

# SONS, DAUGHTERS, AND PARENTAL BEHAVIOUR

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*The prevalence of son preference and its implications for family behaviour in developing countries have received a great deal of scholarly attention, but child-gender bias is believed to be empirically unimportant in wealthy, non-traditional societies. Studies by sociologists and psychologists during the past 30 years, however, have documented consistent discrepancies between the behaviour of parents of sons and parents of daughters—boys tend to increase marital stability and marital satisfaction relative to girls, and fathers spend more time with, and are more involved with, sons than daughters. In recent years, economists have begun to contribute to the child-gender literature, re-examining the effects of sons and daughters on family structure and parental involvement with larger samples and greater concern for possible sources of selection bias. Other economic outcomes, such as market work and earnings, have also been studied, and some investigators have exploited the randomness of child gender as a source of exogenous variation in parental behaviour. In general, recent results suggest that child gender does affect family stability and the time allocation of parents, but it is not clear whether these responses reflect parental preferences for boys rather than girls or differences in the constraints parents face.*

## I. INTRODUCTION

An extensive social-science literature documents the existence of a preference for sons in South and East Asia, and the implications of this child-gender bias for fertility, marriage markets, and the relative wellbeing of girls and boys. There is little evidence,

however, of parental discrimination in favour of sons in most of the developed world. Fertility patterns and surveys from many countries reflect a widespread desire for ‘balanced families’, with at least one boy and one girl. The observable allocation of resources within families is not strongly discriminatory: recent cohorts of young men and women

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receive comparable levels of education and sons and daughters appear to be treated equally in terms of parental transfers and bequests (Taubman, 1991). A well-publicized recent report compares gender-specific trends in child and youth wellbeing in the United States between 1985 and 2001 and concludes that, though boys and girls fare differently in some quality-of-life indicators, overall levels of wellbeing are equivalent (Meadows *et al.*, 2005).

The absence of significant discrepancies in the wellbeing of boys and girls does not, however, imply that child gender has no impact on family life and parental behaviour in wealthy, industrialized societies. Psychologists and sociologists have documented differences in the parenting of sons and daughters, in levels of father involvement, and in levels of marital satisfaction reported by parents of boys and of girls. Some studies have found that the presence of a son significantly reduces the probability of divorce by American couples. This body of work has been recently augmented by research by economists, who have found significant effects of child gender on marital stability and family structure, as well as on parental time allocation and expenditures. The economics literature is characterized by the use of large samples and longitudinal data sources, by explicit concern for possible selection bias in the samples being analysed, and, to some extent, by formal modelling of the role of child gender in parental decisions.

In general, this recent work has confirmed and extended the results of previous studies that find different patterns in the parenting of sons and daughters and, in particular, greater levels of father involvement and paternal time investment in boys. Though the estimated differences in most parental responses to sons and daughters in Europe and America are small in magnitude,<sup>2</sup> the lower levels of father involvement experienced by daughters could affect overall levels of wellbeing for girls. Child-gender effects on parental behaviour may also provide a window on a more general set of work–family issues, since they suggest that parenting norms, and in particular the expected role of fathers, are influencing both the stability of marital and non-

marital relationships and the work effort of men (and possibly of women). This research, though currently at an early stage, may have policy implications for countries facing rapid changes in gender roles and in family cohesion.

There are still many unanswered questions concerning child-gender effects and how they vary within and across populations and over time. With the exception of fertility studies, almost all of the current evidence is based on US data, and the most recent studies suggest that parental responses to sons and daughters both vary across cohorts and are heterogeneous within cohorts—with parental education being an important determinant. The source of differential responses to sons and daughters is also unclear: most empirical patterns can be explained either as the result of a preference for sons, or of different constraints facing the parents of boys and girls. Distinct child ‘production functions’ for boys and girls and, in particular, real or perceived differences in the returns to paternal inputs may play a key role. More research from countries with varying labour-market conditions and parenting costs could help to sort out some important issues concerning the causes of child-gender effects.

This survey begins with brief comments on the prevalence of child-gender discrimination in traditional societies, in which cultural institutions, such as dowry and restrictions of the economic activities of women, give parents an incentive to favour sons. In contrast, the converging economic and family roles of males and females in most wealthy countries are expected to lead to parity in the treatment of sons and daughters. Section III sketches out alternative models of child-gender effects, based either on parental preferences (differences in the utility produced by boys and girls, or by their attainments) or constraints (differences in the production functions for boys and girls) and their testable implications. Section IV summarizes existing empirical results on the effects of child gender on fertility, marriage, time allocation, and parenting behaviour. If child gender is random at birth, it may provide a source of exogenous variation in the determinants of family behaviour. Section V discusses the circumstances

<sup>2</sup> For example, one study finds that a first-born daughter in the United States is 3.4 per cent less likely to be living with her father compared to a first-born son (Dahl and Moretti, 2004). However, Lundberg and Rose (2002) find large relative effects of sons on men’s work hours.

under which using child gender as an instrument may be valid and useful, and section VI concludes.

## II. SON 'PREFERENCE'

When parents express a desire for male rather than female offspring, or discriminate against female children in the allocation of resources, they are often described as having a 'preference' for sons. In the parlance of economics, this term suggests differences in parental utility for boys and girls, but what such discriminatory treatment reflects is a difference in parental demands for male and female children or child outcomes. As such, son 'preference' can result from the constraints that individual parents face rather than their preferences *per se*: in either case, son preference can be regarded as a consequence of the distinct economic and social roles that men and women play in traditional societies.<sup>3</sup> It is not surprising that parents who expect to rely on sons for support in their old age focus resources on their survival, nor that parents invest in child attributes that will generate adult pay-offs. In general, industrialization and increasing wealth have been associated with increasing gender equality in political and economic domains, and with more equal treatment of sons and daughters.

