed a low-ranking boy into an heir and a daughter into a daughter-in-law. The latter freed parents from the need to raise daughters and allowed parental attention and affection to flow undivided to sons.

In our study we pursued two questions: (1) why are girls adopted in China, a country better known for son preference and abandonment of daughters?; and (2) at what level did internal adoptions (and by implication, abandonments) continue past the early 1990s? To address the first question, we analysed the 1992 National Sample Survey of the Situation of Children (NSSSC) sponsored by the State Statistics Bureau of China and UNICEF. The NSSSC is the first nationally representative survey to focus on children in China. It is also the last such survey to include direct information on the adoptive status of the child. To answer the second question, we turned to the 1990 and 2000 population censuses and a curious fact that has been hiding in plain sight: sex ratios were increasingly *girl*-biased following the birth of sons. In the 1990 census, among families that already had two sons, at third parity the sex ratio was 74 boys to 100 girls (Zeng et al. 1993, Table 7). By the 2000 census, that number had dropped to 64 boys (Ebenstein 2010, Table 1).

The continued prevalence of girl adoption and the surplus girls evident in the censuses are of interest in their own right. The continued prevalence of girl adoption despite increasing use of prenatal sex selection may also shed light on the process governing girl abandonment. A naive hypothesis is that abandoned girls are unconditionally unwanted; had sex-selective abortion been available, these girls would not have been born. If so, the rise in sex

Table 1 Descriptive data (proportions) for variables used in a study of adoption in China, 1992

	Own-birth children		Adopted children	
	Boys	Girls	Boys	Girls
School				
Attended	0.92	0.87	0.85	0.72
Enrolled	0.96	0.91	0.89	0.79
Sibship				
1	0.22	0.15	0.16	0.15
2	0.49	0.45	0.38	0.38
3	0.23	0.30	0.35	0.37
4	0.06	0.11	0.12	0.10
First-born	0.59	0.61	0.57	0.47
Mother no schooling	0.38	0.38	0.44	0.47
Family income	3,724	3,758	4,818	4,187
Yuan/year (st. dev.)	(3,314)	(3,427)	(4,731)	(3,447)
Brothers	0.53	0.77	0.45	1.02
(st. dev.)	(0.64)	(0.66)	(0.65)	(0.78)
Observations	88,245	77,400	170	541

Note: All variables except family income and number of brothers are indicator variables
Source: NSSSC 1992.

ratios at birth, from 111 (boys/100 girls) in 1990 to 120 in 2000 (Li 2007), would have substantially reduced supply and thus of the opportunity for adoptions. If, on the other hand, daughters are kept as insurance against childlessness and only given up when another child is expected (see, e.g., Johnson et al. 1998; Xinran 2010), then girl abandonments and adoptions might continue unabated despite the ready availability of prenatal sex selection. In this latter situation, girls are abandoned not at birth but as toddlers or preschoolers, an age at which the abandonment–adoption cycle is, it is plausible to assume, more damaging.

Girl abandonment and subsequent adoption is not the only possible reason for surplus girls. Abandonment or abortion of boys is another candidate. If indeed deselection of sons were carried out on the scale suggested by the census numbers, our study would be the first to draw attention to it.

The preference for sons in contemporary China is well known, but most studies have focused on the deficit in the supply of brides and its negative consequences for men (e.g., Wei and Zhang 2011; Edlund et al. 2013). Negative consequences for girls of son preference and parental choice have received relatively little attention (exceptions include Edlund 1999; Song et al. 2006). While a number of studies have pointed to the rise in girl abandonments following the One-Child Policy (Johansson and Nygren 1991; Johansson 1995), our study is one of the few that have considered the girls' fate once

adopted (adding to Johnson et al. 1998; Liu et al. 2004b).

2. Background and related literature

Chinese tradition emphasizes lineage through the male line. The role of the female in reproduction is minimized despite the biological and, to some extent, social reality to the contrary. A daughter was considered to belong to her husband's family and to care for a daughter was to 'water another man's garden'. Only a son could provide old-age support and continue the family name. This view was most closely upheld in the practice of major marriage, a marriage form in which a grown bride was brought into her husband's home, severing her ties with her natal family.

While the persistence of the dominant ethos of son preference and parental authority can help explain the high rate of girl infanticide and abandonment in China, this does not mean that there was no appreciation of, or affection for, daughters in earlier times. While clearly inferior, daughters were considered to be more reliable, loving, and obedient than sons. The wedding day in the prescribed major marriage was a day of tears for the bride and her family, presumably signifying some affection between family members. Moreover, although a daughter thus married was considered lost to her natal family, that cannot have been entirely true. For instance, a supposed advantage of minor marriage was that the bride had no natal family to turn to, suggesting that in major marriage she did.

The practice of adopting a little-daughter-in-law is no longer countenanced by the Chinese government or society at large. Still, as the resurfacing of girl abandonments and infanticide in the 1980s and high sex ratios at birth today remind us, the vestigial and modern can mix, with unexpected effects. (Moreover, neither poverty nor family policy is obviously at fault, as illustrated by high sex ratios among Chinese, Korean, and Indian immigrants in the USA (Almond and Edlund 2008) and Canada (Almond et al. 2013). In both countries, these immigrant groups are economically successful. In the USA, Asians have higher average household income than any other major race group, including non-Hispanic Whites.)

In the little-daughter-in-law practice (*t'ung-yang-hsi* or *sim-pua*), girls were adopted early to be raised by their future in-laws (Wolf 1968; Cheung 1972). The practice was disparaged as cheap (which it was) and was little talked about, wrote Wolf (1968,

p 866): 'Perhaps the reason many Western scholars have ignored the practice of raising a son's wife is that the Chinese themselves disparage the practice and often disclaim it entirely'. Still, a survey of customary law, conducted in preparation for the 1931 Civil Code of the Republic of China, revealed the presence of *t'ung-yang-hsi* throughout the country (Wolf 1968) and it was particularly common in South-east China (Fujian, Jiangxi, and Taiwan) (Wolf 1968, p. 864).

While raising a little-daughter-in-law could hardly be characterized as 'watering another man's garden', her status as the future daughter-in-law and mother of grandchildren did not prompt favourable treatment. In fact, the situation of the little-daughter-in-law was commonly depicted as even worse than that of a daughter, hence the saying 'to cry like a *sim-pua*'. The greater exploitation allowed by absence of blood ties was not lost on parents and families were known to swap daughters (Wolf 1968).

Obedience and loyalty further recommended the little-daughter-in-law practice. Having been rejected by her natal family at an early age and then groomed by the parents-in-law, the *sim-pua* would be more obedient towards her in-laws (Wolf 1968; Cheung 1972; Watson 1980). Additionally, a son married to his adopted sister would remain loyal to his parents. Incest aversion fostered by being brought up together ensured that the son would not be attracted to his wife, thereby diminishing the threat of the dreaded 'pillow-talk' (Wolf 1968). The ability of fathers to enforce marriages between individuals brought up as brother and sister bears witness to the absolute power bestowed on the household head in late Imperial China (Wolf 2005).

The contemporary relevance of this family form that is squarely in the past can be debated. Parents today lack the legal (Bernhardt 1999) and economic clout to force the marriage of their children, and parenting attitudes have shifted towards a less instrumental view of children (e.g., Greenhalgh et al. 1994). Rapid economic growth and modernization of China in the last decades has also changed attitudes towards education, further tipping the power balance in favour of the young. Nevertheless, desire for girls is often expressed in terms of what they can help their parents with, be it household chores or old-age care (Chu 2001; Zhang 2006b). Additionally, girls are considered cheaper to rear and marry (Greenhalgh et al. 1994; Zhang 2006a, 2006b; Wei and Zhang 2011). The last few decades of unbalanced sex ratios, economic inequality, and greater population mobility have left poor rural areas with a considerable bride shortage. Bride prices reported

to amount to several years' earnings have resurfaced, leaving parents of sons scrambling (see Wei and Zhang 2011). Whether consciously factored in, an oblique presence, or absent from any deliberation, the fact remains that if a bride price would be required to arrange the marriage of a son, a daughter's marriage could help defray the cost.

