Using Fathers' Child Support Payments to Test Income Pooling

John Ermisch and Chiara Pronzato

ISER
University of Essex

31 August 2005

Abstract

A large proportion of divorced and separated fathers form new partnerships. The new partner's preferences are likely to put a much lower weight (if any) on expenditures on the man's children from his previous union. As a consequence, his own and his partner's income would have different impacts on his child support payments if partners' relative incomes affect bargaining power in household decisions. Estimating these impacts requires information on whether or not men have dependent children living elsewhere and on their new households, which is relatively rare. Furthermore, preferences favouring child support may be correlated with the father's and his partner's income, making estimates based on between-family variation from cross-section data suspect. This paper exploits within-family variation in the British Household Panel Survey (1991-2003) to estimate the impacts of partners' incomes on child support payments from a sample of formerly married men whose histories indicate that they should have a dependent child living elsewhere. Our estimates indicate that a higher share of father's income in household income increases child support relative to household income, suggesting that partners' relative incomes affect their bargaining power in household decisions.

Introduction

Previous interpretations of the results of empirical tests of "income pooling" in couples' consumption decisions, or more ambitiously, estimation of the "sharing rule" (up to a constant), have typically focussed on private goods that are *assignable*, in the sense that we can observe individual consumption of the good.[1] They examine how individual partners' incomes affect expenditure on such goods. A person's leisure-time is a prime candidate for an assignable good, because it can only be consumed by that person.[2] Following this lead, labour supply has been an important area in which income pooling has been tested, and usually rejected (e.g. Chiappori, Fortin and Lacroix. 2002; Fortin and Lacroix 1997 and Lundberg 1988).[3] Other studies have taken men's and women's clothing to be assignable goods (e.g. Browning *et al* 1994; Lundberg, Pollak and Wales 1997) and rejected income pooling. The latter studies suggest that women do better when they control more of the couple's resources.

In the present paper, we use information about divorced/separated fathers who have dependent children living elsewhere and who have formed new partnerships. Such fathers may pay the children's mother financial support because the father's welfare is increasing in expenditure on his children and he only can influence it by making transfers to the custodial mother (Weiss and Willis 1985). The father's new

[1] While the "unitary model" is synonymous with income pooling in typical cases, on the definitions put forward by Browning et al (2004), income pooling is neither necessary nor sufficient for a unitary model—one that satisfies the Slutsky conditions. Thus, we do not claim to be testing the unitary versus the collective model. Using price variation, Browning and Chiappori (1998) test the "collective model" (i.e. each person has his or her own preferences and the couple's decisions are efficient) against the "unitary model" (one household utility function) without assuming that any goods are assignable or restricting individual preferences, and reject the unitary model.

[2] While leisure can "only be consumed by that person" in a strict sense, this is not true in a broader sense if a person's utility depends directly on his/her partner's leisure. In this case, the variation of a person's leisure consumption in relation to his/her individual income holding joint income constant does not reveal anything about how distribution of welfare in the household varies with individual incomes.

[3] A possible shortcoming of these studies is that it is impossible to distinguish leisure from other non-market time (e.g. home production) in the data available, making it necessary to assume that a person's utility is increasing in all non-market time.

partner's preferences are likely to put a much lower weight (if any) on expenditures on the man's children from his previous union. In the terminology of Browning et al (1994), child support transfers approximate an *exclusive* good for the father in his new partnership. As a consequence, his own and his partner's income would have different impacts on child support transfers if their relative incomes affect bargaining power in household decisions. The paper tests for these differences. This approach to examining intra-household allocation and distribution follows a suggestion by Pollak (1985; p.603) that does not appear to have been ever followed up.

A difficulty in studying how child support payments vary with the income and other characteristics of the father and his new partner in most nationally representative surveys is that we do not know which men have dependent children living elsewhere. In terms of direct information, the British Household Panel Survey (BHPS) is no different (other than in the 2002 wave). But the BHPS collected marital, cohabiting union and childbearing histories, and from the annual waves of the panel there is information on birth and marriage dates and cohabiting union status at each annual wave. From these data we have constructed a sample of men who reported the birth of a child within marriage and for whom that marriage subsequently dissolved. As 90% of children live with their mother after the marriage ends, for annual waves after the couple separated, these men are very likely to have dependent children living elsewhere until their youngest child reaches the age of 16, the date of which can be determined. Multiple annual observations on most fathers in our sample allow us to use within-family variation in partners' incomes to identify the impact of individual partners' incomes on child support payments. In other words, we can allow for unobserved persistent influences on child support payments, including the father's ex-partner's financial circumstances, his preferences, durable public household goods

and whether he has custody, to be correlated with father's income and his current partner's income (and other included variables).

The next section presents the theoretical foundation for our econometric analysis. We then present the data, followed by our results and conclusions. Our estimates indicate that a higher share of father's income in household income (a lower share of partner's income) increases child support relative to household income. There is not income pooling in the couple, nor the household, and partners' relative incomes appear to affect their bargaining power in household decisions.

