Child Support and Non-resident Fathers' Contact with their Children

John Ermisch

ISER Working Paper
2006-14
Revised October 2006
Forthcoming *Journal of Population Economics*

Acknowledgement:

* The research was supported by the Economic and Social Research Council through their grant to the Research Centre on Micro-social Change in ISER. I am grateful to two referees for valuable comments on an earlier version and to Chiara Pronzato for providing the "demographic history" data that allow matching of separated mothers and fathers and provide a check on self-reports by fathers of children living elsewhere.

Readers wishing to cite this document are asked to use the following form of words:

> Ermisch, John (October 2006) '**Child Support and Non-resident Fathers' Contact with their Children**, ISER Working Paper 2006-14. Colchester: University of Essex.

The on-line version of this working paper can be found at http://www.iser.essex.ac.uk/pubs/workpaps/

The Institute for Social and Economic Research (ISER) specialises in the production and analysis of longitudinal data. ISER incorporates

- MISOC (the ESRC Research Centre on Micro-social Change), an international centre for research into the lifecourse, and
- ULSC (the ESRC UK Longitudinal Studies Centre), a national resource centre to promote longitudinal surveys and longitudinal research.

The support of both the Economic and Social Research Council (ESRC) and the University of Essex is gratefully acknowledged. The work reported in this paper is part of the scientific programme of the Institute for Social and Economic Research.

Institute for Social and Economic Research, University of Essex, Wivenhoe Park,
Colchester. Essex CO4 3SQ UK
Telephone: +44 (0) 1206 872957 Fax: +44 (0) 1206 873151 E-mail: iser@essex.ac.uk
Website: http://www.iser.essex.ac.uk

ABSTRACT

The paper presents a theoretical model of a non-resident father's child support and contact with his child, which combines the public good treatment of "child quality" with "trade" in father-child contact-time in a setting of non-cooperative interaction. The model predicts that the father's income and mother's non-labour income should have exactly the same effect on the frequency of father-child contact if he chooses to make lump sum payments to the mother. If he does not or there is a binding child support payment order, they have effects that are opposite in direction. Setting a higher binding child support order would reduce father-child contact, but may well raise "child quality". New data from the British Household Panel Survey is used in a descriptive analysis of the frequency of contact of non-resident fathers with their dependent children, in relation to father's and mother's incomes.

1. Introduction

Resource transfers and other interactions between households containing former partners and their children are of increasing importance in many countries because of higher rates of partnership dissolution. For instance, in Great Britain, 65% of children born into a cohabiting union and 30% of children born within a marriage will experience a dissolution of their parent's union before they are 16 (Ermisch and Francesconi 2000). Monetary transfers from the non-resident parent (usually the father) to the custodial one are an important source of income for one parent families, and they interact with the custodial parent's decisions about labour supply as well as expenditure on children. The frequency of contact of a non-resident father with his child is also important, because it may directly affect the child's welfare and have longer-run impacts on the child in terms of his/her emotional and cognitive development.[1] The data reported below indicate that one-fifth of British non-resident fathers report never seeing their children, and this group is also least likely to pay any child support. Analysis of the links between father-child contact and child support transfers is needed in order to assess the effects of policies concerning the establishment of child support orders by courts or public agencies and their enforcement. It is also required to evaluate the impacts of state income support policies directed at poor one-parent families. This paper presents a model in which father-child contact and child support are jointly determined by non-cooperative interaction between the two parents.

An important policy question is what happens to non-resident's father's contact with his children if a court or agency enforces a binding child support order. For instance, in the United Kingdom, the Child Support Agency (CSA) introduced in 2003 a new, simple formula for setting child support orders for new child support

cases. One of the important objectives of the reform was to ensure more parents paid support for their children after separation. Because of administrative failures, the setting of payments and their enforcement deteriorated after the reform. Another reform was announced in 2006. The model in this paper suggests that if it is successful in improving enforcement, then it is likely to reduce the frequency of fathers' contact with their children for many fathers, but child welfare may still increase.

The UK Income Support system provides benefits for mothers not in employment, and it reduces these benefits by one pound for each pound of mother's child support income from the father. According to the model in this paper, this 100% benefit withdrawal rate not only reduces child support payments but also reduces father-child contact. These connections between policies affecting child support payments and the frequency of fathers' contact with their children have been overlooked because of an inadequate theoretical foundation for the analysis of child support and contact.[2]

The analysis here builds on research by Del Boca and Ribero (1998, 2001, 2003). In their analyses, the mother "trades" time that the non-resident father can spend with his child for child support payments from the father, but expenditures by divorced parents on children are treated as private goods. The latter is in contrast to Weiss and Willis (1985), who treat expenditure on children as a public good to the parents. The present paper's model combines the public good treatment of child-expenditure with the "trade" of child support for father-child contact time. It predicts that when a father is voluntarily making lump sum transfers to the mother, because of the public good nature of children, his income and the mother's income affect father-child contact in the same way. This contrasts with the predictions when he does not

make lump sum transfers. In this case, similar to Del Boca and Ribero, higher income of the father increases contact while higher income of the mother reduces it.

The direction of the effect of parents' incomes on frequency of the father's contact with his child is ambiguous when there is not a binding support order and fathers are making some lump sum child support transfers. This is because changes in parents' incomes shift both the demand and supply curves for father-child contact as a consequence of changes in lump sum transfers. Increasing a binding agency(court)-ordered child support payment is predicted to reduce contact, because it reduces the mother's willingness to supply contact time and the father's demand for it.

The paper is mainly a theoretical one, but the associations of father's and mother's income with the frequency of father-child contact are explored with new data on British fathers' contact with their children from the 2002 wave of the British Household Panel Survey (BHPS). It is usually difficult to estimate how father-child contact varies with parents' incomes because it requires information on non-resident fathers' contact with their children living elsewhere and on both parents' incomes, which is relatively rare.[3] The estimated associations are broadly consistent with interpretations based on the theory, and indicate that frequency of father-child contact increases with father's income in the middle-third of their income distribution among fathers paying some child support.

2. Parents' choices

Ninety percent of children with divorced or separated parents live with their mother, and so we assume that after the parents separate the mother obtains custody of the children.[4] The approach to separated parents' interaction taken here stems from the view that monitoring of cooperative agreements is difficult because the parents live apart, and as a consequence they do not trust that they will be fulfilled. The large

proportion of fathers who make no child support transfers to the mothers is consistent with this view.[5] Parents' interaction is, therefore, modelled as a non-cooperative one.

Most importantly, it is assumed that *child support transfers are determined by voluntary private negotiation* between parents. This approach is justified in the British context, and perhaps also in other jurisdictions, because while courts and child support agencies can order payments, they do not 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).[6] Also, data from the Family and Children Study (1999-2002) indicate that child support is not very stable over time. For instance, 21% of mothers reporting receipt of child support in one year do not report receiving it in the next. With weak enforcement (a small or zero cost of non-compliance), child support payments are essentially voluntary for most fathers, and so a voluntary payment model remains relevant despite the operation of the courts and the CSA.[7] Note that this model does not imply that all fathers pay below an amount set by courts or the CSA, but those that pay at least that amount do so voluntarily, because they care for their children.[8]

In this model, "child-contact rights" are assigned to the mother, and she charges p per unit of father's contact-time with his child, denoted as t. This is the way in which the model introduces the idea of "negotiating" between father and mother

about the father's contact with his children. Assume that there is only one child. The term "child quality" (Q) is used to denote the child's welfare. It is assumed to be a public good to the couple, and it is a function of expenditures on the child (C), mother's non-market time devoted to the child (H), father-child contact time (t) and mother-child contact time (1-t): $Q=Q(C, H, t, 1-t)$. We assume that the mother decides the level of child expenditure and her time allocation. The child's father can only influence C and H by making transfers to the mother. The father's frequency of contact with his child and the price of that contact, along with child support and child-quality, are determined jointly through parents' non-cooperative interaction. The solution of the model is discussed in two steps. In the first, each parent maximises their utility for a given price of father-child contact (p). In the second step, equilibrium is determined by the intersection of the mother's supply schedule for father-child contact time with the father's demand schedule. We first consider the mother's decisions.

The mother

Assume that the mother lives alone with her child, and let the mother's preferences be represented by the utility function $U=U(Q, L, x_m, t)$, where x_m is her private consumption and L is her leisure time. She is assumed to choose C, H, L and t to maximize U subject to $Q=Q(C, H, t, 1-t)$ and $v_m + w(T-H-L) + s + pt = x_m+C$ and $L+H\leq T$, where s is a lump-sum transfer from the father, w is her wage rate, v_m is her unearned income and T is her time endowment. The solution to the mother's problem implies

(1a) $U_Q Q_C = U_x$,

(1b) $wU_x \leq U_Q Q_H$

(1c) $wU_x \leq U_L$

(1d) $pU_x = -U_t - U_Q(Q_f - Q_m)$

where $U_j = \partial U/\partial j$, $j = Q, x_m, L, t$; $Q_j = \partial Q/\partial j$, $j = C,H$, $Q_m = \partial Q/\partial(1-t)$ and $Q_f = \partial Q/\partial t$. Note that the mother's marginal utility of child quality may depend on the amount of the father's contact (i.e. $U_{Qt} \neq 0$, where $U_{jk} = \partial U^2/\partial j \partial k$).