The Chinese approach to the family is unlike that of the West, where the Church and later the State restricted legitimate offspring to those born in wedlock and adoption has only been recognized relatively recently (the 1851 Massachusetts Adoption of Children Act being perhaps the first; most European countries waited until the twentieth century). In China, family matters such as marriage and adoption were considered private contracts with little third-party involvement. In a quasi-feudal pact, obedience of the household head towards the State was obtained on the understanding that he was allowed absolute power over his family members. A Chinese family head could sell his children into slavery, kill them, or commit them to jail (Wolf 2005). Of course, he decided his children's marriage as well as their divorce.

Marriages were treated much like the sale or purchase of livestock, a transaction executed and concluded by the respective family heads (Cheung 1972; Wolf 2005). The main purpose of the daughter-in-law was to deliver a son. Were she to fail in that duty, a son could be adopted. The preferred form would be to adopt a boy from a branch of the father's family. China practised a form of primogeniture and 'sonlessness' in the main branch could be remedied by the adoption of a male from a junior branch. Thus, a boy born into obscure circumstances could be elevated through adoption. A junior brother was in fact obligated to give up a son in the situation sketched above. To give up a son to be adopted outside the lineage was considered dishonourable and something done only by the destitute (Watson 1980).

Traditionally, the adoption of a boy to continue the family line was the only legally recognized form of adoption (Watson 1975; Johnson et al. 1998; Liu et al. 2004a; Zhang 2006a). Whether daughters were adopted is a matter of interpretation. The adoption of a daughter made little sense in a culture where daughters never quite belonged in their natal families. Wrote Watson (1980, p. 227): '… Chinese women "belonged to" the males who acquired them through payment of a bride-price or a sale price … as they do not have rights of inheritance, they do not "belong in" the household or lineage'. Nonetheless, Freedman (1957), cited in Watson (1980), spoke of

girl adoptions and the term is fitting in the sense that parents obtained the same rights over the adopted child as they had over an own-birth child. Along other dimensions, however, girl adoption in China may have been closer to fostering than to adoption as conceived of in the West (see, e.g., Akresh 2009). Johnson et al. (1998) described how adoptive daughters were sometimes returned to their birth families on the arrival of own-birth sons or threatened with eviction. (Adoptive sons, by contrast, were more likely to be passed off as own-birth sons and registered as such.)

Thus, in the past, adoption was treated as an informal matter and girl adoption was notably different from boy adoption, mirroring the dominant ethos denying girls a place in the family other than as producers of sons. Today, marriage has been brought into the realm of the State and formal adoption is regulated by a 1992 law. According to the law, adoption is limited to childless persons above age 35 with the means to support the child, unless the child is an orphan. The orphan qualifier is important. The vast majority of girls were abandoned, not orphaned. (Among the 1970 birth cohort, 200,000 boys and girls were adopted (Johansson 1995). Assuming that they were all orphaned, the risk of being orphaned was about two-thirds of 1 per cent.) The limited application of this condition is further underlined by the high percentage of adopted children going to families with children. Single men and women are allowed to adopt and unlike the West, single men outnumber single women among adopting parents. The 1992 law also stipulates that unmarried men who adopt girls need to be 40 years older than the girl, although this condition appears not to be enforced (Zhang 2006a).

For men too poor or otherwise unfit to marry, adoption of a child may be the only way to ensure support in old age. That girls are adopted rather than boys is primarily because of their greater supply and thus affordability, although fondness for girls may also play a role (Zhang 2006a, 2006b).

Despite the new adoption law, a large fraction of adoptions are informal and few adoptees pass through orphanages. Instead, parents tend to abandon the child in such a way that it is picked up: they may leave the child with a peddler, at a train station, or on the doorsteps of a family believed to be hospitable (e.g., Zhang 2006b; Xinran 2010). The availability of takers may further encourage abandonments, and it is noteworthy that 'in the middle and lower Yangzi area the problem of abandonment became acute in the late 1980s and early 1990s …' wrote Johnson et al. (1998, p. 473). This was the

same area where the tradition of a little-daughter-in-law used to be common (Wolf 1968). In Hunan, a province of 66 million, and neighbouring Jiangxi, a long 'tradition' of 'throwing away' healthy girls has been proposed as a possible factor in the surge in girl foundlings in the 1980s (Johnson 1996).

2.1. Studies of adoptees in China

Information on children's adoptive status is available in two large-scale surveys: the 1988 2/1,000 Fertility Survey and the 1992 NSSSC.

Analysing the 1988 2/1,000 Fertility Survey, Johansson and Nygren (1991) were the first to draw attention to the large number of girl adoptees in China. If girls given up for adoption are not reported, statistics may overstate the deficit of girls. Assuming that year of adoption and year of birth coincide, they showed that the adding of adoptees to the number of girls reported at birth resulted in closer-to-normal sex ratios. Furthermore, Johansson (1995) noted that the near universality of motherhood in China combined with an estimated 3–5 per cent of couples being biologically sterile can be used to obtain a lower bound on adoptions. Using the same data set, Liu et al. (2004a) found that a large fraction of children were adopted by families with two children of the opposite sex, that is, they had adopted a child of the 'missing' sex.

The 1993 NSSSC, the data set used in our study, has been analysed by Liu et al. (2004a, 2004b) and Chen and Li (2009). Liu et al. (2004b) limited their analysis to one-child families and found that adopted children were less likely to be enrolled in school and were less likely to have been inoculated. Girls fared worse than boys, but adopted girls no more so than adopted boys. Moreover, they documented striking differences between families who adopted and those who did not: adopting families were substantially poorer and more rural. Thus, part of the adopted-child disadvantage may not be due to discrimination by the adopting families, but rather to their socio-economic status. Despite worse care as measured by immunization records, adopted children appeared to be in better health than own-birth children—a finding that may stem from selection bias because handicapped children are rarely adopted internally (Liu et al. 2004a). However, one-child families account for less than half of adopting families, and, since they are one-child, comparisons with siblings cannot be used for measuring discrimination.

Chen and Li (2009) focused on the effect of parents' education on child health as measured by height-for-age z-score (HAZ). They found parents' education, especially the mother's, to have a positive effect on HAZ. The magnitude of the effect for adopted children was about three-quarters of that for own-birth children. This suggests a strong role of nurture for child health outcomes (and thus underlines the importance of who adopts). While sex differences were not the focus of their study, they found that the height disadvantage of Chinese children relative to American children was particularly pronounced for girls, adopted girls in particular. The advantage of males was 5 times as large in families where the boy was own-birth and the girl was adopted (compared to families with only own-birth children).

Zhang (2006a) surveyed 425 adoptive families and documented rare but interesting forms of adoption, including, as late as 1992, the arranged marriage of an adopted brother–sister pair, and a fairly high percentage (6.8 per cent) of single men adopting children (mainly girls and often in violation of the 40-year age gap requirement). Zhang (2006b) argued that the informal adoptions continued well past the 1992 reform of adoption legislation and that girl adoptions in China did not merely reflect supply conditions but mirrored demand for girls by families with only sons, consistent with the argument brought forward in this paper.

2.1.1. Selection into adoption. Selection into adoption can occur at abandonment, at adoption, and when reporting adoption, and son preference suggests that at each of these stages adopted boys are more negatively selected than adopted girls.

Johnson et al. (1998) surveyed 629 families, 237 of whom had abandoned a child. The representativeness of the sample is hard to ascertain, but the picture that emerged is noteworthy nonetheless, especially given the dearth of information on families who abandon. Families who had abandoned a child were overwhelmingly rural but were of average income and education. Ninety per cent of the abandoned children were girls. While the majority of abandoned boys were handicapped, this was true of only 8 per cent of the abandoned girls. The main reason for boy abandonment was his being handicapped or orphaned. The main reason for girl abandonment was her being a second or higher-order girl and having no brother. A wish for a son combined with fertility restrictions was the dominant reason for giving up a daughter. Thus, the selection into abandonment is likely to be more negative for

boys than girls. Girls are abandoned simply for being girls (Johnson et al. 1998; Zhang 2006a; Xinran 2010). Boys are generally not abandoned, barring a handicap or a catastrophic event.

