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RATIONALIZING CHILD SUPPORT DECISIONS

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Rationalizing Child Support Decisions†

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Abstract

We provide a framework within which both the child support compliance decisions of noncustodial fathers and the child support awards set by institutional agents can be coherently interpreted. The parsimoniously parameterized model of child support transfers is able to capture all of the relevant features of the actual transfer distribution. We indicate the manner in which behavioral parameter estimates obtained from this analysis can be used to conduct an investigation of the child support award decision. Empirical evidence is provided on the implicit preference weights of institutional agents to support our contention that noncompliance phenemona seem to be largely ignored in the setting of child support awards within our sample. Given the characteristics of noncustodial fathers, our results indicate that the [short-run] expected welfare levels of custodial mothers and their children would have been increased by a reduction in child support orders in almost four-fifths of our sample cases.

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1. Introduction

When a married couple with children obtains a divorce, at least four agents with differing objectives and resources are immediately involved: children, fathers, mothers, and institutional agents. Children typically have little in the way of resources and explicit legal rights. Divorced mothers and fathers, considered as two separate groups of agents, must be viewed as having diverse objectives and resources following a divorce [and at least to some extent within intact marriages[1]]. Fathers most often have significantly greater financial resources than mothers at the time of and following the divorce [Duncan and Hoffman (1985) and R. Weiss (1984)], though the mother may garner a greater amount of loyality from the children if she has served as their primary caretaker during the marriage.[2] Finally, the legal and social system which defines the rules under which the outcome is determined, and more importantly, has implicit or explicit valuations of those outcomes, must be viewed as a fourth agent.[3] What makes child custody and child support determination such a controversial social issue and difficult analytical problem is the fact that the four agents involved are so diverse in terms of objectives and/or resources.

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[1] Current research in household consumption decisions has stressed the role of differences in preferences and resources between members of intact households in accounting for within household consumption allocations [see Manser and Brown (1980), McElroy and Horney (1981), and Chiappori (1988)]. In order to compare behavior within and outside the marriage, Weiss and Willis (1985,1989) have posited invariant preferences for mothers and fathers, with pre- and post-divorce behavior differing due to changes in resource allocations [income and custody rights] and bargaining strategies. In this paper we take the divorce as a given, and therefore need assume nothing about the relationship between pre- and post-divorce preferences and behavior of mothers and fathers.

[2] This argument is often advanced as a reason for awarding the mother physical custody under the "best interest of the child" rationale [see Weitzman (1985), Chapter 8].

[3] Mnookin and Kornhauser (1979) analyze the role of legal institutions in determing final divorce orders through the differential bargaining power given to the contestants. Elster (1989) examines the extent to which legal institutions can and should use rational decision rules in adjudicating custody cases. Cassetty (1978) and the papers in Cassetty (1983) look at the role of public policy in defining and enforcing custody and child support orders.

In this paper we examine the effect of child support orders and transfers on the post-divorce welfare levels of these four groups of agents. Throughout we will treat the post-divorce own-income levels of the parents as exogenous. We begin by specifying the preferences of the parents, which are defined over own consumption and the consumption of the child. In this view, after a divorce child consumption continues to be a public good just as it was during the marriage [see Weiss and Willis (1985,1989)]; what changes is the manner in which child expenditure decisions are made. We adopt an expenditure coordination mechanism which is consistent with the pattern of child support transfers observed in the data.

The institutional agent takes the equilibrium responses of the parents into account when determining the child support order, so that the model has a Stackelberg structure.[4] The institutional agent's preferences are represented by a linear function of the expected welfare of children, mothers, and fathers, and the sole policy instrument available to this agent is the child support order.[5] We impute the institutional agent's preference weights under different assumptions regarding his or her information set.