Condition (1d) indicates that, at the mother's optimum, $U_t + U_Q(Q_f - Q_m) < 0$; more child contact with the father reduces her utility at the optimum when the equilibrium price is positive, either because $U_t < 0$, or $Q_f < Q_m$, or both. The sign of $Q_f - Q_m$ depends on the relative marginal productivity of father's and mother's contact-time at the optimum. We would expect that Q_f is large and Q_m is small when t is small, with the former falling and the latter rising as t increases (i.e. $Q_{ff} < 0$ and $Q_{mm} < 0$). Suppose, for instance, that $U_t \geq 0$ at the optimum; then $Q_f < Q_m$; that is, the mother is willing to allow the father enough contact time to make the marginal productivity of his contact-time less than hers, because it increases her income (and therefore C, H and x_m) sufficiently.

The mother will not take paid employment if, at $H+L=T$, $w < (U_Q Q_H)/U_x = U_L/U_x$. While this would be the relevant comparison in the absence of the state benefit system (and may still be so among most re-partnered mothers), lone mothers in the UK face a complicated non-convex budget constraint rather than the linear one above because of the benefit system.[9] 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" (of £20 per week in 2002/03 for a lone mother).[10] They also receive in-work benefits, called Working Families Tax Credit (WFTC), if they work 16 hours or more per week and

have low to moderate incomes. In the calculation of these benefits, a mother's child support income is fully disregarded under WFTC. These aspects of a lone mother's budget constraint create strong incentives either to remain out of employment (and receive IS), or to work 16 hours or more. For instance, in the Family and Children Study (1999-2002), 83% of lone mothers not receiving IS work 16 or more hours per week and only 8% of IS-recipients have a job.

The exposition in this section focuses on mothers in paid employment ($L+H<T$), but section 5 considers how the analysis changes when the mother is not in employment and receives state welfare benefits. Normalise the mother's time endowment to unity (T=1) and define *full income of the mother* as $F_m=v_m+w+p$. This is what her income would be if she worked her entire time endowment, "sold" all of her child contact rights to the father (t=1), and received no lump sum transfer from the father. Solution of the maximisation problem implies a child expenditure function, a father-child contact supply function and non-market time supply functions of the following form:

(2a) $C = f(F_m+s, w, p)$

(2b) $t^s = g(F_m+s, w, p)$

(2c) $H = H(F_m+s, w, p)$ and $L = L(F_m+s, w, p)$

Define $g_F=\partial g/\partial(F_m+s)$ and $g_j=\partial g/\partial j$, $j=p,w$; the latter define price effects controlling for mother's full income, including lump sum transfers from the father. Analogous definitions apply to the other functions. Note that $\partial t^s/\partial s=g_F$, $\partial C/\partial s=f_F$ and $\partial H/\partial s=H_F$. Under plausible restrictions on preferences, $f_F>0$, $g_F<0$ and $H_F>0$. The slope of her supply curve for father-child contact time is $\partial t^s/\partial p=g_F+g_p$, where $g_p>0$. Because a higher wage increases the cost of producing child quality and the cost of leisure, we would expect that substitution effects lead to the substitution of less father's contact

time for L and Q and for H in the production of Q, which suggests that $g_w \leq 0$. For some preferences (e.g. Cobb-Douglas), $g_w=0$ (see Appendix 2).

The father

For the moment, assume that the father lives alone. Let the father's preferences be represented by the utility function $V=V(Q, x_f, t)$. As the focus is on father's contact with his children, his labour supply is treated as exogenous for simplicity. He is assumed to choose s and t to maximize his utility subject to $y_f = s + x_f + pt$, $C = f(F_m+s, w, p)$ and $H = H(F_m+s, w, p)$, where y_f is his income. This implies:

(3a) $V_Q(Q_C f_F + Q_H H_F) \leq V_x$

(3b) $V_t + V_Q(Q_f - Q_m) \leq pV_x$,

where $V_j=\partial V/\partial j$, $j=x_f, Q, t$. The father's marginal utility of child quality may depend on the amount of the father's contact (i.e. $V_{Qt} \neq 0$, where $V_{jk}=\partial V^2/\partial j \partial k$).

Conditions (3a) and (3b) hold with equality for an interior solution (i.e. $s>0$, $t>0$). In this case, combining the father's first order condition for t with the mother's, in equilibrium, $p=[-U_t - U_Q(Q_f - Q_m)]/U_x=[V_t + V_Q(Q_f-Q_m)]/V_x$; that is, the marginal rate of substitution between father-child contact time and own consumption is equated for father and mother.[11] This is one of the conditions for allocative efficiency, but the efficiency conditions for child expenditure and the mother's time input into child quality are $[U_Q/U_x+V_Q/V_x]Q_C=1$ and $[U_Q/U_x+V_Q/V_x]Q_H=w$, respectively, while the mother's choice of C and H satisfy $Q_C U_Q/U_x=1$ and $Q_H U_Q/U_x=w$. The inefficiency can be interpreted as an *agency* problem (Weiss and Willis, 1993)—the father can only indirectly affect child quality through the mother's choices, while child quality affects the utility of both parents.

Define *full income of the parents* as $F = y_f+v_m+w+p = y_f+F_m$. In the case of an interior solution, solution of the maximisation problem implies the following child support function and father's child-contact time demand function:

(4a) $s = k(y_f, F_m, w, p)$

(4b) $t^d = h(F, w, p)$

Define , $h_j=\partial h/\partial j$, $j=F, w, p$, $k_f=\partial k/\partial y_f$, $k_m=\partial k/\partial F_m$ and $k_j=\partial k/\partial j$, $j=w, p$. The latter two effects represent substitution effects, controlling for F_m and y_f. As higher w increases the cost of child quality, we would expect that it induces substitution against Q, suggesting that $k_w\leq 0$ and $h_w\leq 0$; similarly, higher p encourages substitution of Q for t, suggesting that $k_p\geq 0$. As Appendix 2 illustrates, there are common examples of preferences in which $k_p=k_w=h_w=0$. Maximisation implies $k_f>0$ and $k_m=-(1-k_f)$; that is, the usual condition when one agent is making lump sum transfers to another because of altruism or a public good applies, namely $k_m-k_f=-1$. This means that redistribution of full income from the mother to the father brings an equal reduction in transfers from the father to her.

The dependence of the demand for father-child contact time on parents' joint full income (F) only (i.e. not on its distribution between father and mother) arises because he makes lump sum payments to the mother. He reduces s when the mother's income increases, thereby increasing his demand for contact with his children. Appendix 2 provides an example of these functions when there are "Stone-Geary" preferences.

A father does not make lump sum payments to the mother ($s=0$) when $V_Q(Q_C f_F + Q_H H_F)< V_x$ at $s=0$, which will be the case for fathers who are relatively poor, or who value child quality relatively little. For such fathers, the mother's full

income and wage do not affect his demand for contact time with his children; it only depends on y_f and p.

Courts and child support agencies

In the model above, child support payments are voluntary. They are made, if they are, because fathers value child quality sufficiently. Courts and child support agencies may, of course, "order" payments. This raises the question of what they can order. In the model, child support payments could be interpreted as $s+pt$.[12] But courts and child support agencies set amounts that are not a function of father-child contact time, and so it is assumed that the orders only apply to the lump sum payment—pt is treated as "side payments" that are not readily observed by the court or agency. *Assuming that the orders are perfectly enforced*, this adds a new constraint to the model: $s \geq s^*$, where s^* is the ordered amount. If the fathers choose $s > s^*$, then nothing changes in the analysis above. If, however, a father would choose s less than s^*, then $s = s^*$ is a binding constraint on the father, and his only choice is over contact-time. The only first order condition is (3b). If this holds with equality, then plausible restrictions on preferences entail that $\partial t^d/\partial s^* < 0$ and $\partial t^d/\partial y_f > 0$; that is, fathers reduce their demand for child-contact time when they are ordered to pay more in child support, because it reduces their income. When the father is too poor to make lump sum child support payments, in the sense that condition (3a) holds with an inequality at $s=0$, the impact of his income is the same as when $s=s^*$.

3. Equilibrium

Substituting the father's child support function, $s=k(y_f, F_m, w, p)$, into the mother's father-child contact time supply function, $g(F_m+s, w, p)$, equilibrium contact and contact-price is given by the intersection of this supply function and the father's demand function, $h(F, w, p)$. It is plausible that the mother's supply function for

contact-time becomes steep at sufficiently high values of contact-time and its price (e.g. this is the case with the Cobb-Douglas preferences assumed in the example in Appendix 2). It might also cross the t-axis if mothers value some father-child contact—that is, their marginal utility $U_t + U_Q(Q_f - Q_m)$ is initially positive but declining. This is illustrated in Figure 1, where $U_t + U_Q(Q_f - Q_m)$ becomes negative after t_1. Three equilibria are shown there. The two at positive prices correspond to two different income levels for the father. At the higher income, equilibrium occurs on the steep part of the supply curve ($g_F+g_p \cong 0$). At these equilibria, $[-U_t - U_Q(Q_f - Q_m)]/U_x = [V_t + V_Q(Q_f - Q_m)]/V_x$. If fathers did not value contact nor child quality, but also were not averse to it ($V_t=0=V_Q$ for all t), then equilibrium would occur at t_1.