The selection into adoption is also likely to be more negative for boys than girls. Healthy children are more likely to be adopted, but the bar appears lower for boys. Johnson et al. (1998) found that of 307 adopted girls, only one was disabled (or 0.3 per cent), whereas six of 34 adopted boys were disabled and two were severely sickly, making for a substantially more negatively selected boy sample (that is, almost a quarter of adopted boys were handicapped or very sick).

Reporting introduces another source of selection bias, and again the selection of boys is likely to be more negative. Not to have borne a son carries a particular stigma in China. There is also the fear that adopted children will not care for their parents if they find out that they are adopted. This fear may be more pronounced for boys (since the burden of old-age support traditionally falls on them). If healthy adopted sons are passed off as own-birth, that would be another reason for (reported) adopted sons to be negatively selected.

3. Data

The National Sample Survey on the Situation of Children (NSSSC) contains information on over 300,000 women (15 and older in 1992) and their children (15 years or younger, i.e., born after 1 June 1977), including the following information about the parent–child relationship: (1) both birth parents; (2) one birth parent; (3) adopted from relatives; (4) other adoptions. We coded a child as adopted if the answer was (3) or (4). Information on whether legally adopted is not available; both types are likely to have been included in the adopted category. School attendance and enrolment were asked of children 3 years or older (since 1986, 9-year school attendance from age 6 has been compulsory).

We focused on rural children aged 8–13, ages for which school enrolment is above 90 per cent in the sample, and restricted the sample to mothers 52 years or younger (born 1940 or later). We further restricted our sample to families with four or fewer children (98 per cent of the sample). After these restrictions we were left with an analysis sample of some 166,000 children, 711 of whom were adopted. Among adoptees, girls outnumbered boys three to one (541 girls and 170 boys). Although Fujian and Jiangxi account for only 8 per cent of the children in our sample, more than one-third of the adopted girls were in these two provinces (197/541). (Among boy adoptees, Fujian and Jiangxi accounted for 14 per cent.) Figure 1 shows the percentage of adoptees, subdivided by sex and whether in Fujian and Jiangxi. We see a sharp increase in girl, but not boy, adoptions in the 1980s, and the increase is much more pronounced in Fujian
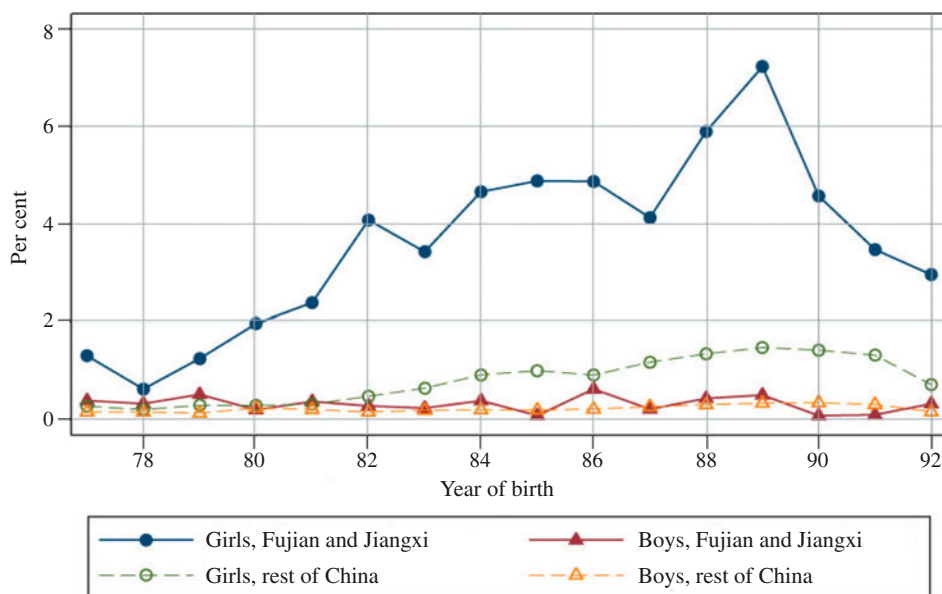

Figure 1 Adoption prevalence by birth year in the National Sample Survey of the Situation of Children (NSSSC), China 1992
Source: NSSSC 1992.

and Jiangxi; in the peak year 1989, 7 per cent of girls were adopted.

Both girl and boy adoptees were disproportionately of the 'missing' sex: girls went to families with boys, boys to families with girls (also see Liu et al. 2004b). The adoption of girls by families with only boys was particularly pronounced in Fujian and Jiangxi provinces, provinces where the *t'ung-yang-hsi* practice used to be common. While in only 7 per cent of cases (5,175/77,400) of own-birth girls was she the only girl in a three-child family, this was true of 26 per cent (51/197) of adopted girls in Fujian and Jiangxi (outside these two provinces, the figure was 19 per cent (66/344)).

Table 1 presents descriptive statistics. School attendance and enrolment rates were around 90 per cent for own-birth children, with girls lagging boys by 5 percentage points. Schooling for adopted children was significantly worse and the gap between the sexes twice as large. Among adopted boys, 85 per cent attended school and 89 per cent were enrolled. Among adopted girls, the corresponding figures were 72 and 79 per cent, respectively.

Own-birth sons were in significantly smaller families than own-birth girls or adopted children of either sex. Almost three-quarters of own-birth boys had no more than one sibling, whereas this was true

of only 60 per cent of own-birth girls and 53 per cent of adopted children. In addition, adopted girls were significantly more likely to be in families where there were older children, boys in particular. Whereas about 60 per cent of own-birth children were the oldest child, this was true of only 47 per cent of adopted girls. Furthermore, adopted girls had 1.02 brothers, far greater than the 0.77 brothers of own-birth girls (own-birth and adopted boys averaged 0.53 and 0.45 brothers, respectively).