Relative parental demand for sons is sufficiently strong in parts of South and East Asia to cause juvenile sex ratios well above the biological sex ratio at birth<sup>4</sup> as a result of sex-selective abortion, sex-selective infanticide, and/or differential child mortality. Sen (1990) argued that 'over 100 million women are missing' in Asia and North Africa as a result of high female mortality rates, and Das Gupta and Li (1999) calculate substantial numbers of missing girls in China, South Korea, and India.<sup>5</sup> The means by which elevated sex ratios are produced varies across countries and by level of development. Excess female mortality is still substantial in South Asia, but the development and diffusion of ultra-

sound technology is providing an alternative method of ensuring a favoured child sex ratio. Sex-selective abortion has increased the ratio of young boys to young girls in Korea to 1.12 (Park and Cho, 1995). Son preference also affects the family environment of boys and girls via differential stopping behaviour in the fertility of couples trying to achieve a desired number of sons. Girls in India belong to larger families on average than do boys, since the parents of girls are more likely to continue to have children in an effort to acquire sons (Clark, 2000).

Strauss and Thomas (1995) survey the evidence for gender differences in the allocation of household resources to children in developing countries. They conclude that girls in South Asia, and perhaps South-east Asia, are disadvantaged in their access to nutritional and health inputs, but that evidence for such discrimination elsewhere is weak.<sup>6</sup> Differences in child mortality and in anthropometric indicators provide the most reliable measures of gender discrimination: studies based on nutrient intakes may be biased by gender differences in requirements or in activity levels. An alternative method of testing for discrimination against girls, using household expenditure data, has been developed by Deaton. When a child is born, expenditures on 'adult' goods such as alcohol and tobacco will tend to fall as resources are shifted to 'child' goods. If households with boys consume fewer adult goods than households with girls, then we can infer that boys are favoured over girls in the allocation of household resources. Deaton (1997) reviews studies from several countries and concludes that this method has yielded little evidence of discrimination against girls in the allocation of goods, even in countries in which there are distinct gender differences in child outcomes.

What are the parental motives that lead to an emphasis on the birth, survival, and education of sons, relative to daughters? Researchers have emphasized the role of social institutions and cultural

<sup>3</sup> In the presence of marked and pervasive gender roles, it is not simple to distinguish between differential treatment of boys and girls that arises from 'preferences' rather than 'costs', particularly if individual preferences themselves are endogenous, and evolve to conform with cultural institutions. Bowles (1998) considers the implications of such endogenous preferences for welfare economics and policy analysis.

<sup>4</sup> More boys than girls are born; the sex ratio at birth (number of boys/number of girls) is about 1.06.

<sup>5</sup> However, Oster (2005) argues that much of the over-representation of males in Asia is due not to excess female mortality, but to the impact of hepatitis B infection on the sex ratio at birth.

<sup>6</sup> Girls in most developing countries receive less education than boys, though this discrepancy tends to decline with per-capita income.

norms that increase the value of sons and increase the costs of daughters, such as the expectation that sons will care for parents in old age, or the need to provide daughters with a substantial dowry upon marriage. Das Gupta *et al.* (2003) examine the surprising persistence of son preference in the diverse economic environments of China, India, and Korea, and argue that these countries are characterized by similar family systems that create disincentives to raise daughters. In patrilocal societies, a woman leaves her parents' household when she marries, and joins the household of her husband's parents. Even when the economic value of women's labour is substantial, a married woman contributes to the resources of her husband's family: a girl's potential contribution to the welfare of her parents is therefore limited. Other institutions, such as the giving of dowry and male responsibilities to aged parents, grandparents etc., augment the net economic costs of girls relative to boys in these societies.

In the economics of the family, parents have traditionally been treated as a single decision-making unit, but mothers and fathers may not have identical preferences (or interests) with respect to the allocation of resources to children. 'Non-unitary' models that allow individual family members to have separate utility functions and make decisions collectively have been used to analyse the determinants of child wellbeing in developing countries (Quisumbing and Maluccio, 2003). In many countries, the share of household resources controlled by mothers is positively associated with measures of child welfare. A small literature analyses the allocation of resources to sons and daughters separately, and finds some evidence that women's control of resources is more strongly associated with daughters' wellbeing than with sons'. Thomas (1994) examines the relationship between parental education and child height, an indicator of health and nutritional status, using household survey data from the United States, Brazil, and Ghana. He finds that, in all three countries, the mother's education has a larger effect on her daughter's height than her son's, and that the father's education has a larger effect on his son's height. Duflo (2003) finds that the effects of a

substantial increase in social pensions in South Africa depend on the gender of the recipient. Pensions received by women have a large impact on the weight-for-height and height-for-age of girls but little effect on boys, while no effect on child anthropometric status is found for pensions received by men.

In contrast, there is little evidence of distinct gender bias in resources allocated to boys and girls in industrialized, non-traditional societies. As parents' dependence on support from children (sons) in old age has eroded in wealthy societies with increased provision of public and private pensions, motives for pronounced son preference have eroded as well. Falling fertility and rising women's labour force participation have equalized incentives to invest in sons and daughters, so that discrepancies in educational attainment have diminished and in some cases reversed to favour females (Jacob, 2002).<sup>7</sup> A survey by Taubman (1991) concludes that there is little empirical evidence of differential treatment of children by gender in bequests, transfers, and education, and Gronau (1988) finds no effect of child gender on household expenditures.

Despite this parity, or near-parity, in transfers to and investments in boys and girls in non-traditional societies, the birth of a son rather than a daughter does have a significant impact on many aspects of parental behaviour and family outcomes. Parents of a son are more likely to marry and less likely to divorce than parents of a daughter, and report higher levels of marital and general satisfaction. Fathers spend more time with, and are more involved with, sons relative to daughters, and their work hours may depend on child gender as well. Girls are less likely to live with their fathers than are boys. These patterns, though they indicate that parenting of sons and of daughters are in some sense distinct activities, are not easily rationalized as the outcomes of observable differences in the expected costs and benefits of raising boys and girls. In fact, one central unanswered question for economists is whether these differences emerge from parental preferences, from differences in constraints, or from both.

<sup>7</sup> Behrman *et al.* (1986) attribute the lower education levels of daughters in earlier American data to the parents' optimal response to gender wage differentials, rather than unequal concern for sons and daughters.