Decisions of Mothers, Fathers and Partners

As we do not observe the custodial mothers in our data, their behaviour is modelled simply (abstracting from labour supply decisions) and described briefly.[4] The mother's preferences are represented by the utility function $U=U(C, x_m)$, where C is expenditure on children and x_m is her private consumption. She is assumed to choose C to maximize U subject to $y_m + s = x_m+C$, where s is a lump-sum child support transfer from the father and y_m is her income. This behaviour implies a child expenditure function, $C = f(y_m+s)$.

Expenditures on children are assumed to be a public good for the parents, even after divorce, as in Weiss and Willis (1985). The father's preferences are represented by the utility function $V=V(C,x_f ,x_p, z)$, where x_f is his private consumption, x_p is his new partner's private consumption and z is her non-market time (taking the father's labour supply as exogenous). When the father acquires a new partner, it is unlikely that she has the same preferences as him regarding expenditures on children from his previous union. We assume that his new partner has preferences represented by the utility function $W=W(x_p, x_f, z)$; that is, she receives no utility from expenditures on his

children from the previous union. Following Browning and Chiappori (1998), assume that the couple achieves an efficient outcome. This is equivalent to choosing s, x_f, x_p and z to maximize $V(C,x_f, x_p, z)+ \mu W(x_p,x_f, z)$ subject to $y_f + v_p + w = s + x_f + x_p + wz$ and $C= f(y_m+s)$, where y_f is the father's income, v_p is his partner's non-earned income, w is her wage (with total time available normalised to unity) and μ is a Lagrange multiplier that reflects the weight put on the father's partner's utility in household decisions.

The efficiency assumption implies three first order conditions: $V_C f_s \leq V_f+\mu W_f$, $V_z+ \mu W_z \geq (V_f+\mu W_f)w$ and $V_f+\mu W_f=V_p+\mu W_p$, where $V_j=\partial V/\partial x_j$, $j=f,p$, $V_k=\partial V/\partial k$, $k=z,C$, $W_j=\partial W/\partial x_j$, $j=f,p$, and $W_z=\partial W/\partial z$. Child support transfers are zero if $V_C f_s<V_f+\mu W_f$ at $s=0$, and his partner's labour supply is zero when $V_z+\mu W_z>(V_f+\mu W_f)w$ at $z=1$. Assuming an interior solution ($s>0$, $z<1$), the first and second order conditions for a maximum imply (via the implicit function theorem) a child support function in terms of μ, partners' joint full income, the partner's wage and the mother's (i.e. the father's ex-partner's) income:

(1) $s=g(y_m, y_f+v_p+w, w, \mu)$

The implicit utility weighting factor μ indicates the location chosen on the utility possibility frontier. In general, μ may be a function of individual incomes and the partner's wage (i.e. $\mu=\mu(y_f, v_p, w)$), and perhaps also other "distribution factors" (Browning and Chiappori 1998; Chiappori at al 2002). These are variables that affect the intra-family decision process without affecting individual preferences or joint consumption possibilities. These may include marriage market attributes and divorce laws that, in some circumstances, affect bargaining between spouses within marriage.

[4] Ermisch (2005b) presents a model in which divorced mother and father interact to determine frequency of father's contact with his children and child support. As our main points can be made with a simpler model, we abstract from the father-child contact decision.

For the empirical analysis that follows, it is more convenient to formulate the couple's problem in terms of conditional rather than unconditional demand functions, conditioning on partner's non-market time. Thus, the couple chooses s, x_f and x_p to maximize $V(C,x_f,x_p, z^*)+ \mu W(x_p,x_f, z^*)$ subject to $y_f + y_p = s + x_f + x_p$ and $C= f(y_m+s)$, where $y_p=v_p+(1-z^*)w$ is the partner's income and z^* is a particular level of partner's non-market time. The first order conditions are $V_C f_s \leq V_f+\mu W_f$ and $V_f+\mu W_f = V_p+\mu W_p$, and the *conditional* child support function, as distinct from the unconditional one in equation (1), is

(2) $s=g^c(y_m, y_f+y_p, z^*, \mu)$

and $\mu=\mu^c(y_f, y_p, z^*)$.

Note first that

(3) $\partial s/\partial z^* = [(D_{ss}+D_{sp})(V_{fz}+\mu W_{fz}) - D_{sp}(V_{pz}+\mu W_{pz}) - D_{ss} f_s V_{Cz}]/D^c$.

where V_{ij} and W_{ij} are second (partial) derivatives, $D^c>0$ by the second order conditions, $D_{ss}= V_{pp}+\mu W_{pp} + V_{ff}+\mu W_{ff} - 2V_{fp} - 2\mu W_{fp}$ and $D_{sp}= V_{ff}+\mu W_{ff} - V_{fp} - \mu W_{fp} - f_s(V_{Cf} - V_{Cp})$. Thus, if the preferences are such that $V_{fz}+\mu W_{fz}=V_{pz}+\mu W_{pz}=V_{Cz}=0$, then $\partial s/\partial z^*=0$. In these circumstances, the conditional child support function does not depend on z^*: $s=g^c(y_m, y_f+y_p, \mu)$, and child support transfers depend on the individual *incomes* of the father and his new partner if $\partial\mu/\partial y_j \neq 0$, $j=f,p$. This separability assumption provides a theoretical foundation for expressing child support payments as a function of the individual partners' *incomes* and the mother's income, but not the partner's non-market time. Nevertheless, the partner's income may be endogenous in an econometric analysis, through the couple's choice of her labour supply. In principle, separability is testable (see Browning and Meghir 1991), and we return to this issue later.