Families with adopted children were relatively well off. Families with an adopted boy had an annual family income of 4,818 yuan, compared to an average of 3,700 yuan for own-birth children. High income is consistent with boys trading at a premium. Families with adopted girls also had above average income (4,187 yuan). High income makes the poor schooling outcomes of adopted children all the more noteworthy. For adopted girls, low school attendance is consistent with the possibility that their role is that of live-in help. As for adopted boys, poor health might have been a factor. Figures 2 and 3 show the average attendance rate subdivided by sex and adoption status by household-income percentile. For own-birth boys and girls, the sample size allowed for 20 quantiles. For adopted boys and girls, the smaller sample size necessitated larger bins, and results are shown for the four quantiles. Figure 2
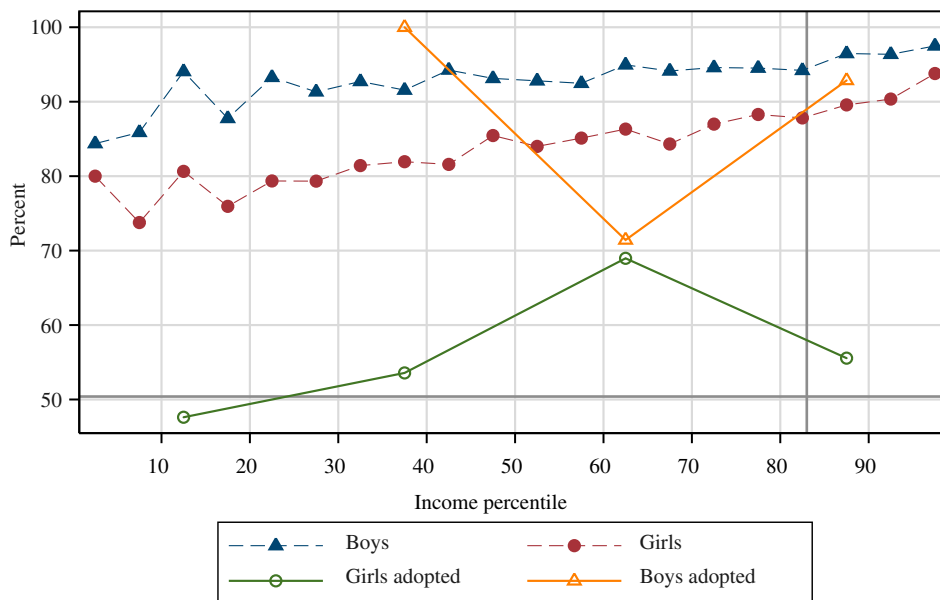
Figure 2 School attendance by household income at ages 8–13, Fujian and Jiangxi 1992
Note: For own-birth children, the data point is at the midpoint of each 20 quantiles. For adopted children, the data point is at the midpoint of each four quantiles. Number of adopted boys 24, number of adopted girls 197. Mean attendance for adopted boys was 87.5 per cent and for adopted girls 50.4 per cent (horizontal grey line). The mean family income of adopted girls was 5,112 yuan, or 83rd income percentile (vertical grey line).
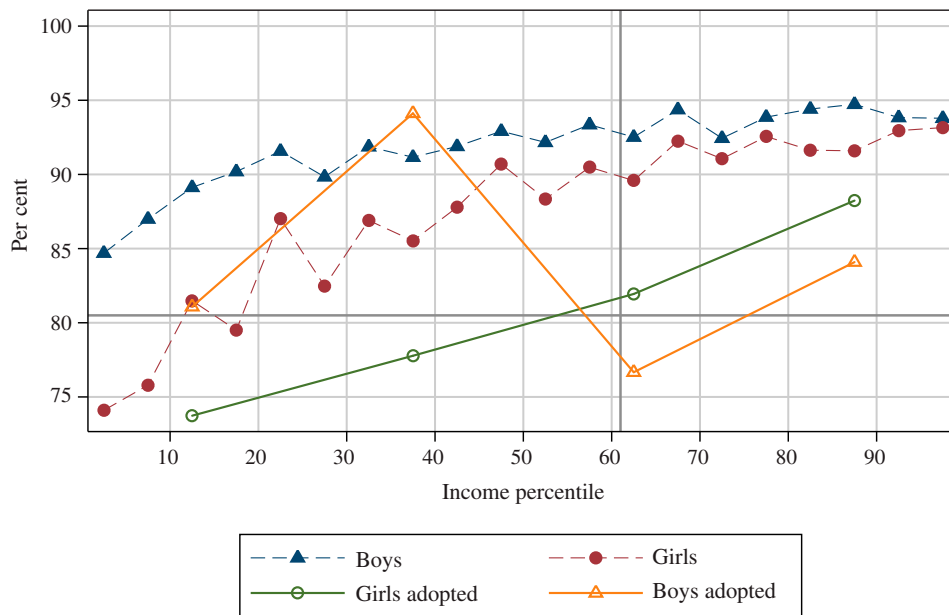*Source*: As for Figure 1.

Figure 3 School attendance by household income at ages 8–13, China 1992, excluding Fujian and Jiangxi
Note: For own-birth children, the data point is at the midpoint of each 20 quantiles. For adopted children, the data point is at the midpoint of each four quantiles. Number of adopted boys 146, number of adopted girls 344. Mean attendance for adopted boys was 84.2 per cent and for adopted girls 80.5 per cent (horizontal grey line). The mean family income of adopted girls was 3,646 yuan, or 61st income percentile (vertical grey line).
Source: As for Figure 1.

shows the results for Fujian and Jiangxi provinces, and it is clear that adopted girls were disadvantaged —on the whole and at every point in the income distribution. On average, school attendance was 50.4 per cent, lower than that of own-birth girls at any income percentile, despite the fact that girls were adopted by relatively rich households. On average, adopted girls were in families with incomes in the 83rd percentile. School attendance for own-birth girls in such families was close to 90 per cent.

Figure 3 shows the results for the rest of China. Attendance rates were clearly lower for adopted girls at every point in the income distribution. Averaging 80.5 per cent, however, the attendance rate of adopted girls was substantially higher than in Fujian and Jiangxi. This attendance rate compares favourably with the attendance rate of own-birth children in the poorest 10 per cent of families and is on a par with the attendance rate of girls in families in the next 10–20 percentile range. It is, however, a full 10 percentage points lower than the attendance rate of own-birth girls in families with similar incomes (the 61st percentile).

4. Regression results

To further investigate the nature of adoptions in China, girl adoptions in particular, we turned to regression analysis and started by estimating versions of the following econometric model:

$$y_i = \alpha \text{girl}_i + \beta \text{adopted}_i + \gamma \text{girl} \times \text{adopted}_i + z_i + x_i + \epsilon_i \tag{1}$$

where y_i is an indicator variable for either school attendance or school enrolment of child i, girl and adopted indicate sex and adoption status of child i, z_i is a vector of age (in years) indicator variables, and x_i is a vector of family 'control' variables such as sibship composition, parental education, and family income. While it is common to include family characteristics as control variables, in the case of adopted children the inclusion can be questioned because the type of family that adopts affects the consequences of adoption. For instance, if the presence of older brothers reduces attendance rates among families in general, adoption by such families is one of the ways adoption leads to disadvantaged outcomes. Family structure in this case mediates the effect. If girl adoptees are seen to have worse schooling outcomes before inclusion of family controls, but this effect is reduced once family controls are included, such a finding need not reduce the importance of the observed disadvantage. In other words, estimates of α in a regression with only the first term would pick up general discrimination

against girls (combining the effect of sex selection and differential treatment of girls within families). Here β allows for a cross-sectional differential for adopted children and γ for a sex-differential effect of adoption. The addition of family controls can clarify the extent to which family characteristics mediate the effects of sex and adoption status.

We considered three hypotheses. First, a naive hypothesis: since adopted girls are adopted with the parents' full knowledge of the child's sex, adopted girls might not face the same discrimination as own-birth girls and therefore schooling outcomes could be better for adopted girls, that is, $\beta + \gamma > 0$. A second possibility was that adopted children have lower aptitude for school and therefore do worse. For the reasons outlined earlier, the selection of adopted boys is likely to be more negative than that of adopted girls, and therefore we expect $\beta < 0$, $\gamma > 0$.

It is however possible that the abandonment–adoption process is more damaging to girls than boys. Perhaps girls spend more time with middlemen

than boys; or perhaps once singled out for abandonment the treatment of the girl in her natal family was harsher. It is also possible that girls are abandoned by their birth parents at an older age and therefore are more marked by the experience (although Johnson et al. (1998) found the opposite to be true). Tempering the empirical relevance of this possibility is the fact that parents screen potential adoptees and children with obvious behavioural problems are unlikely to be chosen. Positive selection on outward characteristics may be particularly true of girls, the quest for a son leading prospective parents to be more indulgent of indications of poor health in a boy. The third of the hypotheses we considered was that poor treatment of girl, but not boy, adoptees is a Chinese tradition, leading to the expectation that $\gamma < 0$.

Table 2 presents the results from estimating equation (1) for school attendance (ordinary least squares (OLS), robust standard errors). Province and age dummies were included in all regressions. The upper panel presents results for all China. In

Table 2 School attendance at ages 8–13, China and Fujian and Jiangxi 1992. Results from estimating equation (1)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. All China								
Girl	−0.0476***	−0.0470***	−0.0468***	−0.0413***	−0.0431***	−0.0436***	−0.0438***	−0.0431***
	(0.00144)	(0.00144)	(0.00144)	(0.00146)	(0.00146)	(0.00147)	(0.00147)	(0.00147)
Adopted		−0.111***	−0.0644**	−0.0591**	−0.0588**	−0.0583**	−0.0615**	−0.0634**
		(0.0156)	(0.0269)	(0.0271)	(0.0272)	(0.0275)	(0.0274)	(0.0274)
Girl × adopted			−0.0609*	−0.0676**	−0.0621*	−0.0588*	−0.0561*	−0.0491
			(0.0328)	(0.0328)	(0.0329)	(0.0332)	(0.0331)	(0.0331)
Observations	166,356	166,356	166,356	166,356	166,356	164,157	164,157	164,157
Adjusted R^2	0.089	0.090	0.090	0.095	0.096	0.106	0.107	0.107
B. Fujian and Jiangxi								
Girl	−0.0898***	−0.0832***	−0.0819***	−0.0762***	−0.0767***	−0.0777***	−0.0781***	−0.0777***
	(0.00508)	(0.00504)	(0.00504)	(0.00505)	(0.00507)	(0.00507)	(0.00506)	(0.00509)
Adopted		−0.242***	−0.0585	−0.0531	−0.0541	−0.0610	−0.0676	−0.0686
		(0.0322)	(0.0696)	(0.0703)	(0.0705)	(0.0751)	(0.0744)	(0.0742)
Girl × adopted			−0.207***	−0.212***	−0.206***	−0.190**	−0.184**	−0.181**
			(0.0779)	(0.0784)	(0.0787)	(0.0826)	(0.0820)	(0.0821)
Observations	13,868	13,868	13,868	13,868	13,868	13,735	13,735	13,735
Adjusted R^2	0.084	0.094	0.095	0.098	0.099	0.110	0.112	0.112
Sibs	No	No	No	Yes	Yes	Yes	Yes	Yes
Birth order	No	No	No	No	Yes	Yes	Yes	Yes
Mother education	No	No	No	No	No	Yes	Yes	Yes
Family income	No	No	No	No	No	No	Yes	Yes
Brothers	No	No	No	No	No	No	No	Yes

Standard errors in parentheses.
All regressions include a vector of age and province indicator variables. All family-level controls except family income are entered as a vector of indicator variables. Standard errors are robust.
Note: *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.
Source: As for Table 1.