Institutions also play a prominent role in the theoretical and empirical analysis of divorce settlements conducted by Weiss and Willis [(1985) and especially (1989)]. In their original paper on the subject (1985), the institutional agent's role was primarily to enforce divorce settlements. In their subsequent paper (1989), they focused attention on the role of the institutional agent in settling disputed cases when the mother and father could not come to an amicable agreement [they did not consider the problem of noncompliance explicitly in that analysis]. The analysis we conduct here

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[4]The model actually has a "double" Stackelberg structure in the sense that fathers condition on the expenditure behavior of the mother and the child support order when making their transfer decision, while institutional agents condition on the expenditure behavior of the mother and the transfer decision rule of the father when determining the child support award. This recursive structure is heavily exploited in our empirical analysis.

[5]In an earlier version of this paper [Del Boca and Flinn (1991)] we also examined the custody decisions of institutional agents; in this paper we examine the choice of child support orders by the judge and the transfer decision of the father *conditional* on the fact that the mother has physical custody of the child. This custody arrangement continues to be the predominant one throughout the U.S.

should be considered as complementary to theirs, in that our attention is focused primarily on parental choices regarding compliance with orders and the effects of divorce settlements on expenditures on children. We make no distinction between settlements reached amicably or adjudicated in an adversarial procedure. Instead we view all settlements as being reached within an environment consisting of legal, political, and social institutions; these institutions as well as the individuals functioning under their aegis should collectively be viewed as the "institutional agent" referred to repeatedly in the sequel.

The compliance decision is central to our analysis, since all behavioral parameters are estimated using only compliance information from a sample of individuals under court orders to make child support payments. While a number of social scientists have investigated compliance empirically [including Chambers (1979), Beller and Graham (1985), Robins (1986), and Garfinkel and Oellerich (1989)], the focus of these studies is usually on the effects of noncompliance on the post-divorce income allocation between fathers and mothers and the enforcement problem *per se*. We have introduced a number of assumptions regarding the preferences of fathers and mothers so as to better understand the behavioral motivation for noncompliance. With such an understanding, it may eventually be possible to consider how divorce arrangements could be structured so as to increase the welfare of all or a subset of the agents involved in a divorce. We take a small step in this direction at the end of the paper.

To motivate our analysis, we present the empirical distributions of child support awards and payments in the data utilized below which are taken from a sample of divorce cases in 18 counties in Wisconsin over the period 1980-1982. These data refer to child support awards and payments in the sixth month from the time of the original divorce decree. The average [pre-transfer] income levels of divorced mothers and fathers is $\$_{1980}624$ and $\$_{1980}1194$ in these data. In Figure 1A we present the distribution of child support awards; the average award is $\$_{1980}261$, which is approximately 22 percent of the mean income of fathers. The distribution is relatively concentrated, with 57 percent of the sample having orders in the interval $[\$_{1980}100, \$_{1980}300]$.