Income effects on child support payments are given by

(4) $$\partial s/\partial y_j = \{D_{ss}(V_{ff}+\mu W_{ff}-f_s V_{Cf}) + D_{sp}[V_{ff}-V_{pf}+\mu(W_{ff}-W_{pf})] + [(D_{ss}+D_{sp})W_f - D_{sp}W_p](\partial\mu/\partial y_j)\}/D^c,\ j=f,p$$

There is "income pooling" ($\partial s/\partial y_f=\partial s/\partial y_p$) if μ is not affected by individual partners' incomes. For example, income pooling may arise because the father and his partner's incomes are sufficiently different and the couple has caring preferences (see below). Suppose, for example, that the father's share of joint income, $y_f/(y_f+y_p)$, is sufficiently large. Then, because he cares for his partner, he makes transfers to her to ensure that her welfare is not too low. Using Becker's (1981) terminology, he is an *effective altruist*, and consumption outcomes only depend on joint income (i.e. $\partial\mu/\partial y_j=0$).[5]

If, however, bargaining power in the couple's decisions is related to the resources that they bring to the partnership, then we would expect $\partial\mu/\partial y_f<0$ and $\partial\mu/\partial y_p>0$. But the difference between $\partial s/\partial y_f$ and $\partial s/\partial y_p$ also depends on the sign of $(D_{ss}+D_{sp})W_f - D_{sp}W_p$ in (4), which is ambiguous because of the interdependence in preferences. In other words, it is hard to interpret what the difference in impacts of individual partners' incomes means in terms of consumption and welfare for each partner because, in effect, all goods other than C are public goods in the father's new partnership. This is a particular example of the general proposition that individual preferences and the family decision process (e.g. a "sharing rule") are not uniquely identified under these general preferences (e.g. Chiappori, Fortin and LaCroix 2002).

A clearer interpretation can be obtained for more restrictive preferences, so called "caring preferences", of the form $F^f[V(x_f,C),\ W(x_p,z)]$ for the father, and similarly for the father's new partner. Caring preferences assume that the father does not care how (in terms of x_p and z) a given level of utility is obtained by his partner

[5] Income pooling can also arise if both partners would make contributions to a household public good in a non-cooperative Nash equilibrium, and individual welfare in this equilibrium provides the threat points for Nash bargaining.

(and similarly for her). Any outcome that is efficient in the context of caring preferences would also be efficient if the parents were selfish (see Chiappori 1992); that is, efficiency is equivalent to maximising $V(C,x_f)+ \mu W(x_p,z^*)$ subject to $y_f + y_p = s + x_f + x_p$ and $C= f(y_m+s)$. In this case, the first order conditions for the conditional (on z) model stated earlier apply with $V_p=W_f=0$, and

(5) $\partial s/\partial z^* = (V_{ff} - f_s V_{Cf})\mu W_{pz}/D^c$

Thus, the separability assumption, such that the conditional child support function does not depend on z^*, collapses to $W_{pz}=0$.

The income effects are:[6]

(6) $\partial s/\partial y_j = (V_{ff} - f_s V_{Cf})[\mu W_{pp}+ W_p(\partial \mu/\partial y_j)]/D^c, \quad j= f,p$

We expect that $V_{ff} - f_s V_{Cf}<0$,[7] and so $\partial s/\partial y_f \geq \partial s/\partial y_p$. If we define $\partial s/\partial y_j\big|_{d(yf+yp)=0}$ as the impact on s of individual income holding the couple's joint income constant, then

(7) $\partial s/\partial y_j\big|_{d(yf+yp)=0}=(V_{ff} - f_s V_{Cf})W_p(\partial \mu/\partial y_j)/D^c$.

This impact operates through the effect of a person's income share on his/her bargaining power in household decisions. If μ declines with the father's share of the couple's income, more will be transferred in child support if the father's share is larger. This suggests that we can interpret this impact of the father's share of income on s as increasing his control of the couple's total expenditure and his welfare.

While we cannot directly observe the mother's income in our data, it is helpful for interpreting our results to derive the impact of her income on child support transfers. In the case of caring or selfish preferences:

(8) $\partial s/\partial y_m = [-(\mu W_{pp}+ V_{ff})(f_s V_{CC} + V_C f_{ss}) + \mu W_{pp} V_{Cf} f_s + (f_s V_{Cf})^2]/D^c$

[6] This amounts to setting various first and second partial derivatives to zero in equation (4).

[7] Note that, if $\partial \mu/\partial y_j=0$, $j=f,p$, then $\partial s/\partial y_j = (V_{ff} - f_s V_{Cf})\mu W_{pp}/D^c$, which should be positive, and $W_{pp}<0$ because of diminishing marginal utility.