Column 1, we included only a dummy variable girl. Girls were on average 4.8 percentage points less likely to attend school than boys. Column 2 added another dummy variable adopted, and we found adopted children to average 11 percentage points lower attendance rates than own-birth children. Column 3 allowed the adoption penalty to vary by sex and we found that adopted boys were 6.4 percentage points less likely to attend than own-birth boys, while adopted girls were 12.5 percentage points less likely to attend than own-birth girls (and 17 percentage points less likely to attend than own-birth boys). In Columns 4–8, 'controls' for sibship size, birth order, mother's education, family income, and finally the number of brothers were added. As expected, the addition of these variables reduced the point estimate of the penalty for being a girl and for being an adopted girl. In the last column, Column 8, the number of brothers were added and the girl × adopted interaction term lost statistical significance at conventional levels (*t*-value of 1.565).

The lower panel of Table 2 singles out Fujian and Jiangxi provinces and at 8 percentage points the girl penalty was almost double that found for all China. The adoption penalty was more than double, at 24 percentage points (Column 2). Consistent with the erstwhile prevalence of the little-daughter-in-law tradition in these provinces, the bulk of that penalty, about 20 percentage points or 80 per cent, was borne by adopted girls. While adopted boys also had lower attendance rates, the effect was not statistically significant (Columns 3–8). Table 3 presents the results for enrolment and the results are similar, albeit less pronounced.

In fact, the negative results for adopted girls relative to adopted boys were driven by Fujian and Jiangxi provinces (the home of one-third of girl adoptees in our sample). Excluding those provinces, the estimated penalties for being a girl and being adopted remain similar, but the additional penalty for being an adopted girl vanishes, see Table A1. Still, the fact that girls were more than twice as likely to be adopted implies that

Table 3   School enrolment at ages 8–13, China and Fujian and Jiangxi 1992. Results from estimating equation (1)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. All China								
Girl	−0.0464***	−0.0459***	−0.0457***	−0.0407***	−0.0424***	−0.0428***	−0.0430***	−0.0423***
	(0.00121)	(0.00121)	(0.00121)	(0.00121)	(0.00122)	(0.00123)	(0.00123)	(0.00123)
Adopted		−0.0963***	−0.0554**	−0.0507**	−0.0505**	−0.0496**	−0.0525**	−0.0541**
		(0.0142)	(0.0232)	(0.0233)	(0.0234)	(0.0236)	(0.0236)	(0.0235)
Girl × adopted			−0.0539*	−0.0599**	−0.0549*	−0.0525*	−0.0501*	−0.0440
			(0.0289)	(0.0289)	(0.0290)	(0.0292)	(0.0292)	(0.0292)
Observations	166,356	166,356	166,356	166,356	166,356	164,157	164,157	164,157
Adjusted R^2	0.062	0.062	0.062	0.069	0.070	0.081	0.082	0.083
B. Fujian and Jiangxi								
Girl	−0.0824***	−0.0763***	−0.0754***	−0.0697***	−0.0701***	−0.0709***	−0.0712***	−0.0708***
	(0.00450)	(0.00445)	(0.00444)	(0.00441)	(0.00444)	(0.00445)	(0.00445)	(0.00447)
Adopted		−0.222***	−0.0882	−0.0837	−0.0842	−0.0902	−0.0954	−0.0966
		(0.0315)	(0.0695)	(0.0700)	(0.0703)	(0.0754)	(0.0749)	(0.0747)
Girl × adopted			−0.150*	−0.155**	−0.151*	−0.137*	−0.133	−0.129
			(0.0775)	(0.0779)	(0.0782)	(0.0827)	(0.0823)	(0.0823)
Observations	13,868	13,868	13,868	13,868	13,868	13,735	13,735	13,735
Adjusted R^2	0.056	0.067	0.068	0.072	0.072	0.083	0.084	0.084
Sibs	No	No	No	Yes	Yes	Yes	Yes	Yes
Birth order	No	No	No	No	Yes	Yes	Yes	Yes
Mother education	No	No	No	No	No	Yes	Yes	Yes
Family income	No	No	No	No	No	No	Yes	Yes
Brothers	No	No	No	No	No	No	No	Yes

Standard errors in parentheses.
All regressions include a vector of age and province indicator variables. All family-level controls were entered as a vector of indicator variables, except family income. Standard errors are robust.
Note: *p < 0.10, **p < 0.05, ***p < 0.01.
Source: As for Table 1.

girls were disproportionately victimized also outside Fujian and Jiangxi.

4.1. Family fixed effects

If families adopt girls as household helps and hedge against future bride shortage, we would expect adopted girls to do worse in families with boys, and possibly more so, in Fujian and Jiangxi. Therefore, we augmented equation (1) with family fixed effects:

$$
\begin{aligned}
y_{ij} = \text{girl}_{ij} + \text{adopted}_i + \text{girl}_{ij} \times \text{adopted}_i \\
+ z_i + \phi_j + \epsilon_{ij}
\end{aligned}
\tag{2}
$$

where i indexes individual and j family, yob is a vector of year dummies, and ϕ is a vector of family dummies. We did not control for birth order on the grounds that birth order is highly endogenous for adopted children. We estimated equation (2) by OLS, clustering error terms at the family level. In this model, comparisons are made between siblings, and factors common to the family such as income are differenced out. In addition to differencing out observed and unobserved family-level heterogeneity, a model including family fixed effects is also interesting because discrimination within the family implies a lack of internal equity and may be particularly damaging to self-esteem. By construction, children adopted as only children do not contribute to the comparisons and results should be interpreted with that in mind.

Columns 1–3 of Table 4 present the results for the entire sample (families with two to four children), sequentially adding girl, adopted, and girl × adopted. In Column 1, we see that girls were 5.5 percentage points less likely to attend school than their brothers. In Column 2, adopted was added and we see that adoption status entailed a 13 percentage point lower probability of school attendance for adoptees than own-birth siblings. Allowing the adoption effect to vary by sex, we see that the adoption penalty was reserved for girls. Adopted girls were 18 percentage points less likely to attend school than own-birth girls whereas adopted boys were as likely as own-birth boys to attend school (Column 3).

One concern is that the gap in education between the sexes was higher among low-education families.

Table 4 School attendance, children at ages 8–13. Family fixed effects, all two-to four-child families. Results from estimating equation (2), China 1992

| | Mother education | | | | |
| | All | | | None | Some |
	(1)	(2)	(3)	(4)	(5)
A. Attended					
Mean	0.889	0.889	0.889	0.841	0.919
Girl	−0.0547***	−0.0536***	−0.0528***	−0.0998***	−0.0196***
	(0.00420)	(0.00419)	(0.00420)	(0.00713)	(0.00496)
Adopted		−0.133***	0.0109	−0.0220	0.0197
		(0.0445)	(0.0802)	(0.116)	(0.110)
Girl × adopted			−0.181**	−0.192	−0.140
Adjusted R^2	0.287	0.288	0.288	0.327	0.258
B. Enrolled					
Mean	0.928	0.928	0.928	0.878	0.959
Girl	−0.0554***	−0.0544***	−0.0540***	−0.104***	−0.0181***
	(0.00365)	(0.00364)	(0.00364)	(0.00651)	(0.00395)
Adopted		−0.122***	−0.0460	−0.0231	−0.0922
		(0.0407)	(0.0775)	(0.121)	(0.0929)
Girl × adopted			−0.0949	−0.165	0.00474
			(0.0892)	(0.136)	(0.107)
Adjusted R^2	0.221	0.222	0.222	0.301	0.121
Observations	135,735	135,735	135,735	52,006	82,393
Adopted girls	459	459	459	223	232
Adopted boys	143	143	143	58	82

Standard errors, clustered at the family level, in parentheses.
All regressions include a vector of age indicator variables.
Note: *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.
Source: As for Table 1.