### III. PREFERENCES VERSUS CONSTRAINTS: TOWARDS A THEORY OF CHILD GENDER AND PARENTAL BEHAVIOUR IN DEVELOPED COUNTRIES

When economists observe differences in individual behaviour, we tend to classify the possible determinants into two categories: variation in individual preferences and variation in the constraints or prices that individuals face. Parental demands for sons rather than daughters can be explained either by systematic bias in the utility generated by male and female children (or their attainments), or by differences in the net costs of raising boys and girls. Ben-Porath and Welch (1976) discuss parental gender preferences in these terms, distinguishing between the effects of a couple's tastes regarding the gender composition of their children and differences in the prices of boys and girls that are generated by differences in 'the economic productivity of children, chances for old age support, and bride prices (positive or negative)' (p. 292).<sup>8</sup> These factors are, as they note, characteristic of some less-developed countries, and the treatment of son preference in development economics centres on these instrumental differences in the value of girls and boys.

In non-traditional, wealthy societies, differences in the economic costs and material returns to sons and daughters appear to be minimal, and we expect to see little overt gender bias in fertility and child investment behaviour. Evidence of child-gender effects on parental behaviour and family structure, therefore, comes as a surprise. The research summarized in the next section shows that, though the effects of child-gender composition on future fertility varies across countries, male children (relative to female children) tend to increase the stability of their parents' union, to generate more father involvement in family and childcare, and to affect parental time allocation. Early researchers in sociology pointed to two possible explanations that are consistent both with the negative effect of sons on divorce and with the extensive evidence that fathers spend more time with sons, and have stronger ties to the family if there is at least one son. First, both mothers and

fathers express concerns that divorce may have a more negative impact on boys than on girls—the 'boy needs a father' effect. Morgan *et al.* (1988) emphasize the belief that fathers have a special role in the emotional and social development of boys. Second, men may prefer boys to girls or prefer spending time with boys, and so fathers of sons expect divorce (with the mother as the primary custodial parent) to be more costly than if they have only daughters. These stories are consistent with 'constraint' and 'preference' models of child-gender effects, respectively.

Let us begin with a simple economic model of parenting behaviour that assumes a mother and father can be treated as a single decision-making unit, and in which the family's utility is some function of the number of children and/or child outcomes. These outcomes or child 'quality' are outputs of a household production process whose inputs are parental time and market goods and services. In this unitary model, parents have child-gender preferences if the marginal value of an additional male child differs, *ceteris paribus*, from the marginal value of an additional female child, or if the marginal utility of increments in boy quality is not equal to the marginal utility of girl quality. In a household production framework, any assertion that boys and girls have different 'prices' runs into the critique of Pollak and Wachter (1975)—that the effective cost of a home-produced good, such as a child, will depend not just on exogenous market prices, but also on the parents' preferences (for time spent with children, or desired child attributes). If the child production function itself differs by gender, however, we can think of parents of boys and girls as facing different constraints.

We can use this unitary family framework to examine the parenting of boys and girls within a particular marriage, but to analyse child-gender effects on marriage and divorce requires a more general model in which individuals can choose to form and dissolve relationships.<sup>9</sup> Let fathers and mothers have separate utility functions and assume that they make joint decisions through some collective process when in a marital or non-marital partnership. Each parent's

<sup>8</sup> A referee points out that R. A. Fisher (1931), in his pioneering discussion of natural selection and the sex ratio, makes a similar value–cost distinction. Fisher argues that the equilibrium child sex ratio depends upon the 'reproductive value' of male and female offspring and on 'total parental expenditure' on each (ch. VI, p. 142).

<sup>9</sup> For a discussion of unitary and non-unitary models of the family, see Lundberg and Pollak (1996).

demand for children will depend upon custody/coresidence arrangements: the simplest assumption is that children generate utility only for parents who live with them or spend time with them, and that maternal sole custody after separation is customary. In this case, if men prefer sons to daughters, the birth of a son increases the value of marriage relative to separation more than does the birth of a daughter, i.e. sons create more marital surplus than daughters. The implications of this paternal preference model are clear: the parents of sons will be more likely to live together/marry than the parents of daughters, and less likely to separate or divorce. A change in custody rules that increases the prevalence of paternal custody will tend to weaken the union-stabilizing effect of sons, as the expected loss of divorce to the father of a boy will be reduced.

This sort of preference-based model of child-gender effects is consistent with the observed effects of sons and daughters on marriage and divorce. Increased marital stability will have other implications for the parent's allocation of time, however. If parents of boys are more likely to stay together, this will increase their incentives to make marriage-specific or family-specific investments. These investments can take the form of increased specialization in home work by the mother and market work by the father, or greater spending on durables, such as housing. In fact, expenditures on housing by US married couples with one boy were found to be 4 per cent higher than expenditures by couples with one girl and the same level of income (Lundberg and Rose, 2004). Finally, if men prefer boys we would expect to see, as we do, that fathers spend more time with sons, because that interaction generates more direct utility than time with daughters.

The alternative, constraint-based explanation of child-gender effects begins with different child production functions for male and female children. The optimal inputs of time and other resources into the production of child quality for sons and daughters

may differ if, for example, the marginal returns to maternal and paternal time are not identical for boys and girls. If fathers are more important to the development of emotionally stable and socially adept boys, rather than girls, and if parental separation makes it more costly for fathers to provide this input, then this provides another mechanism by which the birth of a son can increase marital surplus and marital stability. Evidence that boys fare worse following a divorce (Hetherington and Kelly, 2002) lends some support to the proposition that fathers are more 'productive' in producing boy quality; but studies of maternal employment find that decreases in mother care time is also more likely to have negative impacts on boys than girls (Desai *et al.*, 1989; Baydar and Brooks-Gunn, 1991; Bogen-schneider and Steinberg, 1994).<sup>10</sup> Most of the testable implications of the father-productivity explanation are identical to those of the paternal son-preference hypothesis—more stable relationships and more paternal time with sons.<sup>11</sup>

Models that allow the child production function to differ between girls and boys can potentially be much more general than this, however. If child quality is characterized by a vector of outputs, rather than a single scale, parents may place different weights on son and daughter characteristics and so provide different inputs. Parameters may differ because of the biological characteristics of boys and girls (if, for example, boys 'need' more food, space, attention), social norms (girls 'need' more clothes), or peer effects (parents may wish to spend more on housing if they have boys in order to purchase higher neighbourhood quality). For example, Dustmann (2003) finds that the probability of return migration from Germany responds to parental perceptions about differential net benefits of migration to male and female children and so differs by ethnic group. Multi-dimensional child quality implies that the relationship between child gender and parental inputs is unlikely to be invariable across time and cultures. There may also be sibling effects that are gender

<sup>10</sup> A meta-analysis of studies of non-resident fathers and child wellbeing by Amato and Gilbreth (1999) finds no support for the hypothesis that boys benefit more than girls from paternal involvement, but it should be noted that there are potential selection biases in all studies based on correlations between parental presence and child outcomes.