Diminishing marginal utility ($V_{CC}<0$), additive separability in the father's preferences ($V_{Cf}=0$) and $f_{ss} \leq 0$ are sufficient for $\partial s/\partial y_m<0$, but not necessary. By raising the mother's expenditure on children, mother's higher income reduces the father's transfers to her.

So far we have ignored the state benefit system, which can interact in important ways with mothers' incentives to work and fathers' incentives to pay child support. In the UK, lone mothers who receive the main out-of-work benefit for families, Income Support (IS), receive benefits related to the number and ages of their children and have their rent fully paid if they are tenants. Their IS-benefits are withdrawn at a rate of 100% on all child support and other non-earned income received, and on earnings above an "earnings disregard" (e.g. of £20 per week in 2002/03 for a lone mother).[8] The 100% benefit withdrawal rate on child support payments makes the value of f_s faced by fathers equal to zero. Thus, his first order condition for lump sum transfers is $V_C f_s<V_f+\mu W_f$, implying $s=0$. In other words, fathers whose ex-partners receive IS have no incentive to pay child support because such transfers are fully taxed away. But IS-recipients are strongly encouraged to get a child support assessment from the Child Support Agency (CSA), and so some fathers may be forced to pay even though the only beneficiary is the UK Treasury. Ermisch (2005a) shows that 30% of lone mothers who receive IS receive some child support, but IS-recipients are much less likely to report receiving child support than non-recipients, and they also receive smaller amounts.

Because courts and child support agencies can order child support payments, the relationship between father's income and amounts paid could merely reflect the

[8] Lone mothers also receive in-work benefits (Family Credit (FC) before October 1999 and Working Families Tax Credit (WFTC) afterwards) if they work 16 hours or more per week and have low to moderate incomes. In the calculation of these benefits mothers' child support income is fully disregarded under WFTC, and the disregard was £15 per week under FC.

formulae for these orders. But courts and child support agencies are not able to enforce the orders very well. For instance, among UK families in Summer 2000 for whom the Child Support Agency (CSA) had assessed an amount of child support payment, about 35% of non-resident parents were in arrears, and official statistics for those who used the Child Support Collection Service indicate that only 49% of non-resident parents were fully compliant during the quarter to February 2001 (Wikeley et al 2001, Chapter 6). Enforcement action was taken by the CSA in only about one-quarter of the arrears' cases, and most "parents with care" (mostly mothers) judged the CSA to be an ineffective enforcement agency (Wikeley et al 2001, Chapter 6). Using data from the Family and Children Study (1999-2002), Ermisch (2005a) shows that court orders and CSA assessments are not very stable over time. For instance, 30% of mothers reporting a CSA assessment in one year do not have one in the next, and this is the case for over 40% of court orders. With weak enforcement (a small or zero cost of non-compliance), child support payments are essentially voluntary for most fathers, and so the voluntary payment model above remains relevant despite the operation of the courts and the CSA.[9]

Data and econometric issues

After restricting the sample to fathers whose household income is between the first and 99th percentiles of the distribution, the sample consists of 224 divorced/separated fathers with new partners contributing 850 person-year observations between their date of separation and until their youngest child is 16. The dependent variable in the analysis that follows is taken to be monthly child support payments as a percentage of monthly household income. Including the zeroes, child support averages 3% of household income, and among fathers paying something the mean is 7%. The new

[9] In the model of Del Boca and Flinn (1995), fathers are assumed to have varying costs of non-compliance with the order. Here we are saying that they are low for most fathers.

partner's income represents on average 35% of household income, and about 4% of household income is contributed by young adult offspring of either the father or his new partner (in 17% of the observations there are more than two adults in the household). In 62% of the person-years, the father is married to his new partner. Other descriptive statistics are shown in Table 1.

A scatter plot of the child support transfer share and the father's new partner's share of household's income is shown in Figure 1. A tendency for the share of household income transferred in child support to decrease with the partner's share is evident from the simple regression line, thereby suggesting that income pooling in the household can be rejected and that a higher partner's income share increases her control over family resources. A simple fixed effect regression relating the share of child support payments to the partner's share of income strengthens this suggestion. It yields a coefficient (standard error) of -0.017 (0.008); that is, each 10 percentage point increase in the partner's share reduces the percentage of income devoted to child support by about 0.17.

The theoretical model of the previous section indicates that child support should be a function of the two parents' incomes and the father's new partner's income, and the probability of paying any child support should be much lower if the mother receives Income Support. Our data only provide information about the father and his new partner. To illustrate the bias that may result, let the child support function suggested by the theoretical model for mothers not receiving IS be linear: $s=\alpha y_p+\beta y_f+\delta y_m+e$, where e is a random variable capturing residual influences on s. The problem we face is that y_m is omitted from the equation that we estimate for fathers. As a consequence, the OLS estimates of α and β may be inconsistent, and the asymptotic bias depends on δ and the covariances $cov(y_m,y_f)$, $cov(y_m,y_p)$ and

$cov(y_p,y_f)$.[10] There is likely to be positive correlation between spouses' incomes, but this is likely to reflect mainly 'between-couple variation'.[11] Our favoured estimator is a fixed effects' (FE) estimator, which uses only within-family variation, and for 'within-variation' we expect that $cov(y_m,y_f)$ and $cov(y_m,y_p)$ are close to zero, thereby eliminating the asymptotic bias. The within-family correlation coefficient for y_p and y_f in our sample is -0.14 (p-value=0.0005).