The mother illustrated in Figure 2 never values father-child contact (i.e. $U_t + U_Q(Q_f - Q_m)<0$ for all t). In addition to an interior equilibrium at t_1, an equilibrium at which $t=0$ is also illustrated. This occurs, for example, when the father's income is low enough that his demand for contact-time is below the mother's supply curve, such as shown for the lower demand curve in Figure 2. At this equilibrium, $[-U_t - U_Q(Q_f - Q_m)]/U_x > [V_t + V_Q(Q_f - Q_m)]/V_x$

Appendix 1 shows that, for an interior solution, the impact of the father's income and mother's non-labour income on the equilibrium amount of contact time with his child are given by

$$(5) \qquad \frac{\partial t}{\partial y_f} = \frac{\partial t}{\partial v_m} = \frac{-h_F g_p + g_F[k_f(h_p + h_F) - h_F(k_f + k_p)]}{h_F + h_p - g_F(k_f + k_p) - g_p}$$

As discussed in Appendix 1, "family market stability" requires that the denominator of (5) is negative. Recall that $g_F<0$, $k_f>0$, $h_F>0$, $g_p>0$, and it is likely that $h_F+h_p<0$ and $k_p \geq 0$. Thus, father's income and mother's non-labour income have the same, ambiguous effect on father-child contact. On the one hand, higher father's income

increases the demand for father-child contact time, which moves us up the supply curve (the first term in the numerator of (5)). On the other hand, there is a reduction in the supply of contact-time caused by an increase in lump sum child support payments (the second term in the numerator of (5)). Appendix 2 gives an example in which $\partial t/\partial y_f = \partial t/\partial v_m > 0$, and also one (when both parents have Cobb-Douglas preferences) in which the supply shift exactly offsets the demand shift—there is no change in father-child contact and the only effect of higher father's income is to raise its price. Note that if the mother's income were fully exogenous, (5) would give its effect.

If the father does not make a lump sum transfer or a child support order is binding, then the father's demand function takes the form $h^0(y_f, p)$, and higher father's income (y_f) unambiguously increases father-child contact time when $g_p + g_F > 0$:[13]

$$\text{(5a)} \qquad \frac{\partial t}{\partial y_f} = \frac{-(g_p + g_F)h^0_y}{h^0_p - (g_p + g_F)}$$

where $h^0{}_y = \partial t^d/\partial y_f$ and $h^0{}_p = \partial t^d/\partial p$. The impact of the mother's non-labour income on father-child contact is unambiguously negative when $s=0$ or $s=s^*$:

$$\text{(5b)} \qquad \frac{\partial t}{\partial v_m} = \frac{g_F h^0_p}{h^0_p - (g_p + g_F)}.$$

These two predictions are what we would expect from the analysis of Del Boca and Ribero (2001). More interesting is the possible positive effect of mother's income when the father makes lump sum transfers, which arises because higher mother's income also increases father's demand for contact. The impact of the mother's wage on father-child contact is

$$\text{(6} \qquad \frac{\partial t}{\partial w} = \frac{\partial t}{\partial y_f} + \frac{(h_p + h_F)(g_F k_w + g_w) - h_w[g_F(k_f + k_p) + g_p]}{h_F + h_p - g_F(k_f + k_p) - g_p}$$

This differs from the other income effects in (5) if changes in the wage induce substitution (given full income), but the direction in which it differs is unclear. With the preferences assumed in Appendix 2, h_w, k_w and g_w are zero, and so the wage effect is the same as the other income effects. The effect of the mother's wage when s=0 takes a similar form to equation (5b) replacing g_F with g_F+g_w, which would be larger in size than the effect of non-labour income if $g_w<0$; that is, higher wages would provide an additional encouragement to mothers to supply less father-child contact time, as they substitute it for higher-cost child quality.

Total transfers to the mother are $pt+s$. The total impact of the father's income on these is equal to $(\partial t/\partial y_f)p + (\partial p/\partial y_f)t + k_f + [k_p-(1-k_f)](\partial p/\partial y_f)$, and that of mother's non-labour income is $(\partial t/\partial v_m)p + (\partial p/\partial v_m)t - (1-k_f)[(\partial p/\partial v_m)+ 1] + k_p(\partial p/\partial v_m)$. Appendix 1 shows that $\partial p/\partial y_f>0=\partial p/\partial v_m>0$. For example, in the case of Cobb-Douglas preferences, $pt+s$ increases with father's income and decreases with mother's income (Appendix 2).

We now consider how the equilibrium father-child contact time changes when a child support order is a binding constraint on the father.

$$(7) \qquad \frac{\partial t}{\partial s^*} = \frac{g_F h_p^0 - (g_p + g_F)h_s^0}{h_p^0 - (g_p + g_F)}$$

where $h_s=\partial t^d/\partial s^*<0$. Thus, a higher order reduces father-child contact time, even if $g_p+g_F=0$. Its effect is not the same as that of lower father's income, because the higher child support order reduces both the supply and demand for contact time, while the father's income only affects demand (cf. (5a) and (7)).

Heterogeneity in parents' incomes and preferences means that we observe a mix of different equilibria, and so variation in $\partial t/\partial y_f$. Among fathers for whom a child support order is not binding (i.e. $s>s^*$), equation (5) is relevant, while some fathers

may face a binding order ($s=s^*$) or choose $s=0$, for whom (5a) is relevant. Other fathers, particularly those with low incomes, may be in a situation like that in Figure 2, for whom $t=0$.

When the father acquires a new partner, it is unlikely that she has the same preferences as him regarding expenditures on and time spent with children from his previous union. Following the "collective approach" of Chiappori (1992), which assumes that the couple achieves an efficient outcome subject to the non-cooperative interaction with the mother, the only change to the analysis of equilibrium is the addition of the father's new partner's wage and unearned income as possible determinants of outcomes. Re-partnering by the mother would require an analogous extension for decision-making in her new household.

Child Welfare

From the conditions (1a) and (1b) and the child quality function, the impact of some parameter κ on child quality is given by

$$(8) \qquad \partial Q/\partial \kappa = (U_x/U_Q)[\partial C/\partial \kappa + \partial H/\partial \kappa] + (Q_f - Q_m)\partial t/\partial \kappa$$

It clearly depends on the sign of $Q_f - Q_m$ in equilibrium. For mothers who are not averse to father's contact at the optimum (i.e. $U_t \geq 0$), condition (1d) indicates that $Q_f < Q_m$. In this case, an increase in a binding child support order for the father unambiguously increases child welfare because $\partial t/\partial s^* < 0$, $\partial C/\partial s^* > 0$ and $\partial H/\partial s^* > 0$, while father's welfare falls. When $U_t < 0$ at the optimum, it is possible that $Q_f > Q_m$, in which case the impact of s^* on child welfare is ambiguous.

4. Promoting efficiency

The inefficiency entailed by non-cooperative interaction leads to sub-optimal expenditure on children (C) and mother's non-market time devoted to the child (H), and this is likely to be accompanied by too much father-child contact time, as the

mother trades this to increase C and H. Appendix 2 illustrates this outcome for Cobb-Douglas preferences. Separated parents and their children would be better off if they could come to a cooperative agreement on resource allocation. Even if they are sufficiently trusting and trustworthy to implement a cooperative agreement, there are a continuum of such efficient allocations among which to choose, each involving different amounts of lump sum transfers from the father to the mother and entailing different levels of C, H and father-child contact. Flinn (2000) focuses on this equilibrium selection issue in a model in which contact with the child is not valued by either parent. He proposes that a court or child support agency can resolve the indeterminacy by, in effect, "suggesting" a given cooperative allocation indirectly through the child support order; in other words, it provides a "focal point".[14] In the present context it could work as follows. Suppose each parent's utility is "transferable"; i.e. their utility functions take the form $A(t,C,H)x_j + B_j(t,C,H,L)$ for parent j. The court/agency announces the child support order, and if the cooperative allocation implied by that order gives each of the parents higher utility than they would obtain in the non-cooperative equilibrium of the preceding section, then they implement this cooperative equilibrium; if not, the non-cooperative equilibrium prevails. There would be a maximum lump sum transfer that the father would pay in the cooperative equilibrium, and a minimum transfer that the mother would accept. If the court/agency sets the child support order in this range, the parents would cooperate. Note that this range is couple-specific; it depends on the parents' preferences and incomes. For this reason it is difficult for the court/agency to set child support orders in a way that encourages an efficient outcome in every case.

This would be an alternative model to the non-cooperative one developed above, producing a different, efficient equilibrium for *some* parents. But transferable

utility plays an important role in such a model when father-child contact affects parents' utilities. With more general preferences, setting the lump sum transfer is not sufficient to guide the parents to an efficient allocation. The remainder of the paper assumes the non-cooperative model.

5. Mothers not in employment

So far we have assumed that the mother has a job. As noted above, the state benefit system, such as that in the UK, can interact in important ways with mothers' incentives to work and fathers' incentives to pay child support. Here we examine briefly how this affects father-child contact.