<sup>11</sup> Dahl and Moretti (2004) present a model of child-gender effects in which they distinguish between three possible sources of son/daughter differences: a 'gender bias' effect and 'role model' effect that are similar to the preference and child production effects discussed here, and a 'differential costs' effect based on exogenous prices for boy and girl children. They argue that the differential costs story is inconsistent with observed parity progression patterns, and that the gender bias explanation is bolstered by survey data in which men report that they would rather have a boy than a girl.

specific because of economies of scale or limits on mother's time or father's time.<sup>12</sup>

The preference and constraint models of son/daughter effects on family structure and parental time allocation do generate a couple of distinct predictions in a non-unitary model, though there is at present little relevant empirical evidence. Intuitively, these implications emerge from the observation that, if men prefer sons, fathers alone will have an incentive to maintain contact with their children, while if men are more productive parents of sons, both mother and father will benefit if father and son remain together. Consider a standard marital bargaining model in which the threat point is determined by the utility of each parent if the marriage dissolves.<sup>13</sup> If men prefer male children, then the birth of a son will leave mothers better off than the birth of a daughter. This occurs because boys provide a direct utility bonus to fathers, and intra-household bargaining will distribute some portion of that additional marital surplus to mothers. If fathers of sons are more productive as parents, however, mothers of sons need not benefit, and may be left worse off. That is, mothers may be willing to pay a higher proportion of family resources to the father of a son to induce him to stay in the marriage and continue providing parental inputs. If we have some measure of the relative wellbeing of mothers of sons and mothers of daughters, such as leisure or a female consumption good, we may be able to distinguish between the preference and child production models.<sup>14</sup>

A related test can be found in patterns of assortative mating. If men prefer sons, then the supply of available partners will be greater for the mother of a son and we will expect that, given her own characteristics, she will acquire a higher-quality partner than the mother of a daughter. However, if a boy needs a father, then the value of a partner with given characteristics will be enhanced for the mother of a son, relative to raising him on her own. The child

production model therefore predicts that mothers of sons will have lower-quality partners than mothers of daughters. At present, there have been few attempts to estimate the effects of child gender on intra-household distribution and marital sorting, but these are promising areas for future research.

#### IV. EMPIRICAL EVIDENCE

The non-economics literature on child-gender differences in parenting has focused on two issues: the impact of sons and daughters on marital quality and/or stability, and differences in parental treatment of sons and daughters, particularly with reference to gender role socialization. Sociologists and developmental psychologists have addressed both aspects of parental behaviour, but sociologists have generally used large-scale survey data, while psychologists often rely on small clinical samples.

Development economists have long been concerned with child gender as a potential determinant of parental investments in children, or as a source of variation in total household resources.<sup>15</sup> The entry of economists into the study of child-gender effects on parenting in non-traditional societies has been part of the recent expansion in family economics, but is also motivated by a search for sources of exogenous variation in the determinants of individual and household behaviour. Recent economic research in this area can be distinguished from earlier work by the use of large samples and longitudinal data that permit more precise estimates of small child-gender impacts and by concern for possible selection bias resulting from gender-biased fertility and family structure choices. Empirical analysis has focused on three types of child-gender effects: on the formation and dissolution of marital or non-marital partnerships, on the probability of subsequent fertility (parity progression), and on parental time allocation.

<sup>12</sup> For example, the effects of sibling sex composition on women's educational attainment found by Butcher and Case (1994) (and not found by Kaestner (1997)). A recent review by Steelman *et al.* (2002) finds no agreement among researchers on the effects of sibling sex composition on child achievement.

<sup>13</sup> See the discussion in Lundberg and Rose (2004).

<sup>14</sup> Lundberg (2005), however, does not find evidence of differences in leisure consumption between mothers of young sons and daughters in the American Time Use Survey, and Lundberg and Rose (2004) fail to find significant differences in assignable expenditure categories.

<sup>15</sup> Deolalikar and Rose (1998) analyse the effects of the 'gender shock' on the resources of households in rural India that result from the birth of a son or daughter.

### (i) Marriage, Divorce, and Child Custody

The birth of a son, relative to a daughter, increases both the quality and stability of his parent's relationship in the United States. Child-gender effects on marriage and divorce imply that girls are less likely to live with their fathers; this gap in father contact is exacerbated by substantial differences in post-divorce custody arrangements for boys and girls.

Male children increase parents' subjective reports of individual wellbeing and marital satisfaction. Several studies (Barnett and Baruch, 1987; Katzev *et al.*, 1994; Cox *et al.*, 1999; Mizell and Steelman, 2000) have found that both partners in marriages with sons report higher levels of marital satisfaction than do husbands and wives who have only daughters. Boys also reduce their mothers' perceptions of the likelihood of divorce (Heaton and Albrecht, 1991; Katzev *et al.*, 1994). A recent study of subjective reports of wellbeing among a sample of Danish twins (Kohler *et al.*, 2004) finds that the birth of a first child increases reported happiness, and that men enjoy an almost 75 per cent larger happiness gain from a first-born son than from a first-born daughter.

Beginning in the 1980s, several studies by sociologists reported that, in the United States, having a son relative to a daughter increases the likelihood that a marriage will remain intact. Spanier and Glick (1981) find that divorce is more likely if all children are girls, especially if the mother has relatively little education. Morgan *et al.* (1988) find that sons reduce the risk of marital disruption by 9 per cent more than do daughters. Girls are less likely than boys to live in a household with a father present (Mott, 1994). Other studies, however, have found no significant child-gender effect on divorce, including some that use non-American data (Devine and Forehand, 1996; Bracher *et al.*, 1993 (Australia); Diekmann and Schmidheiny, 2004 (16 European countries, Canada, and USA)). Morgan and Pollard (2003) replicate the results of Morgan *et al.* (1988) and confirm a

negative effect of sons on divorce rates for the 1960–79 period, but report that this effect is 'attenuated sharply' in later periods.