The effect of mother's IS-receipt on the estimated impacts of father's income on child support may be more substantial for some estimators. As explained in the preceding section, father's income should have little impact on child support if the mother receives IS. Thus, for the roughly 25% of fathers who are in this situation, the impact of their income is zero. As a consequence, our average estimate of the impact of father's income will understate the impact of father's income among mothers not receiving IS by about 25%. For 'random-effects-type' estimators, for which it is assumed that the father-specific heterogeneity is not correlated with income variables, this understatement may be moderated by a negative correlation between father's income and the mother's IS-receipt in conjunction with the negative impact of mother's IS-receipt on child support.[12] But the FE estimator is less likely to be affected in this way, because the within-family correlations between mother's IS-receipt and father's and his partner's income are likely to be close to zero.

---

[10] In particular, $plim\ \beta_{ols}=\beta+\delta[var(y_p)cov(y_m,y_f) - cov(y_p,y_f)cov(y_m,y_p)]/[var(y_f)var(y_p)- cov(y_p,y_f)^2]$, and $plim\ \alpha_{ols}=\alpha+\delta[var(y_f)cov(y_m,y_p) - cov(y_p,y_f)cov(y_m,y_f)]/[var(y_f)var(y_p)- cov(y_p,y_f)^2]$.

[11] The first twelve annual waves (1991-2002) of the British Household Panel Study (BHPS) provide a sample of about 300 mothers of dependent children who separate from their partner during the panel. Assuming that the partner is the father of some of her children, the father's monthly income in the annual interview preceding the separation is observed. The correlation coefficient between the father's income in the year before the separation and the mother's income in the first year after separation is 0.15 for mothers who did not receive IS. This is comparable to the 'between-couple' correlation coefficient between father's and new partner's income of 0.13 in our analytical sample.

[12] For instance, in the sample of separating couples discussed in the previous note, each £100 additional monthly income for the father reduces the probability that his ex-partner receives IS by about 0.012. In other words, lower income fathers are disproportionately represented among mothers receiving IS.

Parameter estimates

As is common in demand analysis, we express the child support transfer function in terms of a share of household income. We allow for lagged adjustment to changes in the explanatory variables, such as log household income and the partner's share of household income. Thus, the share of household income spent on child support transfers, s/y_h, is assumed to be given by

$$(9) \qquad (s/y_h)_{it} = \gamma(s/y_h)_{it-1} + \alpha(\boldsymbol{Z_{it}}) + \beta\ln(y_{hit}) + \lambda_p(y_p/y_h)_{it} + \lambda_o(y_o/y_h)_{it} + u_i + e_{it}$$

where $\alpha(\boldsymbol{Z_{it}}) = \alpha_0 + \alpha_1 Z_{1it} + \alpha_2 Z_{2it} + \ldots$, the Z_{kit} are "preference shifters", like the number of children in the father's new household for father i in year t, y_{hit} is household income, y_{oit} is household income other than the father's or his new partner's and u_i and e_{it} are stochastic error terms. The income shares are expressed in percentages (i.e. multiplied by 100). The 'father-specific' unobservable may reflect, among other things, the father's ex-partner's financial circumstances, his preferences, durable household public goods and whether he has custody. The key parameters for our purposes are λ_p and λ_o, which will be zero if $\partial\mu/\partial y_j=0$, $j=f,o$ (see equation (7)). We have assumed that these parameters are invariant to the intra-household income distribution, but they could vary when preferences are caring, or if there are household public goods to which both partners would contribute in a non-cooperative Nash equilibrium and this provides the threat points for bargaining. Our sample of fathers is not large enough to attempt to allow for this variation.

As is well known (e.g. Arellano and Bond, 1991; Arellano, 2003), if we take first differences in equation (9), instrumental variable estimation of the difference equation (using a generalised 'method-of-moments' estimator) provides consistent parameter estimates for this model. The instruments are all lags of the endogenous variables (including the dependent variable) from t-2 backwards, as well as lags of

first differences in the strictly exogenous variables from t-1 backwards. In addition, the first difference in the number of adults is used as an instrument when the partner's and other adults' income shares are treated as endogenous. Thus, only fathers contributing at least 3 years of data can contribute to the estimation, which reduces the sample to 117 fathers and 395 person-year observations. The number of instruments varies with the father according to the number of years that the father is observed. Note that this estimator does not require orthogonality between the father-specific effect (u_i) and the explanatory variables in (9).