As a result, the estimated negative effect of being an adopted girl could be a result of adopted girls being predominantly adopted by such families (although that would be another form of disadvantage for adopted girls). To investigate this further, we split the sample according to mother's education: none (Column 4) or some (Column 5). Discrimination against girls was indeed greater in families where the mother had no education, possibly a result of primary education being more severely rationed in poorer families or of lower bargaining power of females. However, this finding does not explain the disadvantage of adopted girls. Comparing the two types of families, the discrimination against adopted girls appeared to be higher in the low-education group, although the smaller sample size resulted in lower precision and the girl × adopted term failed to be significant (Columns 4 and 5).

Again, the particularly poor outcomes for adopted girls (relative to adopted boys) are driven by the situation in Fujian and Jiangxi (details not shown).

4.1.1. A more homogenous sample. To further increase the transparency of the comparison, we estimated equation (2) on a more homogenous sample of families: two- or three-child families with one girl, the girl being either own-birth or adopted. Thus, the estimated coefficient on adopted was derived from comparing the brother–sister schooling gap in families with only own-birth children with the gap in families where the girl was adopted.

Column 1 of Table 5 presents the results from the entire sub-sample, and Columns 2 and 3 for the sample split by mother's education. Columns 4–6 repeat these estimates for Fujian and Jiangxi. In these more homogeneous samples, the coefficient on the adoption term was estimated with more precision. Among low-education families (Column 2) the adoption penalty was estimated at 24 percentage points (significant at the 5 per cent level). Separating out the results for Fujian and Jiangxi (Columns 4–6), we found a substantially larger adoption penalty, of 36 percentage points (Column 4). The effect found was stronger among families where the mother was uneducated (39 percentage points, Column 5) but it was still significant among the better educated (27 percentage points, Column 6).

Table 5 School attendance, children at ages 8–13. Family fixed effects, two/three children, one girl. Results from estimating equation (2) on a more homogenous sample of families, China and Fujian and Jiangzi 1992

	All China			Fujian and Jiangxi		
	Mother education			Mother education		
	All (1)	None (2)	Some (3)	All (4)	None (5)	Some (6)
A. Attended						
Mean	0.905	0.864	0.929	0.908	0.880	0.928
Girl	−0.0378***	−0.0762***	−0.0127**	−0.0571***	−0.103***	−0.0224
	(0.00499)	(0.00879)	(0.00578)	(0.0158)	(0.0274)	(0.0181)
adopted	−0.172***	−0.241**	−0.0888	−0.359***	−0.388***	−0.271**
	(0.0651)	(0.0976)	(0.0784)	(0.0954)	(0.129)	(0.128)
Adjusted $R2$	0.278	0.305	0.273	0.274	0.268	0.315
B. Enrolled						
Mean	0.943	0.902	0.967	0.939	0.913	0.958
Girl	−0.0393***	−0.0815***	−0.0117***	−0.0557***	−0.100***	−0.0224
	(0.00417)	(0.00783)	(0.00437)	(0.0140)	(0.0244)	(0.0158)
Adopted	−0.145**	−0.228**	−0.0483	−0.294***	−0.384***	−0.117
	(0.0592)	(0.0962)	(0.0524)	(0.0958)	(0.125)	(0.112)
Adjusted $R2$	0.205	0.279	0.142	0.208	0.269	0.181
Observations	62,589	23,211	38,823	5,787	2,457	3,285
Adopted girls	270	137	131	103	63	40

Standard errors, clustered at the family level, in parentheses.
All regressions include a vector of age indicator variables.
Note: *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.
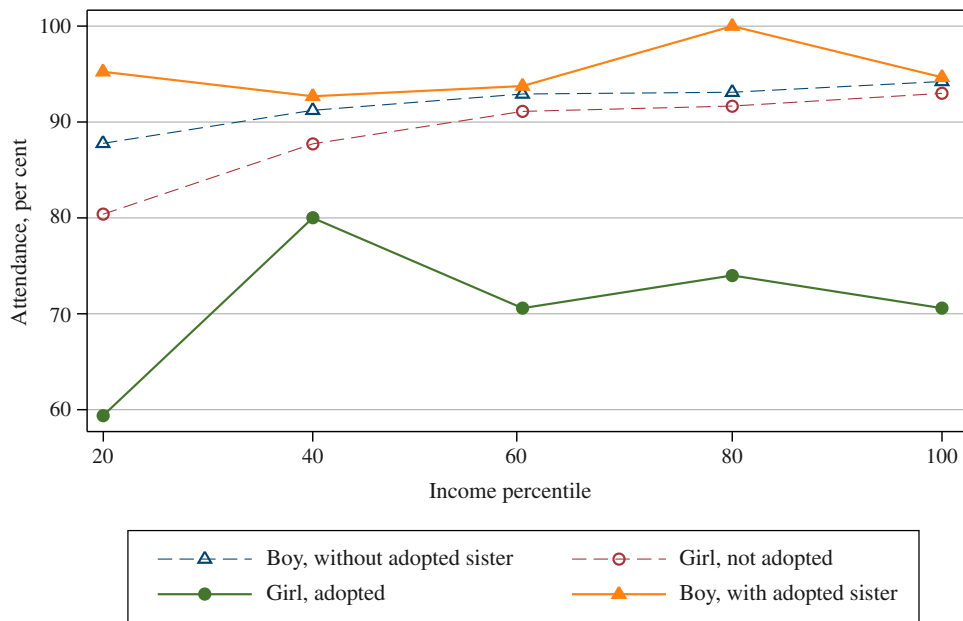*Source*: As for Table 1.

Figure 4 School attendance by family income, two/three-children–one-girl families, China 1992, excluding Fujian and Jiangxi
Note: To generate income percentiles we selected all families that had two or three children, one of which was a girl and the boys were not adopted though the girls might have been. There were 62,034 such families. The graph shows attendance rates for the children aged between 8 and 13. The generation of the series for adopted girls and boys with adopted sisters was based on 270 families.
Source: As for Figure 1.

Another way of showing the within-family differences is to simply plot attendance rates for boys and girls in families with two or three children and one girl by the adoption status of the girl. To account for between-family heterogeneity in income that is lost in the family fixed effects framework, we calculated the means by family income quintile. The results are presented in Figure 4 and it is clear that the poor outcomes of adopted girls appear in rich and poor families alike. In contrast, boys with adopted sisters appear to have benefited from their presence.

5. Surplus girls and continued prevalence of adoption

Despite the rapid rise in girl adoption immediately following the introduction of the One-Child Policy, little is known about its prevalence past the 1980s. The 1990s saw sex ratios at birth climb from 111 to 120 boys per 100 girls, presumably crimping the supply of girls. Owing to the lack of direct information on adoption prevalence past the 1980s, we turned to the censuses and the curious presence of 'surplus' girls. For instance, at third parity, if the first two children were boys, the 2000 census shows a mere 64 boys to 100 girls.

We used the 2000 census to estimate girl adoptions (by birth year) for the 1990s and the 1990 census to estimate it for the 1980s. For the late 1980s, we obtained two estimates, one from each census. An advantage of the 2000 census over the 1990 census is that it may better capture girls eventually abandoned (but not yet in 1990). A disadvantage is that as children age (a child born in 1988 was 12 years old in 2000), the likelihood that there is an older sibling who has moved out increases. For instance, a boy-first, girl-second family might show up as a girl-only family, leading us to underestimate the number of surplus girls. Therefore, we used the 2000 census for birth years 1988 and onwards.