The 100% benefit withdrawal rate on child support payments makes the value of f_s and H_s faced by fathers equal to zero. Thus, his first order condition for lump sum transfers is $V_Q(Q_C f_s + Q_H H_s) < V_x$, implying $s=0$. When all payments, including pt, are observed and subject to this 100% tax by the benefits agency, mothers cannot trade father-child contact time for child support and her decision alone determines father's contact-time (assuming that fathers are not averse to contact with their children). She chooses contact time $t>0$ such that $U_t + U_Q(Q_f - Q_m) = U_t^* = 0$ if $U_t^* > 0$ at $t=0$, or chooses $t=0$ if $U_t^* < 0$ at $t=0$. The former corresponds to the t_1 equilibrium illustrated in Figure 1. Heterogeneity in preferences would produce different amounts of father-child contact time for different women, and there would be positive amounts of father-child contact for some women, even though the fathers make no transfers to the mother. Thus, while the equilibrium father-child contact for a mother in employment may be t_2 or t_3 in Figure 1, when she leaves employment and receives IS, contact would fall to t_1. With the situation depicted in Figure 2, contact would fall to zero when she receives IS. Furthermore, father's income would not affect contact among women receiving IS.

It is possible that to some extent *pt* may represent "side payments" that are not readily observed by the benefits agency. These could include direct purchases of children's clothing and entertainment by the father, or the mother may receive non-monetary compensation in return for contact. But there is likely to be a binding constraint on how much of *pt* can escape the 100% benefit withdrawal. Appendix 3 shows that when this constraint is binding, when a mother leaves employment to receive IS, father-child contact falls and the effect of father's income on contact becomes negative.

An institutional feature in the UK that counteracts the negative effect of the IS-system on child support payments is that the mothers receiving IS are compelled to get a child support assessment from the Child Support Agency (CSA). As a consequence, fathers with sufficient income may be forced to pay even though the only beneficiary is the UK Treasury, although we have seen that CSA enforcement is weak. If they are forced to pay (i.e. the $s=s^*$ constraint is binding), then that would reduce contact when the mother receives IS for the reason given in section 3.

6. Data

A difficulty in studying how child support payments vary with the income and other characteristics of the non-resident father in most representative surveys is that we do not know which men have dependent children living elsewhere. Such men are identified in two ways with the British Household Panel Study (BHPS). First, 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. A sample of men who reported the birth of a child within a union (marital or cohabiting) that subsequently dissolved was constructed from these data. The sample was narrowed to years in which the father's

youngest child is aged under 16 and not living with him; there are multiple annual observations on most fathers in this sample.[15] Fathers in this sample observed in 2002 constitute sample A. The 2002 wave of the BHPS (its twelfth annual wave) collected similar information in a direct way. It asked all adults: *Do you have any children aged under 16 who do not live with you in this household?* Men who respond affirmatively to this question constitute sample B. The measure of father's "income" used in the empirical analysis is father's monthly personal income in the month preceding the interview.

The crucial feature of the 2002 data is that it collected information on frequency of contact with such children. Men in sample B are asked the following question: *Can you tell me how often you visit, see or contact your child(ren) under 16 living outside the household?* Table 1 shows the distribution of responses for fathers by whether or not they paid "child support". Information on the latter is obtained from a question that asks if the respondent *transfers money to any person not co-resident for maintenance, alimony or child support*. If the answer is affirmative, the respondent is asked for the amount transferred and the weeks covered by the transfer. Overall, 62% of fathers in sample B paid child support, and 58% "saw" their child(ren) once a week or more.[16]

Table 1 indicates that there is a large minority of fathers who have substantial contact with their children but who pay no child support (e.g. 30% for fathers who see their child weekly). This may arise because "side payments" such as the father's direct purchases of children's clothing and entertainment are not reported by the father as child support, or the mother may receive non-monetary compensation in return for contact. It could also arise if mothers value some contact by their children with their father and either fathers do not value contact, or the mothers receive IS and

have all transfers taxed away. There is a clear tendency for fathers who see their child(ren) more frequently to be more likely to pay child support, and also for mean payments to increase with contact frequency. This simple positive correlation would appear to contradict the model's prediction that higher child support orders should reduce contact (equation (7)), but this ignores the fact that child support payments represent in large part voluntary choices, not binding CSA-assessments or court orders.

Samples A and B are compared to investigate under-reporting in sample B. Table 2 shows that there are 60 fathers who we know have dependent children living elsewhere in 2002 from the sample A data, but who do not report having them in 2002. These non-reporting fathers are much less likely to pay child support, and they have lower incomes and are less likely to have a higher educational qualification (above "A-level") than fathers appearing in both samples A and B. There are also 191 fathers in sample B who are not in A, because we do not have sufficient information about their childbearing and union histories. In large part, this is because they are "temporary sample members" (i.e. currently resident with permanent BHPS-panel members), but also because they come from the Scottish and Welsh booster samples that started in 1999—only 50 are continuing permanent BHPS-panel members. There also may be some fathers who fathered a child outside a co-residential union. Fathers in this sub-sample are less likely to have at least weekly contact with their children, have lower incomes and are less likely to have a higher educational qualification than those fathers appearing in both samples A and B.

According to the non-cooperative model presented above, both child support and father-child contact should be a function of the two parents' incomes, and frequency of contact should be lower if the mother receives Income Support. The

difficulty is tracing the mothers in 2002. From the history information used to construct sample A, it is possible to identify 85 custodial mothers corresponding to the non-resident fathers in sample B. Table 3 compares the fathers who can be matched with the mothers in 2002 with those who cannot. Matched fathers are more likely to have at least weekly contact with their children, have much higher income, are more likely to have a higher educational qualification and are less likely to have a new partner living with them, compared with the other fathers in sample B. These differences mean that an analysis based solely on the matched parents would be based on a different distribution of frequency of contact than that for unmatched fathers, one skewed toward more contact, at least in part because of the higher incomes and less re-partnering among the matched fathers.

In the sample of matched mothers, 17% receive IS and 70% have a job, compared with 27% receiving IS and 59% having a job among all custodial mothers. The mother's mean monthly personal income is £1318 (cf. £2268 for the fathers), and the correlation coefficient between the mother's and father's own income in this sample is about 0.15; the correlation of father's income and IS-receipt is –0.09.[17] The impact of omitting mother's wage, non-labour income and IS-receipt in the analysis of contact and child support with sample B is investigated in section 8.

7. Father's income and father-child contact

In the presence of individual heterogeneity, it is not possible to estimate an empirical counterpart of the theoretical model presented above with these cross-section data. Instead, the modest aim of the empirical analysis is to describe how father-child contact varies with parents' incomes. A simple reduced form is estimated using sample B, expressing the frequency of father-child contact as a function of father's income, his marital status and the number of his own children in his current

household.[18] The analysis is restricted to fathers with some personal income.[19] Because of the likely non-linearity of income effects suggested in sections 3 and 5, the analysis examines the impacts of income in three parts of the income distribution. Descriptive statistics for the estimation sample are given in the third column of Table 3.

Table 4 shows how the percentage with at least weekly (more than monthly) contact varies according to the third of the father's income distribution in which he falls. Frequency of father-child contact rises with his income, particularly from the bottom to the middle third of the distribution. Correspondingly, the percentage of fathers who have no contact falls as his income rises. The proportion paying some child support rises with income.

As any particular aggregation of frequency of contact categories may be arbitrary, an "ordered probit" model is estimated.[20] The parameterisation incorporates a "spline" function for the impact of father's income. The parameter estimates in the first column of Table 5 indicate that frequency of contact rises with father's income in the middle third of the fathers' income distribution, but father's income has virtually no impact in the bottom and top third of the distribution (the decline in the impact from the middle to the top third is statistically significant). The absence of a father's income effect in the top third of the distribution may reflect the steeper mother's supply function illustrated in Figures 1 and 2. Fathers in the bottom third of the distribution are more likely to have ex-partners who receive IS, for whom income effects are predicted to be non-positive (see section 5).

The second column of Table 5 shows what happens if we ignore the endogeneity of child support payments in the model and instead treat them as exogenous. It indicates that the amount of payment is positively associated with

frequency of contact, contrary to what equation (7) predicts. But such a specification ignores the voluntary nature of child support for most fathers—variation is *not* primarily generated by differences in binding child support orders among fathers. Note that the coefficients of the other variables change very little compared with the first column.

An important implication of the theoretical model is that $\partial t/\partial y_f$ should vary according to whether or not the father makes lump sum payments to the mother. Thus, we really have an "endogenous switching model" because whether or not he makes such payments is determined by the same technology (for the production of Q), preference and income parameters that affect contact. There are no obvious exclusion restrictions for identifying the switching mechanism, although it is identified by distributional assumptions. In order to explore this issue, frequency of father-child contact is reduced to a dichotomous indicator—"at least weekly" compared to less frequent. With this formulation, two "probit models with sample selection" can be estimated, one for payers of child support and the other for non-payers. We can test for whether the correlation between the error term for contact is correlated with that for paying (not paying) some child support. It turns out that the father's age significantly affects the probability of a child support payment (see the first column of Table 6), but it does not affect the probability of weekly contact; thus, there is an exclusion restriction that aids identification. The estimated values of the correlation coefficient for the paying and non-paying samples are 0.07 and –0.63, respectively, with respective p-values of 0.925 and 0.251. Furthermore, with one exception, the probit coefficients in the contact equations are similar to those estimated when sample selection is ignored. The exception is that the coefficient on father's income in the middle-third of the distribution is negative in the non-paying group when selection

into this group is ignored, but positive when selection is taken into account.[21] In both cases however, the coefficient is insignificantly different from zero.