Initially, we treat household income and the income shares as exogenous. The estimates in the first column of Table 2 impose the assumption of separability between the partner's non-market time and her private consumption. In the second column, whether or not the father's partner has a job and her number of working hours are included among the explanatory variables. The estimated standard errors allow for the variance of e_{it} to vary among fathers.[13] The estimates in the first column indicate that a 10 percentage point increase in the share of partner's income initially reduces the share of child support expenditure in household income by about 0.4 percentage points, and in the long-run it declines by 0.5 points. A larger contribution to household income by other adults also reduces child support. The child support share declines with household income, and the share is much higher for fathers who are cohabiting with (as opposed to married to) their new partners. Second-order serial correlation in the residuals would suggest model misspecification, but there is no evidence of it (negative first order serial correlation is expected). The Sargan test (asymptotically distributed as chi-square conditional on a common variance of e_{it}) cannot reject the over-identifying restrictions. In the estimates in the second column,

[13] The parameters were estimated using the *xtabond* routine in Intercooled Stata version 9.0.

whether or not the father's partner has a job and her number of working hours do not significantly affect child support payments. This is consistent with the assumption of separability between the partner's non-market time and her private consumption made in the first column estimates.

So far we have assumed that the variation in the incidence and extent of partner's paid employment, partner's and other adults' income share and household income are exogenous (i.e. not correlated with e_{it}), which the theoretical model suggests may be doubtful. In principle, there are sufficient instruments to treat all of these variables as endogenous, which we do in Table 3. Again, the first column imposes separability. There are now 261 over-identifying restrictions (rather than 65), which cannot be rejected by the Sargan test. Compared with those in Table 2, the estimate of λ_p indicates a much larger negative impact of partner's income on child support and that of λ_o indicates a smaller impact of other adults' income share. The estimates in column 2 of Table 3 suggest that we cannot reject separability. Within-variation in the number of adults is significantly correlated with within-variation in the potentially endogenous variables $\ln(y_{hit})$, $(y_o/y_h)_{it}$. and $(y_p/y_h)_{it}$. But while the various lagged values of the dependent variable and explanatory variables appear to satisfy the requisite orthogonality conditions, they do not appear to be particularly good instruments in terms of their explanatory power in predicting these potentially endogenous variables.

As a final exercise, we estimate some static models (i.e. γ=0 in (9)), imposing separability between the partner's non-market time and her private consumption and assuming exogeneity of the explanatory variables in each case. A common econometric approach for dealing with the concentration of budget shares at zero (57% in our data) is to estimate a "Tobit model", assuming that the father-specific

unobservable (u_i) is not correlated with the right-hand side variables in (9). Estimates of the parameters of this model are shown in the first column of Table 4, with their marginal effects on E(s/y_h) shown in the second column.[14] Large negative values for λ_p and λ_o are estimated, and we see evidence that higher household income *increases* child support transfers, suggesting that child support transfers are akin to a "luxury good". The child support share declines with the number of his children in his new household, but this could mainly reflect the fact that fathers having custody do not pay child support. Ignoring the concentration of zeroes, FE estimates, which remove the assumption of orthogonality between the father-specific effect and the right-hand side variables in (9), are shown in the third column of Table 4. These indicate a slightly larger negative impact of the partner's income share on E(s/y_h) than the corresponding marginal effect from the Tobit model: -0.027 compared with -0.024 (0.43*(-0.055)). The FE estimate of the impact of the share of other household income on E(s/y_h) is, however, virtually zero, compared to the Tobit estimate of -0.044. This, and different effects of household income and children, contribute to the rejection of the orthogonality assumption required for linear random effects' estimates to be consistent (see Hausman test in Table 4). The negative FE estimate for the impact of log household income on E(s/y_h) compared with the positive Tobit estimate suggests that the father-specific unobservable is positively correlated with household income. Similarly, the FE estimate of the negative impact of children on E(s/y_h) is much smaller in size than the Tobit estimate. That is, fathers whose preferences or the unobserved attributes of ex-partners incline them to pay more child support have higher household income and fewer dependent children in their current household

[14] Note that the estimated impact of the k-th variable on the expected child support share is, $\partial E(s/y_h)/\partial x_k$, is $\delta_k F(\delta \mathbf{x}/\sigma)$, where $F(.)$ is the standard normal distribution function and δ is the vector of parameters in (9), and its impact on the probability of paying something is $\delta_k f(\delta \mathbf{x}/\sigma)$, where $f(.)$ is the standard normal density function.

than those who pay less.[15] These different results point to the value of having panel data for estimating how intra-household income distribution affects expenditure patterns and to the need to allow for correlation between explanatory variables and father-specific heterogeneity.

Conclusion

The primary contribution of this paper is to construct a sample of divorced or separated fathers who have formed new partnerships, and to use these data to estimate how intra-household distribution of income affects child support transfers by fathers to mothers of their dependent children living elsewhere. The idea is that new partner's preferences are likely to put a much lower weight (if any) on expenditures on the man's children from his previous union. As a consequence, his own and his partner's income would have different impacts on his child support payments if partners' relative incomes affect bargaining power in household decisions. Our estimates indicate that a higher share of father's income in household income (a lower share of partner's income) increases child support relative to household income. There is not income pooling in the couple, nor the household, and partners' relative incomes appear to affect their bargaining power in household decisions.