The absence of significant child-gender effects on divorce rates in these latest studies appears to be due both to a real decrease in the differential impact of sons on marital stability and to the use of data sources with relatively small sample sizes. Census-based analyses show significant child-gender effects on divorce that increase with family size and decline over time. Bedard and Deschenes (2005) and Ananat and Michaels (2004) find significant effects of sons on divorce probabilities using the 1980 US Census Public-Use Microdata Samples (PUMS).<sup>16</sup> The two studies find comparable (4 per cent versus 3.2 per cent) positive effects of a first-born daughter on the probability that her mother's first marriage ends in divorce. Dahl and Moretti (2004) find a significant but very small gender effect—first-born daughters are about 1 per cent more likely to reside with a currently divorced or separated mother or father (so that this effect reflects remarriage, as well as divorce, behaviour) in the 1960–2000 Census samples. This effect increases with family size, so that four girls are 7.5 per cent more likely to be living with a divorced or separated parent than four boys.<sup>17</sup> When these results are broken down by Census year, they are very similar to those of Morgan and Pollard: the 1990 and 2000 Census samples generate no significant child-gender differences.<sup>18</sup> There are two possible explanations for the apparent temporal decrease in the effect of sons on divorce: a decline in the real significance of child gender, either in parental preferences or child-rearing practices, or an increase in the margins on which parent-child coresidence decisions are made as non-marital fertility becomes more widespread.

If a son increases the stability of marital unions, it seems likely that the birth of a boy will improve the quality of non-marital unions as well. Lundberg and Rose (2003) estimate the effect of child gender on the probability of marriage for women in the Panel

<sup>16</sup> The 1980 Census provides information about marital history, so that ever-married mothers can be identified.

<sup>17</sup> Comparisons at higher parities are more difficult to interpret, however, since the gender of the first child may have influenced the parents' subsequent fertility decisions.

<sup>18</sup> That son preference is related to marital stability is borne out by a strong association between lower risk of divorce and having at least one son across sub-groups of women in India (Bose and South, 2003).



Study of Income Dynamics who had non-marital births. Mothers of sons were more likely to marry, and married more quickly, than mothers of daughters. Using a competing risks analysis, they find that this effect comes from marriages to the child's biological father: the transition rate into marriage with the child's father for women with a son was 60 per cent higher than that of women with a daughter.<sup>19</sup> In US Census data, a first-born son has a positive effect (2.6 per cent) on the probability that his mother has ever been married (Dahl and Moretti, 2004). Both of these studies fail to find an effect of child gender on the remarriage probability of divorced mothers, however.

The effect of a son born to unmarried parents on the probability that his parents subsequently marry appears to be declining,<sup>20</sup> but as ultrasound screening becomes more widespread, an alternative route for a child-gender effect on living arrangements occurs through the decision to marry between conception and birth. Using data on birth certificates of first-time mothers from the California Birth Statistical Master File for 1989–94, Dahl and Moretti (2004) examine these so-called 'shot-gun weddings'. They find that mothers of girls who had an ultrasound test during pregnancy (and who are therefore very likely to know the gender of their baby), are 0.3 percentage points less likely to be married at birth than mothers of boys who also had the test. Using an imputed probability that the mother was unmarried at conception, they interpret this as a child-gender difference of about 4 per cent in the probability that an unmarried, pregnant woman marries before the birth.

Comparing the living arrangements of boys and girls provides an alternative way to measure the overall impact of child gender on family structure (Mott, 1994). Children in families with a father figure present in the 1983–2001 Current Population Surveys are significantly more likely to be boys than girls (Mammen, 2003). Dahl and Moretti (2004) use

a sample of all families with children under age 12 from the 1960 to 2000 US Censuses and find that first-born girls are 3.4 per cent less likely than first-born boys to have a father or step-father in the household. There are several possible sources of this difference in father presence: parents of boys may be less likely to divorce or separate, more likely to marry or cohabit in the first place, or fathers may be more likely to seek and gain custody of boys. This discrepancy in living arrangements between boys and girls has been falling over time and is increasingly the result of differences in the probability of marriage and in custody arrangements between parents of boys and girls rather than a child-gender gap in divorce rates. Dahl and Moretti find that fathers are substantially more likely to obtain custody of sons than daughters and that, as paternal custody rates rise, this custody effect has risen to account for about 60 per cent of the overall difference in living arrangements between boys and girls. Cancian and Meyer (1998) analyse a sample of Wisconsin divorces and find that shared custody is significantly more likely, relative to maternal custody, if all the children are boys, and that father sole custody is more likely if the children are age 11 or older and all are boys.<sup>21</sup>

Though the mean differences are quite small, young girls are significantly less likely than young boys to live with their fathers in US data. Little is known about the living arrangements of boys and girls in other countries.<sup>22</sup> Studies that examine child-gender effects on specific routes to father absence, such as divorce and marriage after a non-marital birth, find that the differences between the experiences of boys and girls in the United States have been declining over time. With the increased prevalence of cohabitation, non-marital childbearing, and joint-custody arrangements, however, empirical approaches that focus on the living arrangements of children can provide a more comprehensive picture of child-gender effects on family structure.

<sup>19</sup> Since this study used retrospective marriage and fertility histories for women who were surveyed between 1968 and 1993, these results are reflective of behaviour over several decades.

<sup>20</sup> In preliminary work, I find that there is no significant effect of child gender on the transitions to marriage of unmarried mothers in the National Longitudinal Survey of Youth (1979) during the 1980s and 1990s.

<sup>21</sup> The estimated combined effects of child age and gender on custody arrangements are quite large. Cancian and Meyer estimate the probability of sole maternal custody to be 92 per cent with one female child age 0–2 and 71 per cent with two boys age 11+ (at mean values of other variables).

<sup>22</sup> Though Choi *et al.* (2005) find that the rate at which German men leave a household shared with their first child is 25 per cent lower if that child is male.