In light of these results, the sample is simply split between those fathers who report paying some child support and those who do not, and an ordered probit model is estimated for each group. The only clear theoretical prediction is that father's income should have a positive impact on contact in the latter group if the mother's supply curve is not too steep (see equation (5a)). The parameter estimates for these two groups are shown in the third and fourth columns of Table 5.[22] Among the payers, for whom equation (5) is relevant, higher father's income reduces contact in the bottom third of the income distribution and increases it in the middle third. The pattern is reversed for the non-payers, but not very precisely estimated. Consistent with the theory, its association is positive in the bottom third.

Among non-paying fathers, the larger the number of father's own dependent children in his current household, the less frequent contact he has with his dependent children living elsewhere. This may arise because more children in his new partnership place additional demands on financial and time resources. Also, those who have a partner have less frequent contact, particularly among fathers who pay some child support.

With regard to child support, we have seen that there is a large minority of fathers who report no child support payments (about 40%), and the data on amounts indicate that the average payment is £61 per week among the fathers who pay something. In the theoretical model, there are no lump-sum payments when $V_Q(Q_C f_F + Q_H H_F) < V_x$ at s=0, which will be the case for fathers who are relatively poor, or who value expenditure on their children relatively little, or whose ex-partners receive IS. Similarly, fathers have no contact with their children when $[-U_t - U_Q(Q_f - Q_m)]/U_x > [V_t$

$+V_Q(Q_f-Q_m)]/V_x$ at t=0, a situation that arises for poorer fathers and fathers who do not value contact highly (e.g. see Figure 2). Thus, poorer fathers are more likely to have $pt+s$=0, and so we expect that the probability of paying some child support (as well as the amount transferred) increases with the father's income.[23]

The first column of Table 6 shows estimates of a model for the probability of making some payment; that is, the equation for determining the sample split in Table 5. The second column analyses the amount of weekly child support payments among fathers who pay something, and the third analyses both together, with the concentration of many fathers at zero being taken into account with a "Tobit" model. Table 6 indicates that the probability of making some payment only rises significantly with father's income in the middle third of the distribution. Among fathers paying something, payments rise with his income in the top two-thirds of the distribution, and decline with income in the bottom third, although not significantly. The latter association might reflect a stronger concentration of mothers receiving IS among low-income fathers. The positive association in the top third of the income distribution is not inconsistent with the results for contact because lump sum child support payments are predicted to increase with the father's income even if contact is affected little by father's income. The results from the first two columns suggest that the Tobit estimates may be misleading, mixing incidence of payment and amount.

8. Analysis of matched mothers and fathers

According to the theoretical model, mother's wage and unearned income are the appropriate income-related variables for the mother. The mother's usual gross monthly pay is taken as a measure of the former. Table 7 shows how the frequency of father-child contact varies with it and with household income other than her own.[24] It rises with her pay, being lowest for mothers not in employment, and it declines with

other household income. One of the reasons that fathers whose ex-partners are without a job have less frequent contact may be because 44% of these mothers receive IS benefits (66% of non-employed women without a partner). Table 8 shows how frequency of father-child contact differs by IS-receipt. The relatively high level of father-child contact among mothers receiving IS is surprising in light of the disincentives in the IS-benefit system.

The primary interest in the matched sample is to test the prediction that mother's non-labour income should have the same effect on contact as father's income when the father makes lump sum transfers and opposite effects when he does not. It also allows us to examine how the association of father's income with contact is affected by the inclusion of mother's pay, other household income, IS-receipt and other attributes. As noted in the previous section, the sample of matched fathers and mothers over-represents higher income fathers. In particular, the income marking off the top third of the income distribution for the fathers in the samples used in Tables 4-6 (£1842) is approximately equal to the median income in the matched sample (£1801). The estimates from Table 5 would therefore suggest little effect of father's income on frequency of contact above the median in the matched sample. Thus, in the analysis of the matched sample we only distinguish income effects between the top and bottom halves of the father's income distribution (in the matched sample). Mother's IS-receipt and whether either parent is married or not did not have significant impacts on contact, and so they are dropped from the analysis to conserve degrees of freedom.

In order to use as much of the small matched sample as possible, a "predicted usual monthly pay" was obtained from a regression of usual monthly pay on educational qualifications, age and its square among employed mothers, and it was

used in the analyses. Use of the predicted pay should also reduce the influence on the parameter estimates of endogeneity and measurement error in usual monthly pay. Table 9 shows analyses of father-child contact with the matched sample, comparing parameter estimates with and without the mother's variables in the first two columns and the two groups of fathers in the other two columns.

In the full matched sample, frequency of father's contact increases significantly with the mother's predicted pay, and declines significantly with mother's other household income. In estimates not shown, allowance was made for possible different effects for mothers with and without a new partner because, for the 47% of mothers in the sample with a partner present, other household income mainly reflects the partner's income. Higher income for him may increase his bargaining power in household decisions, and his preferences may be against contact with his "step-child's" father. The estimated differential effects are in the opposite direction to what this reasoning would suggest: the impact of other household income is negative for mothers without a new partner and near zero for mothers with one.

Consistent with the earlier analysis, father's income only increases contact in the bottom half of the father's income distribution, although standard errors are relatively large. Excluding the mother's variables overstates the impact of father's income, as we might expect from the positive correlation between father's income and predicted pay (r=0.15). The size of the impact of the number of own dependent children in the father's household in the matched sample is also overstated, owing to a surprisingly large positive correlation between it and other household income in the mother's household (r=0.41).

According to the theoretical model when lump sum payments are made (s>0), the effect of mother's other household income on father-child contact should be the

same as the effect of father's income (see equation (5)). The results from the split sample show virtually no effects of mother's wage or other household income in the sample of paying fathers, while father's income has a positive effect in the bottom half of their income distribution. A test for the difference between this impact of father's income and mother's other household income is not significant at the 0.10 level or less, but of course the small sample reduces the power of the test.

If $s=0$ or there is a binding child support order ($s=s^*$) the mother's wage and non-labour income effects should both be negative, while the father's income should have a positive effect (see equations (5b) and (5a)). Among the non-paying fathers, father's income has virtually no effect, while other household income has a negative effect, although not significantly less than that of father's income. This would be consistent with the theory if the mother's contact supply curve were relatively steep. The effects of the mother's wage and other household income are opposite in direction and significantly different from each other at the 0.05 level. This result is hard to reconcile with the theoretical model. Of course, this is a small unrepresentative sample of matched mothers and father, and with these cross-section data we cannot rule out the possibility that higher wage mothers have different preferences, such that they view father-child contact more favourably.

This has been an exploratory empirical analysis. It is limited by the type of data that can be compiled for such analyses. There is evidence that the sample of fathers who report having children elsewhere and their contact frequency over-represent those more likely to pay child support and probably also those who see their children more frequently. The sample of fathers and mothers who we can match is also unrepresentative, over-sampling more affluent fathers considerably.

9. Conclusions

The effects of father's income and mother's wage and non-labour income on a non-resident father's contact with his child are found to depend on whether or not he chooses to make lump sum payments to the mother. If he does, then the father's income and mother's non-labour income should have exactly the same effect on the frequency of father-child contact. If he does not, or there is a binding child support payment order, they have effects opposite in direction. While only suggestive because of data limitations, the empirical analysis indicates that among middle-income fathers, higher father's income increases the probability of making child support payments and it also increases frequency of contact with his children among fathers who pay some child support. Child support payments increase with income in the upper two-thirds of the fathers' income distribution among payers. Among fathers not paying child support, a higher mother's wage is associated with more father-child contact, but higher other income in her new household is associated with less. The opposite direction of these associations is hard to reconcile with the theory, and merits further investigation with better data.

Another prediction from the theoretical analysis is that a higher binding child support order reduces father-child contact. This suggests that if the reform of the child support system in the UK does succeed in putting more payment orders in place and enforcing them better, father's frequency of contact with their children would decline among fathers paying less than the ordered amount before the reform. Nevertheless, child welfare could still increase.

Appendix 1

Substituting the father's child support function into the father-child contact-time supply function, we can derive an expression for the "supply price" of father-child contact time:

$$\text{(A1)} \quad dp^s = \frac{dt - g_F k_f d(y_f + v_m + w) - (g_w + g_F k_w)dw}{g_p + g_F(k_f + k_p)}$$

Inverting the father-child contact time demand function, we obtain an expression for the "demand price":

$$\text{(A2)} \quad dp^d = \frac{dt - h_F d(y_f + v_m + w) - h_w dw}{h_p + h_F}$$

Equating $dp^s = dp^d$, we obtain an equation for changes in the equilibrium amount of father-child contact time:

$$\text{(A3)} \quad dt = \frac{\begin{array}{l}\{[(h_p + h_F)g_F k_f - h_F(g_F(k_p + k_F) + g_p)]d(y_f + v_m + w) + \\ [(h_p + h_F)(g_w + g_F k_w) - h_w[g_F(k_f + k_p) + g_p]dw\}\end{array}}{h_F + h_p - g_F(k_f + k_p) - g_p}$$

On the plausible assumption that price dynamics are such that the temporal change in price is a positive function of excess demand for father-child contact time, t^d-t^s, convergence to equilibrium ("family market stability") requires that $h_F - g_F(k_f + k_p) + h_p - g_p < 0$. Also,

$$\text{(A4)} \quad \frac{\partial p}{\partial y_f} = \frac{\partial p}{\partial v_m} = \frac{g_F k_f - h_F}{h_F - g_F(k_f + k_p) + h_p - g_p}$$

$$\text{(A5)} \quad \frac{\partial p}{\partial w} = \frac{g_F k_f - h_F + g_w + g_F k_w - h_w}{h_F - g_F(k_f + k_p) + h_p - g_p}$$

We have seen that $k_f > 0$, $h_F > 0$ and $g_F < 0$, and so equation (A4) indicates that $\partial p/\partial y_f = \partial p/\partial v_m > 0$. The sign of $\partial p/\partial w$ is ambiguous.