[15] One possible factor behind the positive correlation with father's income is the tendency for higher income men to be less likely to have ex-partners receiving Income Support. As noted earlier, fathers with child custody would not pay child support and have more own children in their current household.

References

Arellano, M. 2003. *Panel Data Econometrics*. Oxford University Press.

Arellano, M. and S. Bond. 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations, *The Review of Economic Studies* 58: 277-297.

Browning, M., F. Bourguignon, P-A. Chiappori and V. Lechene. 1994. Income and outcomes: a structural model of intrahousehold allocation. *Journal of Political Economy* 102:1067-1096.

Browning, M. and P-A. Chiappori. 1998. Efficient intra-household allocations: a general characterization and empirical tests. *Econometrica* 66:1241-1278.

Browning, M., P-A. Chiappori and V. Lechene. 2004. Collective models and unitary models: a clarification. CAM, Institute of Economics, University of Copenhagen.

Chiappori, P-A. 1992. Collective labor supply and welfare. *Journal of Political Economy* 100:437-467.

Chiappori, P-A. , B. Fortin and G. Lacroix. 2002. Marriage market, divorce legislation, and household labor supply. *Journal of Political Economy* 110:37-72.

Del Boca, D. and C. Flinn. 1995. Rationalizing child support decisions. *American Economic Review* 85:1241-1262.

Del Boca, D. and R. Ribero. 2001. Evaluation of child support policies. *American Economic Review Papers and Proceedings*, 91:130-135.

Ermisch, J.F. 2005a. The Family Market for Divorced Fathers' Contact with their Children: Testing its Operation. CHILD Working Paper 06/2005, University of Turin, http://www.child-centre.it/papers/child06_2005.pdf.

Ermisch, J.F. 2005b. New Families, Child Support and Divorced Fathers' Contact with their Children. http://team.univ-paris1.fr/espe2005/papers/ermisch_paper.pdf.

Fortin, B. and G. Lacroix. 1997. A test of the unitary and collective models of household labour supply. *Economic Journal* 107:933-955.

Lundberg, S., R. Pollak and T. Wales. 1997. Do husbands and wives pool their resources? *Journal of Human Resources* 32: 461-480.

Pollak, R. 1985. A transactions cost approach to families and households, *Journal of Economic Literature*, 23:581-608.

Weiss, Y. and R.J. Willis. 1985. Children as collective goods and divorce settlements. *Journal of Labor Economics* 3:268-292.

Weiss, Y. and R.J. Willis. 1993. Transfers among divorced couples; evidence and interpretation. *Journal of Labor Economics* 11:629-679.

Wikeley, N. et al. 2001. *National Survey of Child Support Agency Claimants*. London: Department for Work and Pensions Research Report No. 152