## (ii) Fertility

Does the gender or gender composition of current children affect the probability that an additional child is born? Ben-Porath and Welch (1976) find that gender preferences do have a statistically significant effect on fertility, and that in US data there is a U-shaped relationship between the propensity to have more children and the ratio of boys to total children. They interpret this relationship as evidence that parents have a taste for balance in the gender composition of their children, rather than of a difference in the economic costs and benefits (or 'price') of boys and girls, which would suggest a monotonic relationship.<sup>23</sup> A preference for 'balanced' families is found in the parity progression data in many countries: parents with same-sex children are more likely to have an additional child (Arnold, 1997; Hank and Kohler, 2000). Angrist and Evans (1998) and Iacovou (2001) document this relationship in US and UK data, respectively, and go on to use the sibling-sex composition of the first two children as an instrument for the effect of fertility on women's labour supply.

'One of each' is overwhelmingly the top choice of most parents: parental preference for boys or girls is not reported in most parity progression studies. Teachman and Schollaert (1989) find that couples whose first child is a boy tend to have a subsequent child sooner, but they attribute this finding to the greater stability of the relationship associated with the birth of a son. However, the very large samples in US Census data reveal a small degree of boy 'preference': women with two girls are 2.4 per cent more likely to go on to have a third child (Dahl and Moretti, 2004).<sup>24</sup> Recent evidence from Nordic countries, on the other hand, is consistent with a preference for girls (Jacobsen *et al.*, 1999). Andersson *et al.* (2004) find that families with two sons have a 10 per cent higher probability of having another child in Sweden, Denmark, and Norway, though Finnish parents exhibit son preference in their fertility decisions. One possible (but untested) interpretation of these cross-country differences in

child-gender effects on parity progression attributes them to differences in the relative bargaining power of men and women. If women have a stronger preference for at least one daughter than do their partners (and vice versa), then we may see apparent daughter preference in data from countries in which women have relatively greater influence on fertility decisions.

## (iii) Time Allocation and Parenting

The preference- and constraint-based models of child-gender effects have the same predictions with respect to parental time allocation and child involvement. Increased time with a same-sex child can result from the enjoyment of time spent with the child who is most like you, perhaps engaged in familiar and gender-typical activities, or from the belief that you are a more effective, productive parent with this child. Differences in the market work or other activities of parents of boys and girls may occur as indirect outcomes of differences in optimal childcare time or as reactions to different expectations about relationship stability.

Time-allocation data from the USA show that men spend more time with sons and women spend more time with daughters (Bryant and Zick, 1996; Yeung *et al.*, 2001). Men also spend more time with their children overall if they have at least one son (Barnett and Baruch, 1987; Harris and Morgan, 1991). Fathers of sons are more involved with their children's discipline, schoolwork, and other activities than are fathers of daughters (Lamb *et al.*, 1987; Morgan *et al.*, 1988), and mothers report greater emotional attachment of their husbands to sons than to daughters (Morgan *et al.*, 1988). To some extent, these patterns reflect greater parental involvement with same-sex children and the gender-typing of much household and leisure activity, but a review and meta-analysis by Siegal (1987) found that fathers' treatment of children was much more likely to differ significantly by child gender than was mothers' treatment.

<sup>23</sup> This simplifies their analysis, which also allows for a learning effect (i.e. parents adapt their subjective probability of having a boy to experience).

<sup>24</sup> The effect of a first-born girl on the probability of a second child is small and negative, and Dahl and Moretti interpret this as the result of a higher probability of divorce for mothers of daughters, who are then less likely to have an additional child. Using longitudinal data from California so that they can control for changes in marital status, they find no effect of a first-born girl and somewhat larger positive effects on subsequent fertility of two or three girls.

Fathers' time with children has increased overall, but the pattern of higher same-sex parent time with sons and daughters has remained stable in the USA. The 1997 Child Development Supplement to the Panel Study of Income Dynamics includes child time diaries for more than 3,500 children aged 0–12, providing a detailed snapshot of parental time and activities with children. Fathers in married-couple families spent significantly more time with sons in play/companionship activities than with daughters (Yeung *et al.*, 2001), and fathers overall spent more time engaged in activities with boys, though there was no significant difference in the amount of time fathers were available to sons and daughters (Hofferth and Anderson, 2003).

Greater paternal interaction with sons is not limited to married-couple families. Lundberg *et al.* (2005) use recent data from the Fragile Families and Child Wellbeing Study to examine the involvement of both married and unmarried fathers with their sons and daughters 1 year after the child's birth. Using mothers' reports concerning the frequency with which fathers participate in activities such as diapering, feeding, and playing with their children, they find that both unmarried and married fathers engage in substantially more caretaking of sons than of daughters. Mothers' reported interactions with 1-year-old sons and daughters, on the other hand, are essentially identical.

There is a large literature in psychology on differential parental treatment of sons and daughters, though Maccoby (2003) emphasizes that these differences are likely to be the outcome of bi-directional processes, with gender differences in parent–child relationships emerging from both parent actions and child responses. Cowan and Cowan (1992) provide an interesting analysis of the interactions between marital satisfaction and parenting behaviour based on a small sample of new parents who were interviewed and observed over several years. They report that mothers of sons did not differ from mothers of daughters in their interactions with preschoolers, but that fathers of girls were, on

average, more authoritarian, colder, more critical, and less encouraging to their children than fathers of boys. In particular, marital conflict caused the relationships between men and their daughters to deteriorate markedly, but did not affect their relationships with sons.<sup>25</sup>

If the birth of a son increases the likelihood that his parents will stay together relative to the birth of a daughter, this may provide another route for child-gender influence on parental time allocation. An increase in the expected duration of a marital or non-marital relationship will increase parents' incentives to make family-specific investments. Since work at home produces household public goods, and the skills involved in home production yield limited returns in the market should the relationship end, a couple is unlikely to choose traditional gender specialization without the expectation of a long-term union. Therefore, sons should increase fathers' work hours and reduce market work and labour-force participation by mothers. Two longitudinal studies find that first-born sons have substantially larger positive effects on the work hours of American and German men born in 1950 or later (Lundberg and Rose, 2002; Choi *et al.*, 2005). However, more recent work suggests that these results may be sensitive to cohort and education level, and that child gender may affect mothers' labour supply as well (Lundberg, 2005).