Figure 1B contains the distribution of actual child support transfers

FIGURE 1A
Distribution of Child Support Awards

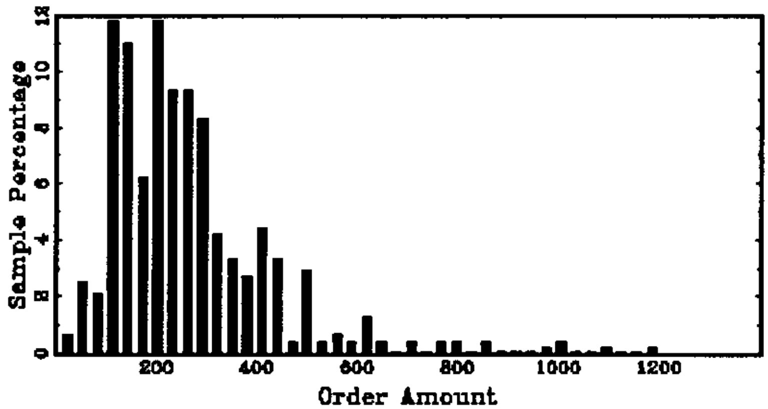


FIGURE 1B
Distribution of Child Support Payments

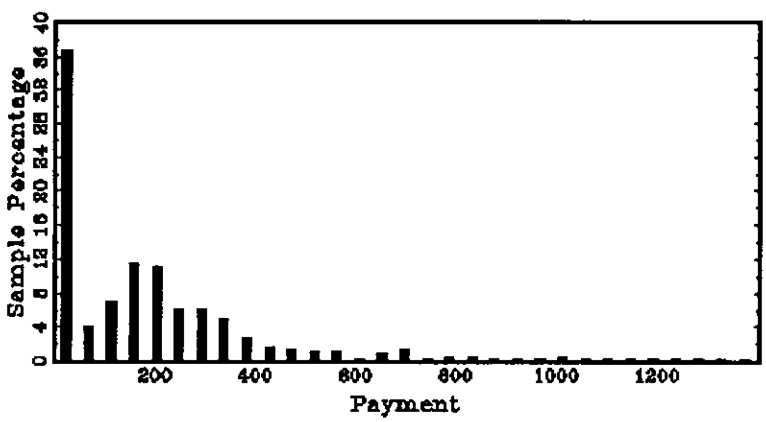
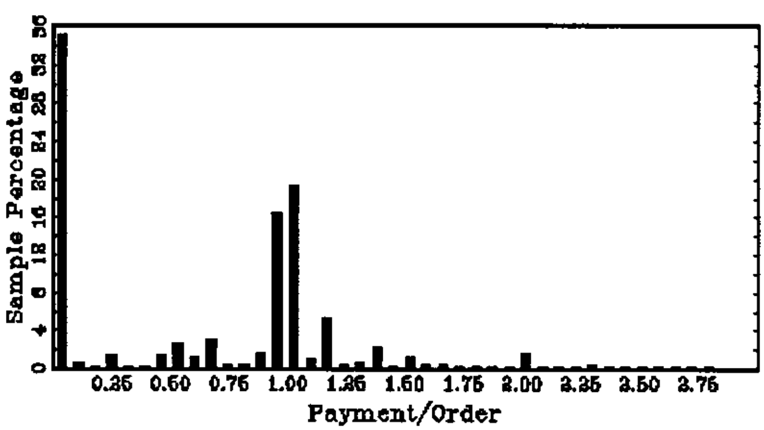


FIGURE 1C
Distribution of Payment/Order Ratio



from the noncustodial father to the custodial mother. The most notable feature of this distribution is the spike at zero payments; 35 percent of all sample fathers made *no* transfer during this month though all were under orders to do so.[6] The distribution of the ratio of payments to orders in the sixth month is presented in Figure 1C. This distribution is interesting in that while the spikes at 0 and 1 [corresponding to what we will refer to later as *exact* compliance] are its predominate feature, a significant proportion of individuals make positive payments less than the amount ordered [30 percent of the sample] and a smaller proportion make payments greater than the ordered amount [17 percent of the sample]. The model we describe and estimate below will be able to capture these qualitative features of the distribution in a parsimonious manner.

The plan of the paper is as follows. In Section 2 we provide an exposition of our modelling assumptions and characterize equilibrium expenditures of the divorced parents on the child given the child support order. Section 3 contains a discussion of the institutional agent's optimization problem under different assumptions regarding his or her information set. Section 4 sets out the econometric model used to obtain consistent estimates of parental preferences. While being of some interest in their own right, these estimates are of particular importance in assessing the implicit welfare weights attached to the parties to the divorce given the pre-transfer income distributions of the parents and the actual order. We describe the data used and all the empirical results of the analysis in Section 5. Section 6 contains a brief conclusion.