Our estimate of surplus girls was calculated as follows. In the absence of sex selection, the probability of a girl is, to a first approximation, independent of the sex composition of older siblings. Therefore, among families where the first child is a boy, the ratio of boys to girls at second parity should be close to the 1.06 that occurs naturally (for our purposes a conservative choice, a higher number would result in a higher surplus girls estimate). To compute the number of surplus girls, we counted the number of families where the first child was a boy and the

second was a girl and subtracted the number of families where the first two children were boys divided by 1.06. We repeated this exercise for families where the first two and three children, respectively, were boys. We restricted the sample to nuclear families with the mother present and required mothers to have been between 14 and 49 years of age when they gave birth. Moreover, since we were interested in the sex and birth order of children, we excluded families with multiple births.

We used the 2000 census for years 1988–2000 and the 1990 census for years 1978–90, where the year is the birth year of the focal child (for instance, for 1995, we computed the distribution of family types for all 5-year-olds in the 2000 census).

In the NSSSC, 52 per cent of the adopted girls had older brothers (one, two, or three) and no older sister. Assuming that the above procedure captured 52 per cent of girl adoptees, we divided the number of surplus girls by 0.52 to obtain an estimate of the total number of girl adoptees. Our estimates suggest that girl adoptions peaked in the early 1990s at 6 per cent and then settled at 3–4 per cent (Figure 5). While estimated adoption rates declined in the 1990s, the decline was smaller than might be expected from the concurrent rise in sex ratios at birth. (For estimates for China excluding Fujian and Jiangxi, see Table A1.)

The surplus girls could be the result of selective abortion or abandonment of sons. To check against that possibility, Figure 5 also plots the fraction of adopted girls in the 1988 2/1,000 Fertility Survey (the numerator is from Johansson and Nygren 1991, Table 4). These estimates overlap remarkably well with our estimates using surplus girls in the censuses, including a dip in 1985. If anything, the comparison suggests that our method is conservative. Our estimates for the 1980s could be checked against the 1988 2/1,000 Fertility Survey. However, for the 1990s, we had no other information source. If boy abandonments or abortions rose in the 1990s, our method overestimated girl adoptions in that period. Allowing for some of the 'surplus girls' to be the result of boy abandonments or abortions would reduce our estimate of adopted girls accordingly.

Based on the distribution of adopted girls in the 1992 NSSSC, our calculations assumed that the surplus girls represented half of adopted girls. Given the rise in sex ratios at birth, it is possible that the share of adopted girls going to families with sons increased in the 1990s, in which case the estimates for those years should be adjusted downwards. Therefore, we also report the unscaled estimates from the censuses, that is, the estimates that would result from assuming that the surplus girls account for all adopted girls. In addition to providing a conservative estimate,
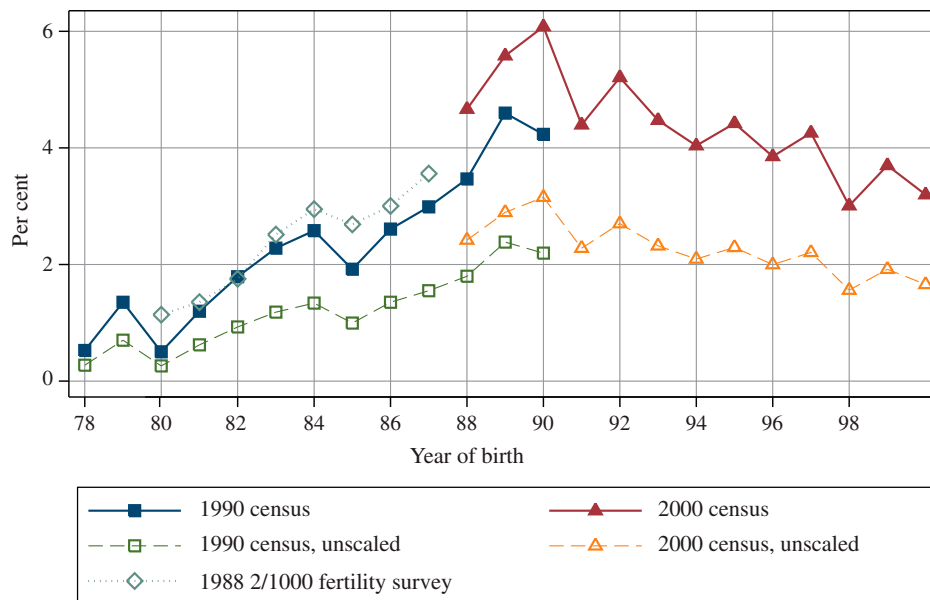

Figure 5 Census estimates of adopted girls using measure of surplus girls, all China 1990 and 2000
Note: The dashed lines represent the number of surplus girls born after one, two, or three sons in a year, as a percentage of all girls born in that year. The solid line represents the surplus girls divided by 0.51, on the assumption that 'surplus girls' represent 51 per cent of adopted girls in China, excluding Fujian and Jiangxi (the case in the NSSSC). For comparison, the percentage of adopted girls estimated from the 1988 2/1,000 Fertility Survey for the years 1980–87 (Johansson and Nygren 1991, Table 4) are indicated by hollow diamonds connected by dots.
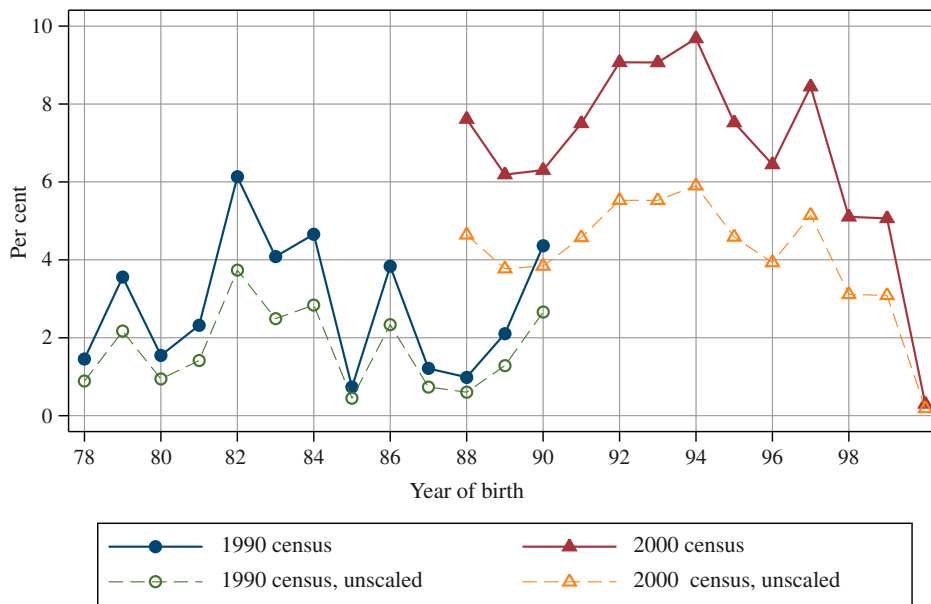*Source*: 1990 and 2000 censuses, 1 per cent sample.

Figure 6 Census estimates of adopted girls using measure of surplus girls, Fujian and Jiangxi 1990 and 2000
Note: The dashed lines represent the number of surplus girls born after one, two, or three sons in a year, as a percentage of all girls born in that year. The solid line represents the surplus girls divided by 0.61, on the assumption that 'surplus girls' represent 61 per cent of adopted girls in China, excluding Fujian and Jiangxi (the case in the NSSSC).
Source: 1990 and 2000 censuses, 1 per cent sample.

a reason to focus on the surplus girls (the dashed lines in Figures 5 and 6) is that adopted girls with brothers suffered the most disadvantage. Girls adopted by childless couples may have faced less discrimination (cf. Liu et al. 2004b).

Figure 6 plots the analogous estimates for Fujian and Jiangxi, the provinces where we found the greatest discrimination against adopted girls. The solid line assumes that the observed surplus girls account for 61 per cent of adopted girls (the share in the NSSSC), whereas the dashed line presents the share of surplus girls unscaled. Assuming that boy abortions and abandonments were negligible, at least 6 per cent and perhaps as many as one in ten girls were adopted in the peak years in the early 1990s.