Appendix 2

Example : Stone-Geary Preferences

Ignoring home production, so that $Q=C$, let mother's preferences be represented by the utility function $U=a_1\ln(C) + a_2\ln(x_m) + a_3\ln(1-t) + a_4\ln(L)$, and mother's total time available for work or leisure is normalised to unity. The father's preferences are represented by the utility function $V=b_1\ln(C-\gamma_C) + b_2\ln(x_f-\gamma_x) + a_3\ln(t-\gamma_t)$, $\gamma_j \geq 0$, $j=C,x,t$. In this case,

$C=f(F_m+s, p, w) = a_1(v_m+s+p+w)$

$t^s=g(F_m+s, p, w) = [-a_3(v_m+s+p+w) + p]/p$

$s=k(y_f, F_m) = b_1(y_f-\gamma_x-p\gamma_t)-(1-b_1)(v_m+p+w-\gamma_C/a_1)$

$t^d=h(F, p, w) = b_3(y_f+v_m+p+w-\gamma_x-\gamma_C/a_1)/p + \gamma_t(b_3b_1+b_2)/(1-b_1)$

Solving for the equilibrium price by equating t^d and t^s,

$p= [(b_3+a_3b_1)(y_f+y_m+w-\gamma_x)+ (a_3-b_3-a_3b_1)\gamma_C/a_1]/q$

where $q=1-b_3-a_3b_1 + [(1-b_1)a_3b_1+ b_3b_1+b_2]\gamma_t/(1-b_1)$. Equilibrium father-child contact time (t) is obtained by substituting for p in the demand or supply function. It depends on $y_f+ v_m+w$ and the preference parameters, including $\gamma_j, j=C,x,t$. In particular,

$\partial t/\partial y_f =\partial t/\partial v_m=\partial t/\partial w= a_3b_3\gamma_C/a_1p^2q >0$ for $\gamma_C>0$.

In the special case where $\gamma_j=0, j=C,x,t$. (Cobb-Douglas preferences),

$p= (b_3+a_3b_1)(y_f+ v_m+w)/[1-(b_3 +a_3b_1)]$

$t=b_3/(b_3+a_3b_1)$

Thus, with these preferences, equilibrium father-child contact time is independent of parents' incomes—it only depends on parents' preferences. For example, higher income of the father initially raises the father's demand for contact (by b_3/p) and lump sum child support transfers to the mother (by b_1), and the latter produces a reduction in the mother's supply (by a_3b_1/p). At the initial price, there is excess demand for

contact (of $(b_1+a_3b_1)/p$), which increases the price of father-child contact, which in turn reduces father's lump sum transfers. The higher price and lower transfers choke off the excess demand for contact, producing the same contact at a higher price when the father's income is higher.

Taking the father-child contact price into account, in equilibrium,

$s=\{[(1-a_3)b_1-b_3]y_f-(1-b_1)(w+v_m\}/[1-(b_3+a_3b_1)]$,

$C=a_1b_1(y_f+v_m+w)/[1-(b_3+a_3b_1)]$, $L=a_4b_1(y_f+v_m+w)/[1-(b_3+a_3b_1)]w$

$x_m=a_2b_1(y_f+v_m+w)/[1-(b_3+a_3b_1)]$ and $x_f=b_2(y_f+v_m+w)/[1-(b_3+a_3b_1)]$.

$s+pt=[(1-a_3)b_1y_f-b_2(v_m+w)]/[1-(b_3+a_3b_1)]$.

In the case of Cobb-Douglas preferences, the *efficient outcomes* for C and t are given by:

$C^e=(b_1+\mu a_1)(y_f+v_m+w)/[1-b_3+\mu(1-a_3)]$

$t^e=b_3/(b_3+\mu a_3)$

where μ is the weight given the mother's preferences relative to the father's. If, for example, they are given equal weight ($\mu=1$), t is above the efficient level in the non-cooperative equilibrium because $b_3+a_3b_1<b_3+a_3$.

When $s=0$,

$t=b_3(1-a_3)y_f/[b_3y_f+a_3(1-b_1)(v_m+w)]$

Appendix 3: Side Payment Constraint

Suppose that payments pt up to K escape the attention of the benefits agency. Then mothers receiving IS choose C and t to maximise $U=U(Q, L, x_m, t)$ subject to $Q=Q(C, H, t, 1-t)$, $T=H+L$ and $b + pt = x_m+C$ and $pt \leq K$, where b is IS benefits.[25] This implies $U_Q Q_C=U_x$, $U_L=U_Q Q_H$ and $pU_x \geq -U_t - U_Q(Q_f - Q_m)$. The strict inequality in the latter holds when $pt=K$; that is, the mother would like to increase the supply of contact time to obtain more income, but she is constrained by the benefit system from doing so. With $K>0$, the mother's effective supply function is the side payment constraint, and $\partial t^s/\partial b=0$ and $\partial t^s/\partial p=-t/p <0$.

The only decision variable for fathers whose ex-partners receive IS is their contact time with their child, with their choice satisfying $V_t + V_Q(Q_f - Q_m) \leq pV_x$. His contact demand function takes the form $h(y_f,p)$ for $t>0$, with $h_y>0$ and $h_p<0$. Equilibrium when the *side payment constraint is binding with* $K>0$ is given by the intersection of the demand curve with the $pt=K$ constraint. Higher income for the father would reduce contact in this case.

Equilibrium when *not receiving IS* is given by the intersection of the supply and demand functions, compared with intersection with the $pt=K$ constraint when she receives IS. Thus, father-child contact is lower when she receives IS than when she does not. The father's demand curve for contact may also be lower when the mother receives IS than when she does not, because we have seen that lower mother's income reduces his demand for contact when he is making lump sum payments ($s>0$). This would dampen the decline in contact.

References

Amato, P. R. and S.J. Rezac. 1994. Contact with nonresident parents, interparental conflict, and children's behavior, *Journal of Family Issues*, 15:191-207.

Beller, A.H. and J.W. Graham. 1993. *Small Change: The Economics of Child Support*. New Haven and London: Yale University Press.

Bradshaw, J. et al. 1999. *Absent Fathers?* London: Routledge.

Cooksey, E.C. and P.H. Craig (1998), Parenting from a distance: the effects of paternal characteristics on contact between nonresidential fathers and their children, *Demography* 35:187-200

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

Del Boca, D. and R. Ribero. 1998. Transfers in non-intact households. *Structural Change and Economic Dynamics*, 9:469-479.

_____. 2001. Evaluation of child support policies. *American Economic Review Papers and Proceedings*, 91:130-135.

_____. 2003. Visitations and transfers after divorce. *Review of the Economics of the Household*, 1:187-204.

Ermisch, J. and M. Francesconi. 2000. Patterns of household and family formation, in *Seven Years in the Lives of British Families*, R.Berthoud and J. Gershuny, eds. Bristol: The Policy Press.

Ermisch, J. and C. Pronzato. 2006. Using fathers' child support payments to test income pooling, ISER Working Paper 2006-????, Colchester: University of Essex, forthcoming.

Flinn, C. 2000. Modes of interaction between divorced parents. *International Economic Review* 41:544-578.

Kelly, J.B. 1993. Current research on children's postdivorce adjustment: no simple answers, *Family and Conciliation Courts Review*, 31:29-49.

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

Manning, W.D. and P.J. Smock. 1999. New families and nonresident father-child visitation, S*ocial Forces* 78:87-116.

Manning, W.D. S. Stewart and P.J. Smock. 2003. The complexity of fathers' parenting responsibilities and involvement with nonresident children, *Journal of Family Issues* 24: 645-667.

Peterson, J.L and N. Zill. 1986. Marital disruption, parent-child relationships, and behavior problems in children, *Journal of Marriage and the Family*, 48:295-307.

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

Table 1: Frequency of Father's Contact with His Child(ren) and Payment of Child Support, Fathers' responses, BHPS 2002

	Percent who Pay Child Support*	Row N, Unwgt.	Mean Weekly CS Payment*	Column Percent*
Shared care, 50/50	100	6	56.5	1.8%
Almost every day	68.3	39	38.7	11.2
Several times per week	78.5	79	55.5	23.9
About once a week	69.9	87	29.8	21.4
Several times per month	52.0	43	29.0**	11.9
Once a month or less	51.9	14	20.5	4.0
A few times per year	46.9	21	19.5	6.3
Never	39.9	78	19.7	19.6
All	61.8%		33.4	100%
Un-weighted N	375	373	343	373
Weighted *N*	*241*	*239*	*223*	*239*

*Weighted values.