2. Monetary Transfers Between Divorced Parents

Many popular discussions of the problem of noncompliance with child support orders stress the fact that a large proportion of noncustodial parents who are legally required to make monthly monetary transfers to their former spouses in fact make no transfers whatsoever [a point which is illustrated in Figure 1B]. Nonetheless, the majority of noncustodial parents

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[6] While the large number of zero payments is to some extent an artifact of using only a one month payment period, significant numbers of individuals make no payments over periods as long as one year.

under orders to make child support payments *do* make some positive transfers to the other parent, though in many cases the amount paid is less than the ordered amount. A large proportion of noncustodial parents transfer more or less the exact amount ordered, and a not insignificant number transfer *more* than the amount ordered. In this section, we develop a simple behavioral model of the interactions between divorced parents that is consistent with these empirical facts. In the following section, we will investigate the behavior of institutional agents who make policy choices which are constrained by the behavior of the divorced parents.

Throughout the analysis, we will assume that one parent is the custodial parent [the mother]. We begin by examining the behavior of divorced parents in an environment without child support orders. Though the divorced parents no longer inhabit the same household and are assumed to have access to two independent sources of income, denoted y_m and y_f, their welfare levels are interrelated after the divorce due to the presence of a public good, the child. Let c_p denote the private consumption of parent p, and let k denote the consumption of the child. Then the utility function of parent p is assumed to be Cobb-Douglas, so

$$[1] \qquad u_p = \delta_p \ell n(c_p) + (1-\delta_p) \ell n(k), \quad \delta_p \in [0,1], \; p \in \{m,f\}.$$

A critical assumption concerns the manner in which the consumption level of the child is set. Because the mother has both physical and legal custody, we assume that all "significant" expenditures on the child must be made or approved by her. We take the extreme position that the only way in which the father may augment the consumption level of the child is by transferring money to the mother. Given the father's transfer and her own income, the mother freely allocates it on her own consumption and that of the child.[7]

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[7] In a dynamic model, the mother's choices in any period t may elicit behavioral responses from the father in latter periods which she would consider in setting period t expenditure levels. In such a situation, we might observe different expenditure levels on child consumption by custodial mothers with the same levels of total income but different amounts of child support income. However, in a static model such as the one analyzed here, such feedback is ruled out and mothers have no behavioral or legal reason for treating the two income sources differently in making expenditure decisions. For a discussion which touches on some of these points see Del Boca and Flinn (1993).

Without loss of generality, we will normalize the price of the private consumption goods of the parents and the child to unity. Given her total income level $y_m + t$, where t is the transfer from the father, the mother then chooses a level of expenditure on the child equal to $k^*(\delta_m, y_m+t) = (1-\delta_m)(y_m+t)$. The father, taking the mother's behavior as predetermined, chooses his transfer to the mother according to:

$$[2] \qquad t^*(\delta_m, \delta_f, y) = \underset{t \in [0, y_f]}{\arg\max}\ \delta_f\ \ell n(y_f - t) + (1-\delta_f)\ \ell n((1-\delta_m)(y_m+t)) ,$$

where $y = (y_m\ y_f)'$. Due to the functional forms with which we are working, it is apparent that the optimal transfer of the father to the mother is independent of the value of the mother's preference parameter, so $t^*(\delta_f, y) = t^*(\delta_m, \delta_f, y)$ for all values of δ_m. The decision rule is then characterized by:

$$[3] \qquad t^*(\delta_f, y) = \begin{cases} y_f - \delta_f y_t & \text{if } \delta_f < y_f/y_t \\ 0 & \text{if } \delta_f \geq y_f/y_t \end{cases} ,$$

where $y_t = y_m + y_f$ is aggregate parental income.

The assumption that only mothers can directly make expenditures on "child goods" leads to the prediction that we would observe positive transfers from fathers to mothers even in the absence of child support awards. Because the amount of the child support award appears nowhere in the specification, this model of transfers leads to no interesting implications regarding compliance behavior. To rectify this situation, we modify the preferences of the father so as to produce the utility function

$$[1'] \qquad u_f = \delta_f\ \ell n(c_f) + (1-\delta_f)\ \ell n(k) - \vartheta\ \mathbb{I}[t < s],$$

where s is the amount of the child support order and $\mathbb{I}[\cdot]$ is the indicator function. A father pays a fixed cost of ϑ denominated in utils if he does not fully comply with the order.[8] The cost is avoided if his transfer to the