Figure 1: **Scatter Plot of s/y_h and y_p/y_h**

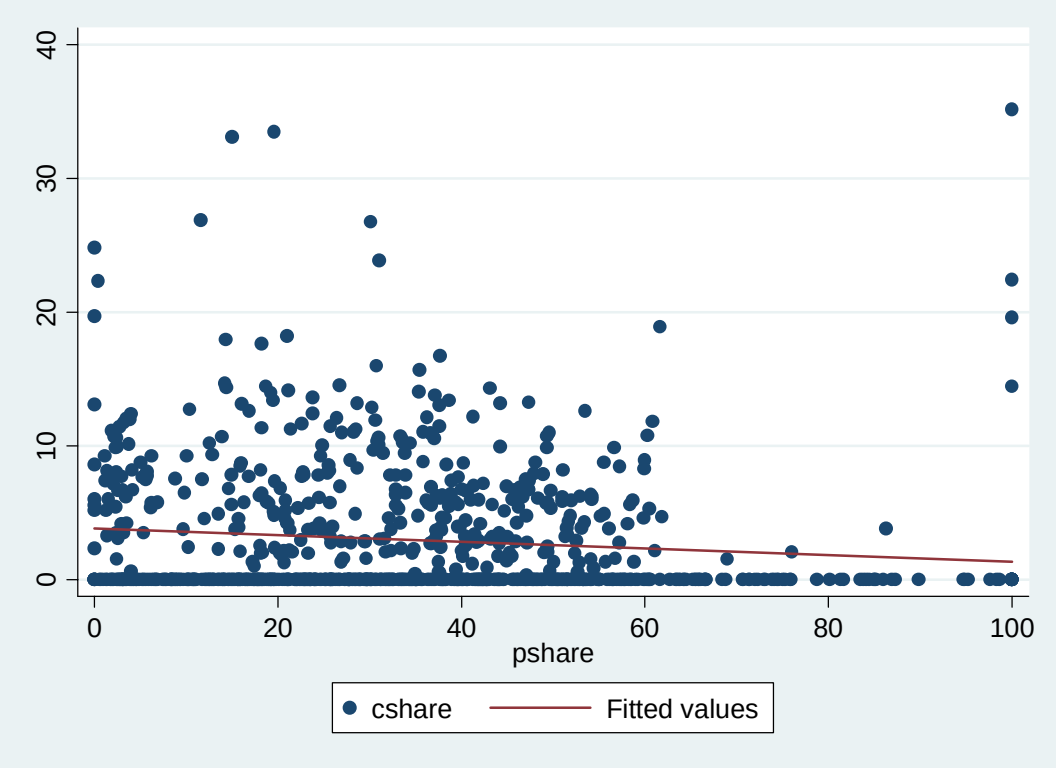

Table 1: Descriptive Statistics

Variable	**Mean* (Overall Std. Dev.) [Within Std. Dev.]**
Child support share, %	3.0 (4.8) [2.9]
Partner's income share,%	34.5 (22.2) [14.1]
Other adults' income share, %	3.6 (11.0) [6.1]
Log household income	2.830 (0.570) [0.282]
Number of own dependent children in current household	1.4 (1.2) [0.5]
Cohabiting with new partner (cf. married)	0.382
New partner has a job	0.673
Usual hours worked per week	19.1 (16.4) [8.8]
Age of youngest child at separation	3.6 (3.0)
Age of father	38.2 (6.4) [2.2]
Years since separation	6.7 (3.9) [2.1]
Proportion separated but not divorced	0.161

*****Means calculated over 850 person-years for 224 fathers

Table 2: IV Estimates of Impacts on Child Support Payments as a Percentage of Household Income, robust standard error in parentheses, BHPS 1991-2003
All explanatory variables treated as strictly exogenous

Variable	**Separable non-market time**	**Full conditional demand**
Lagged child support share, %	0.203 (0.096)	0.168 (0.092)
Partner's income share,%	-0.038 (0.013)	-0.033 (0.016)
Other adults' income share, %	-0.032 (0.016)	-0.020 (0.016)
Log household income	-1.000 (0.670)	-0.820 (0.758)
Number of own dependent children in current household	-0.802 (0.776)	-0.842 (0.805)
Cohabiting with new partner (cf. married)	2.36 (1.05)	2.17 (1.14)
New partner has a job	--	-0.440 (0.705)
Usual hours worked per week	--	-0.015 (0.031)
Constant	0.0258 (0.196)	0.055 (0.206)
Summary statistics:		
***N* fathers** ***N* father-years**	117 395	111 370
Test for zero correlation in residuals: ***order 1 p-value*** ***order 2 p-value***	 0.0013 0.9725	 0.0072 0.7154
Sargan test for over-identifying restrictions (p-value), conditional on common variance (65df)	75.55 (0.174)	79.65 (0.104)

Table 3: IV Estimates of Impacts on Child Support Payments as a Percentage of Household Income, robust standard error in parentheses, BHPS 1991-2003 Only number of children and cohabiting treated as strictly exogenous*

Variable	**Separable non-market time**	**Full conditional demand**
Lagged child support share, %	0.151 (0.074)	0.094 (0.087)
Partner's income share,%	-0.062 (0.016)	-0.036 (0.018)
Other adults' income share, %	-0.019 (0.021)	-0.013 (0.017)
Log household income	-1.120 (0.960)	-0.123 (0.907)
Number of own dependent children in current household	-0.805 (0.497)	-1.074 (0.544)
Cohabiting with new partner (cf. married)	1.80 (0.81)	1.27 (0.85)
New partner has a job	--	-0.829 (0.915)
Usual hours worked per week	--	-0.020 (0.027)
Constant	0.030 (0.135)	0.010 (0.121)
Summary statistics:		
***N* fathers** ***N* father-years**	117 395	111 370
Test for zero correlation in residuals: ***order 1 p-value*** ***order 2 p-value***	 0.0025 0.7961	 0.0238 0.4665
Sargan test for over-identifying restrictions (p-value), conditional on common variance	228.68 (0.926) ***(261df)***	282.52 (1.000) ***(391df)***

*****First difference in number of adults treated as additional instrument.

Table 4: Random Effect 'Tobit' and Fixed Effect Linear Estimates of Impacts on Child Support Payments as a Percentage of Household Income, BHPS 1991-2003, standard error in parentheses

Variable	**Tobit**	**Tobit Marginal effects***	**Fixed effects (Robust SE)**
Partner's income share,%	-0.055 (0.013)	-0.024	-0.027 (0.011)
Other adults' income share, %	-0.105 (0.028)	-0.044	-0.003 (0.016)
Log household income	1.964 (0.545)	0.845	-1.232 (0.724)
Number of own dependent children in current household	-1.809 (0.255)	-0.778	-0.586 (0.355)
Cohabiting with new partner (cf. married)	3.03 (0.54)	1.30	1.58 (0.47)
Separated (not divorced)	-1.94 (0.93)	-0.83	--
Constant	3.662 (2.781)		7.65 (1.36)
σ_u	5.45 (0.33)		4.40
σ_e	5.19 (0.22)		3.29
$\sigma_\alpha^2/(\sigma_\alpha^2+\sigma_u^2)$	0.525 (0.038)		0.641
***N* fathers** ***N* father-years**	224 850		224 850
Hausman test (5df)			34.24**

*Computed at average values for the explanatory variables.

**Comparing estimates with estimates from a linear random effects' model.