**Omits one case of a weekly payment =831.4.

Table 2: Comparison of Means between Samples of Fathers with Dependent Children Living Elsewhere, BHPS 2002

Variable	In Samples A and B	In Sample B only	In Sample A only
Percentage at least weekly father-child contact	64%	50%	?
Percentage who pay child support	61%	55%	27%
Father's monthly income	1878	1379	1298
Age	38.7	35.8	40.0
Qualification >A-level	52%	41%	41%
Marital Status:			
Married	26%	27%	31%
Cohabiting	28%	42%	19%
Div./Sep./Never married	46%	31%	50%
Number of dependent children in household	0.67	0.74	0.57
N	184	191	60

Table 3: Comparison of Means between Samples of Fathers with Dependent Children Living Elsewhere, BHPS 2002

Variable	**Matched with Mother**	**Not matched with mother**	**Estimation sample***
Percentage at least weekly father-child contact	74%	52%	60%
Percentage who pay child support	61%	57%	58%
Father's monthly income:			
Mean	2268	1435	1736
Median	1801	1264	1473
Third Quartile	2883	1901	2180
Age	40.1	36.4	37.3
Qualification >A-level	56%	43%	47%
Marital Status:			
Married	18%	29%	27%
Cohabiting	29%	37%	35%
Div./Sep./Never married	53%	34%	38%
Number of dependent children in household	0.53	0.76	0.71
N	85	290	350

*Fathers with positive income and valid contact data.

Table 4: Frequency of Father's Contact with His Child(ren) and Father's Position in the Income Distribution, Fathers' responses, BHPS 2002*

Percent seeing:	Bottom third	Middle third	Top Third	All
Once a week or more	45.8	59.7	66.2	58.4
More than once a month	52.7	74.5	78.1	70.1
Never sees child	27.4	17.1	15.7	19.3
Per cent paying some child support	41.2	64.2	79.1	63.6
Un-weighted *N*	113	121	116	350
Weighted *N*	61	84	85	230

*****Weighted values

Table 5: Ordered Probit Estimates of Impacts on Frequency of Father's Contact with His Child(ren), BHPS 2002, standard error in parentheses

	Entire Sample		Split Sample	
	(1)	**(2)**	**(3) Pays CS**	**(4) No CS**
Father's income (per £100), bottom third	-0.005 (0.023)	-0.005 (0.025)	-0.055 (0.032)	0.042 (0.034)
Father's income (per £100), middle third	0.056 (0.024)	0.051 (0.025)	0.070 (0.032)	-0.030 (0.042)
Father's income (per £100), top third	-0.002 (0.005)	-0.012 (0.007)	-0.005 (0.006)	-0.003 (0.011)
Married	-0.462 (0.162)	-0.421 (0.168)	-0.642 (0.213)	-0.472 (0.263)
Cohabiting	-0.372 (0.148)	-0.385 (0.156)	-0.592 (0.190)	-0.256 (0.246)
Number of own dependent children in current household	-0.272 (0.068)	-0.261 (0.070)	-0.030 (0.102)	-0.353 (0.100)
Amount of child support paid, per £10		0.030 (0.013)	--	--
N	350	322	210	140
LRchi-square (df)	55.38 (*6*)	56.64 (*7*)	21.16 (*6*)	28.49 (*6*)

Table 6: 'Probit', Regression and 'Tobit' Estimates of Impacts on Payment and Amount of Child Support, BHPS 2002, standard error in parentheses

Variable	**Probit** **(1)**	**CS| CS>0*** **(2)**	**Tobit*** **(3)**
Father's income (per £100), bottom third	0.020 (0.028)	-1.3 (1.4)	2.2 (1.4)
Father's income (per £100), middle third	0.148 (0.032)	2.2 (1.2)	6.8 (1.5)
Father's income (per £100), top third	0.006 (0.007)	2.1 (0.3)	1.4 (0.4)
Married	0.215 (0.216)	-11.8 (7.9)	2.5 (9.8)
Cohabiting	0.136 (0.193)	-9.4 (7.2)	6.7 (9.1)
Number of own dependent children in father's household	-0.399 (0.090)	-3.2 (3.9)	-18.9 (4.4)
Father's age	-0.031 (0.009)		
Constant	0.858 (0.426)	55.6 (13.1)	-30.4 (14.2)
σ_u	1	36.6	55.6 (3.2)
LR chi-sq. (*df*)	71.23 (*7*)	$F(6,174)=16.35$	109.00 (*6*)
***N* fathers**	350	181	323

*Omits one father with weekly payment of £831.4.

Table 7: Frequency of Father's Contact with His Child(ren) and Child Support Payment and Mother's Pay and Other Household Income, Fathers' responses, Matched Sample of Fathers and Mothers, BHPS 2002

A. Mothers Usual Gross Monthly Pay

Percent seeing:	No job	Bottom third	Middle third	Top Third	All
Once a week or more	55.0	68.4	85.7	89.5	74.7
More than once a month	65.0	79.0	85.7	100	82.3
Never sees child	20.0	15.8	14.3	0	13.1
Child Support >0	50.0	60.0	71.4	73.7	61.2
Unweighted N	20	19	21	19	79

B. Mothers Other Household Income

Percent seeing:	Bottom third	Middle third	Top Third	All
Once a week or more	82.1.4	73.3	65.4	75.0
More than once a month	92.9	73.3	73.1	82.5
Never sees child	5.1	13.3	26.9	13.8
Child Support >0	65.0	60.0	61.5	61.2
Unweighted *N*	39	15	26	80

Table 8: Frequency of Father's Contact with His Child(ren) and Child Support Payment and Mother's Income Support Receipt, Fathers' responses, Matched Sample of Fathers and Mothers, BHPS 2002

Percent seeing:	No IS	IS	All
Once a week or more	77.6	64.3	75.3
More than once a month	85.1	71.4	82.7
Never sees child	11.9	21.4	13.6
Child support >0	64.7	50.0	62.2
Unweighted *N*	67	14	81

Table 9: Ordered Probit Estimates of Impacts on Frequency of Father's Contact with His Child(ren), BHPS 2002, standard error in parentheses

	Entire Sample		Split Sample	
	(1)	**(2)**	**(3) Pays CS**	**(4) No CS**
Father's income (per £100), bottom half	0.024 (0.024)	0.034 (0.024)	0.097 (0.065)	0.009 (0.045)
Father's income (per £100), top half	-0.008 (0.006)	-0.007 (0.006)	-0.008 (0.007)	-0.007 (0.016)
Father Cohabiting	-1.042 (0.298)	-0.976 (0.288)	-1.520 (0.396)	-0.659 (0.594)
Mother's expected wage	0.072 (0.035)	--	-0.016 (0.049)	0.121 (0.076)
Mother's other household income	-0.024 (0.011)	--	-0.003 (0.014)	-0.037 (0.021)
Number of own dependent children in father's household	-0.075 (0.167)	-0.234 (0.148)	0.199 (0.237)	-0.249 (0.369)
N	79	79	51	28
LR chi-square (df)	29.94 (*6*)	22.30 (*4*)	18.37 (*6*)	16.15 (*6*)