6. Summary and discussion

Abandonment of girls increased drastically in the 1980s following the introduction of the One-Child Policy. In 1987, some 440,000 girls, or 4 per cent of all girls, were adopted (Johansson and Nygren 1991). The widespread adoption of girls seemingly provides a counterpoint to the son preference prominently on display in abnormal male infant and juvenile sex ratios (Li 2007). However, Chinese tradition offers a less benign interpretation: the

adoption of girls as domestic help and a hedge against future bride shortages.

In this paper, we have analysed the 1992 NSSSC conducted in 1992. Our findings are consistent with the Chinese tradition of little-daughter-in-law adoption and son preference. The abandonment–adoption dyad offers early demotion of daughters: (1) girls were predominantly adopted by families with sons; (2) adopted girls were substantially less likely to attend school despite being adopted by families with above average income; (3) the adopted-girl disadvantage was particularly strong for girls adopted by families with sons; (4) girl adoptions increased more sharply in Fujian and Jiangxi, provinces in which the little-daughter-in-law tradition was particularly common; and findings (1)–(3) were more pronounced in these two provinces.

Low school attendance and enrolment rates of adoptees at ages 8–13 despite family income being above average could stem from selection (of who is abandoned–adopted), damage from the abandonment–adoption experience, or discrimination by the adoptive parents. Son preference alone is a reason to believe adopted boys to have been more negatively selected than girls, and therefore to have formed a conservative comparison group. In fact, lore has it that girls are abandoned for just being girls, whereas for boys the reason is a physical

handicap or extreme poverty. While we cannot rule out damage while awaiting adoption, damage that might be greater for girls than boys, the fact that adoptive parents selected the child in question suggests that adopted girls would have been no less healthy than adopted boys. Furthermore, the fact that the outcome is one over which parents exercise a high degree of control suggests that low school attendance and enrolment reflect parental priorities rather than characteristics of the child. Adoption as a mechanism for upward mobility of boys and downward mobility of girls in a society that privilege sons is consistent with the predictions of sex choice models (Trivers and Willard 1973; Edlund 1999). In fact, adoption may be viewed as a form of post-natal sex choice, and one detrimental to daughters if parents prefer sons.

To the best of our knowledge, our paper presents the first estimate of the prevalence of girl adoptions during the 1990s. Lacking nationally representative data with direct information on adoption status, we exploited a little-noted pattern evident in the censuses: there are too many girl births in families with boys. Assuming that these surplus girls reflect girl adoptions, we estimate that the adoption rate of 4 per cent seen in the late 1980s continued throughout the 1990s. For Fujian and Jiangxi, we estimate that at least 6 per cent of all girls and possibly as many as one in ten girls were adopted in the peak year 1994. To determine whether the subsequent decline is real or reflects adoption practices would require more recent data (late adoption age means that the full adoption rate for a cohort is not realized until perhaps preschool age). Analysis of the 2010 census may cast further light on the issue.

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Note

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Appendix: Estimates of adopted girls and their school attendance, China excluding Fujian and Jiangxi
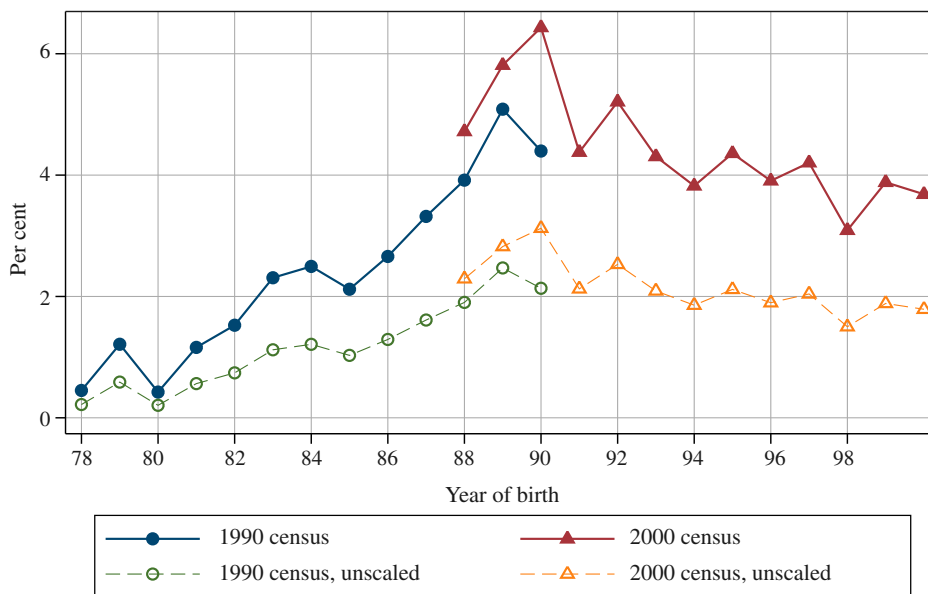

Figure A1 Census estimates of adopted girls using measure of surplus girls, all China 1990 and 2000, excluding Fujian and Jiangxi 1992
Note: The dashed lines represent the number of surplus girls born after one, two, or three sons in a year, as a percentage of all girls born in that year. The solid line represents the surplus girls divided by 0.48, on the assumption that 'surplus girls' represented 48 per cent of adopted girls in China, excluding Fujian and Jiangxi (the case in the NSSSC).
Source: 1990 and 2000 censuses, 1 per cent sample.

Table A1   School attendance and enrolment of children at ages 8–13, China excluding Fujian and Jiangxi 1992

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Attended school								
Girl	−0.0437***	−0.0436***	−0.0437***	−0.0381***	−0.0400***	−0.0405***	−0.0407***	−0.0400***
	(0.00151)	(0.00151)	(0.00151)	(0.00152)	(0.00153)	(0.00153)	(0.00153)	(0.00153)
Adopted		−0.0470***	−0.0660**	−0.0609**	−0.0612**	−0.0592**	−0.0619**	−0.0635**
		(0.0167)	(0.0292)	(0.0293)	(0.0295)	(0.0296)	(0.0295)	(0.0295)
Girl × adopted			0.0272	0.0182	0.0211	0.0221	0.0247	0.0300
			(0.0355)	(0.0356)	(0.0357)	(0.0359)	(0.0358)	(0.0358)
Adjusted R^2	0.063	0.063	0.063	0.070	0.071	0.082	0.083	0.084
B. Enrolled in school								
Girl	−0.0431***	−0.0430***	−0.0430***	−0.0381***	−0.0398***	−0.0402***	−0.0404***	−0.0398***
	(0.00125)	(0.00125)	(0.00125)	(0.00126)	(0.00127)	(0.00127)	(0.00127)	(0.00128)
Adopted		−0.0357**	−0.0505**	−0.0459*	−0.0463*	−0.0446*	−0.0470*	−0.0485**
		(0.0143)	(0.0245)	(0.0245)	(0.0246)	(0.0247)	(0.0247)	(0.0247)
Girl × adopted			0.0210	0.0131	0.0156	0.0168	0.0191	0.0237
			(0.0301)	(0.0301)	(0.0302)	(0.0303)	(0.0303)	(0.0303)
	(0.00322)	(0.00322)	(0.00322)	(0.00465)	(0.00780)	(0.0261)	(0.0261)	(0.0260)
Observations	152,488	152,488	152,488	152,488	152,488	150,422	150,422	150,422
Adjusted R^2	0.063	0.063	0.063	0.070	0.071	0.082	0.083	0.084
Sibs	No	No	No	Yes	Yes	Yes	Yes	Yes
Birth order	No	No	No	No	Yes	Yes	Yes	Yes
Mother education	No	No	No	No	No	Yes	Yes	Yes
Family income	No	No	No	No	No	No	Yes	Yes
Brothers	No	No	No	No	No	No	No	Yes

Standard errors in parentheses.
All regressions include a vector of age and province indicator variables. All family-level controls were entered as a vector of indicator variables, except family income. Standard errors are robust.
Note: *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.
Source: As for Figure 1.