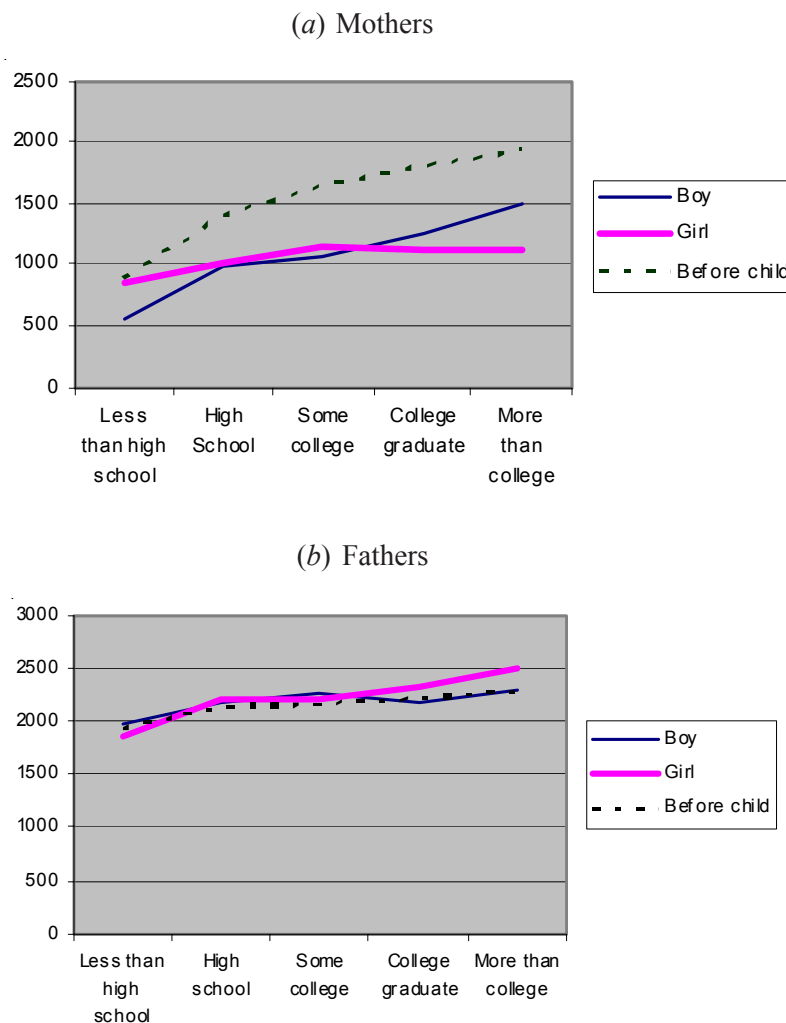
Lundberg and Rose (2002) estimate fixed-effects models of men's work hours and wage rates, using data from the Panel Study of Income Dynamics (PSID) for 1968–92. Both sons and daughters increase their father's work hours, but the effect of sons is substantially (and significantly) larger. Men born after 1950 increase work hours an average of 112 hours per year following the birth of a first-born son, compared to 43 hours if the first-born child is a daughter, but there are no significant effects of child gender on mothers' work hours.<sup>26</sup>

Choi *et al.* (2005) estimate similar models with 1984–2001 data for men born in 1950 or later in the

<sup>25</sup> The authors' interpretation of this pattern includes elements of both the preference and constraint models of child-gender effects. They note that both mothers and fathers perceive boys as more vulnerable than girls during a divorce, and that both parents try to prevent marital difficulties from harming the father–son bond. However, they believe that fathers favour boys, and that 'unhappily married men do not generally make the same efforts to safeguard their relationships with their daughters' (Cowan and Cowan, 1992, p. 157).

<sup>26</sup> These effects will include the direct effects of a son or daughter in the man's household, and indirect effects that operate through the influence of the first-born's gender on subsequent fertility and living arrangements.

**Figure 1**  
**Average Annual Work Hours of First-time Parents of Young Children by Education Level and Child Gender: NLSY79**



German Socio-Economic Panel (SOEP) and find that fixed-effect estimates of marriage and child effects on men's work hours are very similar to those in the equivalent cohort of American men. The relative child-gender effect is also consistent with the PSID result: they find that a first-born son increases his father's labour supply by 60 hours per year, while a first-born daughter has an insignificant negative effect on her father's work hours—the estimated difference in the labour supply impact of son and daughter is a highly significant 107 hours per year. Choi *et al.* (2005) also find evidence of selection bias in estimates that use children currently in a man's household as imperfect proxies for sons and daughters ever born (SOEP, unlike PSID,

does not collect fertility histories for men). Using information on sons and daughters who have ever been in the man's household instead of co-resident children reduces the effects of selection, and reveals that men who stay with daughters appear to be positively selected in terms of their work hours.<sup>27</sup>

Evidence from more recent cohorts of American fathers indicates that the effect of children on men's work hours has decreased, and that the influence of child gender has become more complex. The average effect of preschool children on the work hours of men married to female respondents of the National Longitudinal Survey of Youth, 1979 (NLSY79) sample (born between 1958 and 1965) is substantially

<sup>27</sup> Lundberg and Rose (2002) also find positive relative effects of sons on fathers' hourly wage rates, but sons and daughters do not appear to have different effects on the earnings of German men (Choi *et al.*, 2005) or their wage rates (Lang, 2005).

smaller than child effects in the post-1950 cohorts of the PSID and SOEP (Lundberg, 2005). The impact of sons and daughters on work hours for this sample also varies dramatically by education level: boys under the age of 3 increase specialization by husbands and wives with relatively low levels of education, but reduce specialization by highly educated couples. Figure 1 shows mean values of average annual work hours for mothers and fathers, by education level, during the 3 years following the birth of the woman's first child. The least-educated women with sons worked nearly 300 hours per year less than equivalent women with daughters, and there was an equally large discrepancy at the top end of the education scale, with mothers of sons working more hours. For fathers, the child-gender effect on hours is significant only for highly educated men, who worked about 200 hours per year less after a son, rather than a daughter, was born.