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[8] The addition of this type of random variable to account for differential levels of program participation or noncompliance within a homogeneous population is common in the literature; see for example Moffitt (1983) and

mother meets or exceeds the court order s.[9]

In order to examine the father's behavior under the utility specification [1′], it will be useful to define his utility levels in the states of "exact" compliance with the order and his utility when the transfer $t^*(\delta_f, y)$ defined in [3] is made. [In the sequel we will often drop the explicit conditioning on the income distribution for notational simplicity.] We denote these two utility levels by $V_c(\delta_m, \delta_f) = \delta_f\ \ell n(y_f - s) + (1-\delta_f)\ \ell n(y_m + s) + (1-\delta_f)\ \ell n(1-\delta_m)$ and $V_n(\delta_m, \delta_f) = \delta_f\ \ell n(y_f - t^*(\delta_f)) + (1-\delta_f)\ \ell n(y_m + t^*(\delta_f)) - (1-\delta_f)\ \ell n(1-\delta_m) - \vartheta\ \mathbb{1}[t^*(\delta_f) < s]$. Whether "exact" compliance occurs or not depends solely on the sign of the difference $V_n(\delta_m, \delta_f, \vartheta) - V_c(\delta_m, \delta_f) = D(\delta_f) - \vartheta\ \mathbb{1}[t^*(\delta_f) < s]$. We proceed to examine this difference for three qualitatively distinct cases.

First, we consider the case in which the value of the father's preference parameter is greater than or equal to his share of total parental income. It is clear that in this case, since $t^*(\delta_f) = 0$, the father will either transfer nothing to the mother and pay the penalty of ϑ or transfer exactly the amount s so as to avoid the fixed cost ϑ. The difference between the utilities of the two choices is

$$[4a] \qquad \Delta_0(\delta_f, \vartheta) = D_0(\delta_f) - \vartheta$$
$$= \delta_f\ \{\ell n(y_f) - \ell n(y_f - s)\} + (1-\delta_f)\ \{\ell n(y_m) - \ell n(y_m + s)\} - \vartheta.$$

If we treat ϑ as a random variable which is independently and identically distributed in the population according to distribution function $G(\vartheta)$, then the probability that the father will not transfer anything to the mother in this case is

$$[5] \qquad P(t = 0 | \delta_f, \delta_f \geq y_f/(y_m + y_f)) = G(D_0(\delta_f)).$$

Dubey *et al.* (1989).

[9]It is probably easiest to think of this cost as a future penalty to be borne by the father due to his failure to comply. The penalty may be in the form of reduced income [due to a fine, interest payments on child support owed, and/or in some cases the loss of work time due to incarceration] or a reduction in the time spent with the child. Reduction in visiting time allowed to the father is an oft-cited threat and punishment utilized by custodial mothers attempting to enforce compliance [see, *e.g.*, Weitzman (1985)].

Conversely, the probability that exactly the amount s will be transferred is $1-G(D_0(\delta_f))$.

Next consider the case in which $0 < t^*(\delta_f) < s$. In such a situation, the father would transfer a positive amount to the mother even in the absence of a punishment associated with noncompliance. If the father chooses not to comply, the amount $t^*(\delta_f)$ will be transferred; by convention we will refer to such an outcome as "partial compliance." Note that under our model specification, the fixed cost ϑ is paid no matter how much is transferred to the mother as long as it is less than the amount ordered. From this perspective, partial compliance is not a manifestation of the desire to reduce the severity of a sanction, but rather is a demonstration of the fact that children remain public goods after divorce and that noncustodial parents are limited in their ability to transfer consumption directly to their children.