Figure 1: Equilibria in Father-child Contact Time

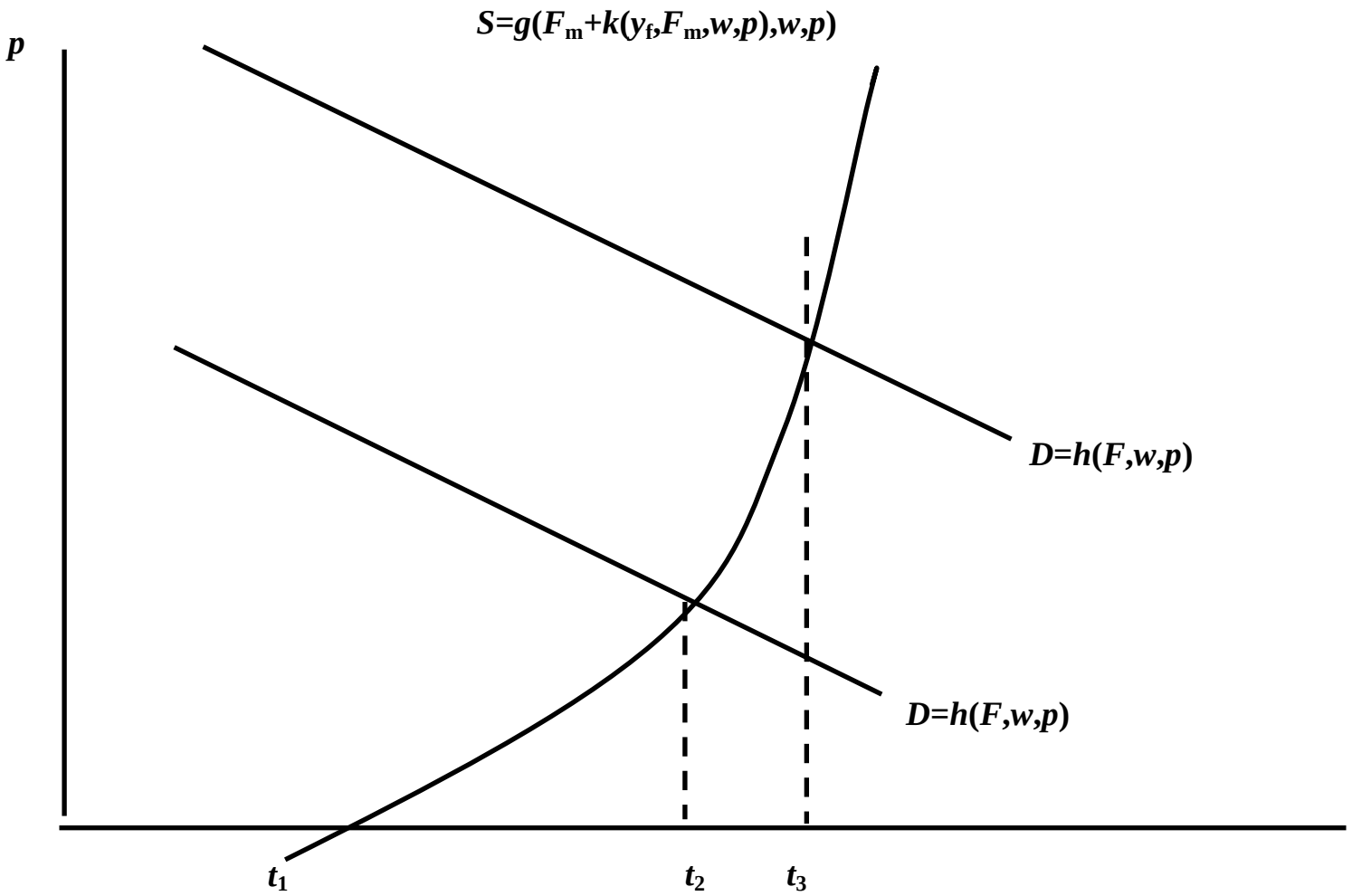
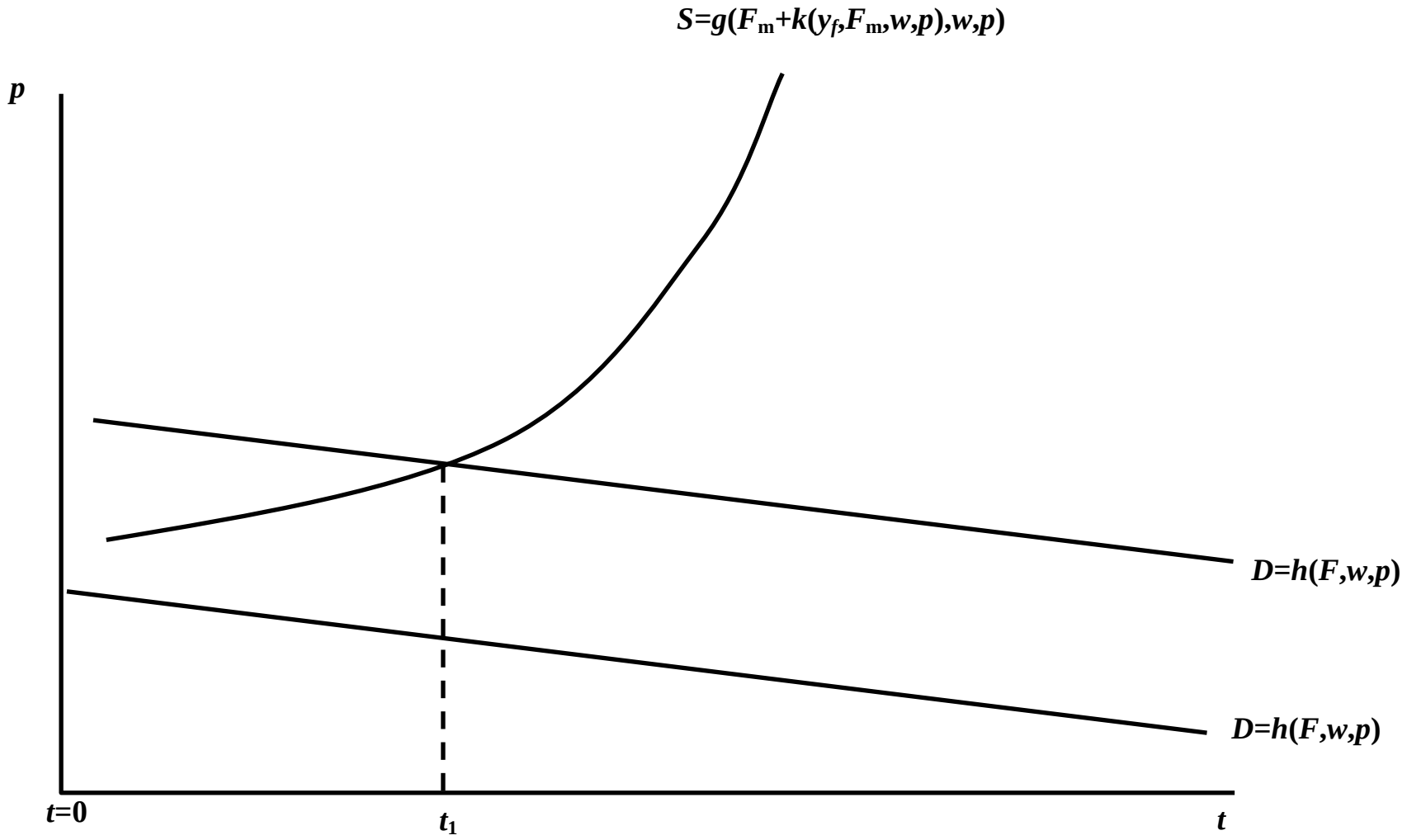


Figure 2: Equilibria in Father-child Contact Time



[1] Children themselves point to loss of contact with their non-resident parent as the most upsetting aspect of their parents' divorce/separation (Kelly 1993). Non-resident parent-child contact is associated with higher psychological scores, greater self-esteem, fewer behavioural problems, higher academic achievement and better peer relationships (e.g. Amato and Rezac, 1994; Peterson and Zill, 1986).

[2] There is empirical research on frequency of contact of non-resident fathers with their children, and the relation between contact and monetary transfers. Cooksey and Craig (1998) provide a descriptive analysis of frequency of fathers' contact, but do not analyze child support. Bradshaw et al (1999) and Manning, Stewart and Smock (2003) analyze both, and Manning and Smock (1999) study the dynamics of father's contact when they form new families. See Beller and Graham (1993) for an early treatment of the analysis of child support.

[3] The papers cited in note 2 other than Bradshaw et al (1999) use the National Survey of Families and Households from the U.S. Bradshaw et al (1999) analyze their own survey of non-custodial fathers.

[4] Weiss and Willis (1985) incorporate the determination of custody into their analysis.

[5] In section 4 below, we discuss a model in which *some* parents cooperate.

[6] The situation did not improve after the 2003 reform. As of July 2006, there was a backlog of 330,000 cases waiting assessments and unrecovered child support payments of £3.5bn (*The Economist*, 29 July 2006, p.30 and *The Guardian*, 25 July 2006, p.7).

[7] 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.

[8] Under the 2006 reform proposals, parents will be encouraged to make their own arrangements, with the government supposedly providing tougher enforcement of these voluntary agreements.

[9] The model ignores fixed costs of working, the market for child care and the existence of non-convex budget constraints for mothers with unemployed partners.

[10] During 2003, a "child support disregard" of £10 per week was introduced into the IS scheme.

[11] Note that if t does not affect either parent's utility directly, then, at equilibrium, $-U_Q/U_x=V_Q/V_x=p$; that is, the mother's marginal utility of child quality is negative at the optimum.

[12] Note that in Del Boca and Ribero (2001) child support payments are pt, as s=0 because of the absence of a public good.

[13] The stability condition is now $h^0_p-(g_F+g_p)<0$.

[14] Flinn (2002) argues that, in the context of a repeated game, implementing the particular cooperative outcome associated with the ordered transfer is a best response if the only alternative is the non-cooperative outcome.

[15] I am grateful to Chiara Pronzato for constructing these data. See Ermisch and Pronzato (2006) for an analysis of child support payments using the panel nature of these data.

[16] Literally, "visited, saw or had contact with". These data over-sample Scotland and Wales, because of booster samples for them since 1999, but the weighting in Table 1 takes this into account. The estimates of the models in Tables 5, 6 and 9 are based on unweighted data.

[17] Very similar correlation estimates are obtained from a sample of about 300 mothers of dependent children who separate from their partner during the BHPS panel. For these women, their partner's monthly income in the annual interview preceding the separation is observed.

[18] Other income in the father's household never had a statistically significant effect on frequency of contact; also, it may be endogenous. For this reason it is not included in the empirical analysis.

[19] As a consequence, 23 fathers who report no personal income are excluded. Two-fifths of these fathers report no contact with their children.

[20] The top category ("shared care") has been grouped with "almost every day" because only 6 fathers report this arrangement.

[21] This reflects the strong effect of father's income in the middle-third of the distribution on the probability of child support payment (see Table 6) and the negative correlation between the error term in the selection (into the non-paying group) equation and that in the contact equation.

[22] The pattern of coefficients in these equations is similar to that in the probability of weekly contact equations discussed in the previous paragraph.

[23] The theoretical model indicates that among fathers who have no contact (t=0), $\partial s/\partial y_f>0$. In the sample, 31% of fathers who never see their children paid some child support.

[24] Other household income is defined as her household income minus her personal income of all kinds, including benefits. Frequency of contact also rises significantly with the mother's educational qualification.

[25] A small lump sum payment from the father may also escape tax, but this is equivalent to a larger b.