A 2003 time diary survey of US households with smaller samples reveals no significant child-gender patterns in the time use of mothers, but effects for fathers that are very similar to those in the NLSY79 (Lundberg, 2005). Married men with more than a college degree work less if they have sons under age 3 than if they have daughters under age 3 (by more than 1 hour per day), and spend more time on childcare.

At this point, the evidence regarding child-gender effects on parental time allocation is somewhat ambiguous. For German and American men born in 1950 or later, the birth of a son increases work hours more than the birth of a daughter—a pattern of increased household specialization that is consistent with evidence that boys increase marital stability. However, more recent data indicate that among married couples with high levels of education and children under age 3, fathers of boys work less and spend more time with their child than fathers of girls. One possible explanation for this change is that, as women's attachment to the labour force and men's involvement with children increase, increased father's time with sons is more likely to be accommodated by a reduction in his working hours and a compensating increase in those of his partner. This response may appear first in educated households in which the father's work hours are more flexible and the opportunity cost of an employment interruption for mothers is higher.

The common thread in the empirical evidence summarized here is that fathers spend more time with sons than with daughters, and are more likely to co-reside with them. The effects of sons and daughters on other outcomes, such as specific relationship transitions, are often not significant, and the impact of child gender on parental work hours seems to vary over time and within samples. There are at least two major inadequacies in the existing evidence: almost all studies are limited to US data, and none provides a rigorous test that can distinguish between child-gender effects that are preference- rather than constraint-driven.

## V. IS CHILD GENDER EXOGENOUS?

One area of interest in the effects of child gender among economists has been the hope that the randomness of sex at birth will provide a source of exogenous variation that can be used to estimate causal models. Two recent studies (Ananat and Michaels, 2004; Bedard and Deschenes, 2005) use the sex of a first-born child as an instrument for the probability that a woman's first marriage ends to examine the effects of divorce on women's labour supply and income. Since child gender does appear to affect the formation and dissolution of partnerships among parents, the sex composition of children after the first cannot be treated as exogenous—selection bias will contaminate any comparison of outcomes for, for example, women with two girls and women with two boys because the characteristics of a woman with a first-born girl who went on to have a second child (despite a higher probability of being unpartnered) are likely to be different from the characteristics of a woman with a first-born boy and a second child. Any comparison of sons and daughters that is conditional upon family structure (i.e. children of married couples) is subject to the same criticism. Finally, treating the sex of a first child as exogenous with respect to subsequent parental outcomes, even if unconditional on family structure, also requires the assumption that there is no sex-selective abortion.

One problem with child gender as an instrument is that the evidence summarized above indicates that sons and daughters may have pervasive effects, not just on marital stability, but also on parental time and resource allocation—the exclusion restrictions are

a priori unpersuasive. Norberg (2004) introduces a second complication—the possibility that a woman's partnership status at conception may be correlated with child gender. Trivers and Willard (1973) hypothesize that natural selection would favour species that can adjust the sex ratio of offspring in response to changes in conditions affecting the relative reproductive success of males and females. Males, who can father children from multiple partners but must compete for them with other males, can be expected to have greater reproductive success, relative to females, when conditions are favourable—suggesting that parents should invest relatively more in female progeny when times are hard.<sup>28</sup> Recent evidence that the sex ratio (see footnote 4) is falling in a set of industrialized countries has been suggested as a possible signal of deteriorating health conditions (Davis *et al.*, 1998). Norberg finds not just aggregate responses of the sex ratio to environmental conditions, but also a cross-sectional correlation: children who were conceived when their mother was living with an opposite-sex partner were 14 per cent more likely to be boys than siblings conceived when the parents were living apart. Both the potential endogeneity of child gender at birth and the impact of sons and daughters on a wide range of parental behaviours suggest that even sex at birth should be employed as an instrument only with great caution.

## VI. CONCLUSION

Recent empirical studies, most of them based on US data, find small but significant and consistent impacts of child gender on the partnership status of parents and the living arrangements of the child—boys are more likely than girls to be living with their fathers. These results are consistent with an extensive literature in the social sciences that finds greater father involvement with boys than with girls, and with an economic interpretation that male children increase marital surplus. There is also substantial evidence that male children increase the work hours of their fathers, and this increase in household specialization may be an optimal response to greater expected marital stability. Very recent results, how-

ever, have produced an exception to this general pattern—highly educated American fathers are more likely to reduce their work hours when they have a very young son, rather than a daughter. This may be a reflection of a changing role for fathers: men with high income, flexible jobs, and a desire to invest intensely in their children have begun to increase their own time input. Whether these child-gender differences are due to the son preference of fathers or to a bias towards same-sex parental inputs as child investment rises, we cannot say. Future research may be able to answer this question by examining child-gender effects on intra-household allocation and assortative mating. The current literature is also extremely focused on the United States; very little is known about the relative living arrangements of boys and girls in other developed countries, or about the time allocation of their parents. Publication bias may be a serious concern in the development of this field, as researchers may reasonably believe that careful studies finding no child-gender differences in outcomes will be difficult to place in journals.

The immediate policy implications of this work are related to gender equality: girls receive less paternal input both within and outside of marriage and this may generate some long-term disadvantage even though their education levels and share of parental bequests are the same as boys. Changes in family structure and family dynamics have altered the mechanisms by which girls' access to fathers is restricted—child-gender effects on the probability of divorce have become less important relative to differences in union formation and in paternal custody. Increases in non-marital childbearing mean that the birth of a boy or girl can affect the probability that a marriage or long-term cohabitation is formed and, with increasing joint and paternal custody, a new route to gender inequality may emerge if fathers seek and acquire custody of boys more than girls.

Another implication of child-gender effects on parental, and particularly paternal, behaviour is that forces promoting a father's daily connection with his children (such as having a male child) are related

<sup>28</sup> See Cox (2003) for a discussion and evidence that parental wealth and relative son/daughter education have a Trivers–Willard relationship, and Edlund (1999), who argues that cheaper sex choice (e.g. prenatal screening) in combination with a Trivers–Willard effect can lead to a permanent female underclass.

to the likelihood that he will participate in a long-term partnership, and that a man's role as a parent (and not just biological parenthood) can have a substantial impact on his work hours. The connections

between parenthood, partnership, and market work for men that are revealed by the child-gender studies may be salient for work–family policy as well as policies promoting gender equality.

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