The value of noncompliance with the order for individuals who would partially comply is $\delta_f \ell n(y_f - t^*(\delta_f)) + (1-\delta_f) \ell n(y_m + t^*(\delta_f)) - \vartheta$. Then whether or not "exact" compliance occurs for this set of fathers depends on the sign of

$$[4b] \qquad \Delta_1(\delta_f,\vartheta) = D_1(\delta_f) - \vartheta$$
$$= \delta_f \ell n(\delta_f) + (1-\delta_f) \ell n(1-\delta_f) + \ell n(y_m+y_f)$$
$$- \delta_f \ell n(y_f-s) - (1-\delta_f) \ell n(y_m+s) - \vartheta.$$

As before, treating the cost of noncompliance as a random variable, the probability of exact compliance within this group of individuals is $1-G(D_1(\delta_f))$, and the probability of partial compliance is $G(D_1(\delta_f))$.

Finally, consider those individuals whose choice $t^*(\delta_f)$ meets or exceeds the size of the order s. In this case, the probability of exact compliance with the order will generally be zero;[10] for lack of a better term, we will refer to this situation as one of "overcompliance." For an individual to overcomply, it must be the case that

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[10]The probability of exact compliance will be zero for this group of individuals if the distributions of δ_f and/or $(y_f-s)/y_t$ are absolutely continuous and if orders are set by institutional agents without knowledge of a given father's value of δ_f. Both of these conditions are satisfied in the model developed and estimated here.

$$t^*(\delta_f) > s$$

$$\Rightarrow y_f - \delta_f y_t > s$$

$$\Rightarrow (y_f - s)/y_t > \delta_f.$$

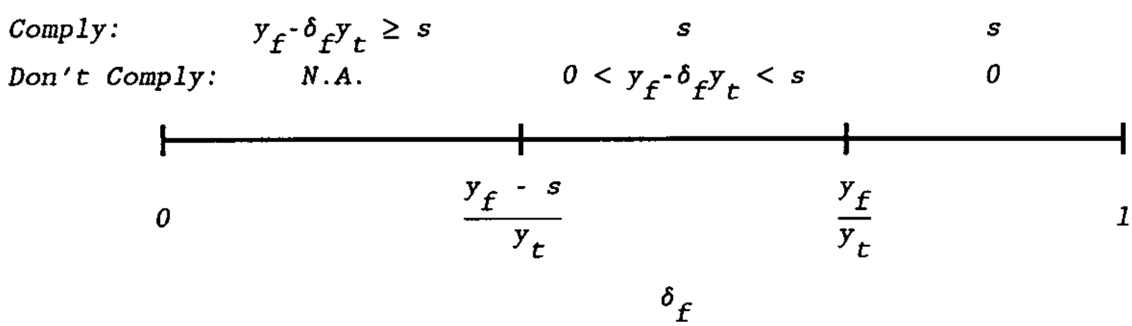
We know that in this instance the observed transfer from the father to the mother will be $y_f - \delta_f y_t$.

Figure 2 provides a summary of the three cases for a given parental income distribution y and a given order s. It is clear that if the distribution of δ_f in the population has support equal to [0,1], and if the cost of

FIGURE 2

Transfers and the Value of the Father's Preference Parameter

Transfers under Compliance and Noncompliance:



noncompliance parameter ϑ is sufficiently "dispersed" [in a sense to be made precise below], this model of the transfer decision in principle has the capacity to explain the observed fact of the simultaneous existence of no transfers, partial compliance, exact compliance, and overcompliance evidenced in the data.

3. The Determination of Child Support Orders

In this section we attempt to "rationalize" the pattern of child support awards observed in our data using a social welfare function approach [while the institutional agent's objective function need not be strictly interpretable as a social welfare function, it will be useful to employ this analogy often in what follows]. Most of our empirical analysis will be devoted to solving the *inverse optimum* problem, good explications and applications of which are contained in Christiansen and Jansen (1978) and Ahmad and Stern (1984).[11] The general approach utilized will be to consider the child support awards as solutions to an institutional agent's first order condition associated with his or her utility maximization problem. Using the first order condition, preference weights can be uniquely determined. Weights attached to the expected utility for each former household member will be computed under different assumptions regarding the institutional agent's expectations regarding parental post-divorce behavior. We will also compute optimal awards under a specific assumption regarding the distribution of welfare weights among institutional agents for purposes of comparing them with the observed orders. Specifically, we will show that observed orders are not consistent with an objective function of the institutional agent which places a weight of unity on the combined expected welfare of the mother and child and a weight of zero on the expected welfare of the father. We show that award amounts are generally *too high* to be consistent with this objective.

We begin by endowing institutional agents with an objective function whic bears a close resemblance to a Benthamite social welfare function, namely

$$W(s,y,F_\omega) = \tau_m E_{F_\omega} V_m(s,y,\omega) + \tau_f E_{F_\omega} V_f(s,y,\omega) + \tau_k E_{F_\omega} V_k(s,y,\omega), \quad [6]$$

where V_j denotes the indirect utility function for individual $j \in \{m,f,k\}$ and ω denotes the state of the world which is unknown at the time the order is

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[11]Both papers address the issue of determining the social preferences implicit in value added tax systems, one paper dealing with the case of Norway [Christiansen and Jansen] and the other the case of India [Ahmad and Stern].

set and has associated cumulative distribution function F_ω. The "welfare weights" are normalized to sum to unity; in general there is no requirement that each weight be nonnegative. The indirect utility function for the child is derived under the assumption that the child's direct utility function is simply equal to the logarithm of expenditures on him or her, or $u_k = \ell n((1-\delta_m)(y_m+t))$.

Given [6] and the behavior of divorced parents which was described in the previous section, we can derive the optimal response of institutional agents with a given set of welfare weights and information set F_ω. Under our assumptions regarding the form of the direct utility function, a number of simplifications of [6] are possible. In particular, note that the indirect utility functions of all three can be written as sums of two functions, one of which contains s but not δ_m as an argument and the other of which contains δ_m but not s as an argument. For the mother we have

$$[7] \qquad \begin{aligned} V_m(s,y,\omega) &= \delta_m \; \ell n(\delta_m[y_m+t^*(s,y,\delta_f,\vartheta)]) + \\ &\quad + (1-\delta_m) \; \ell n((1-\delta_m)[y_m+t^*(s,y,\delta_f,\vartheta)]) \\ &= R_m(\delta_m) + \tilde{V}_m(s,y,\delta_f,\vartheta); \end{aligned}$$

where:
$$R_m(\delta_m) = \delta_m \; \ell n(\delta_m) + (1-\delta_m) \; \ell n(1-\delta_m)$$
$$\tilde{V}_m(s,y,\delta_f,\vartheta) = \ell n(y_m+t^*(s,y,\delta_f,\vartheta)).$$

The indirect utility function of the child of course shares the separability property referred to above, so that

$$[8] \qquad \begin{aligned} V_k(s,y,\omega) &= \ell n((1-\delta_m)[y_m+t^*(s,y,\delta_f,\vartheta)]) \\ &= R_k(\delta_m) + \tilde{V}_k(s,y,\delta_f,\vartheta); \end{aligned}$$

where:
$$R_k(\delta_k) = \ell n(1-\delta_m)$$
$$\tilde{V}_k(s,y,\delta_f,\vartheta) = \ell n(y_m+t^*(s,y,\delta_f,\vartheta)).$$

Finally, the indirect utility function of the father is

$$[9] \quad V_f(s,y,\omega) = \delta_f \, \ell n(y_f - t^*(s,y,\delta_f,\vartheta)) + (1-\delta_f) \, \ell n((1-\delta_m)[y_m + t^*(s,y,\delta_f,\vartheta)]) - \vartheta \, \mathbb{I}[t^*(s,y,\delta_f,\vartheta) < s] = R_f(\delta_m,\delta_f) + \tilde{V}_f(s,y,\delta_f,\vartheta);$$

where: $R_f(\delta_m,\delta_f) = (1-\delta_f) \, \ell n(1-\delta_m)$

$$\tilde{V}_f(s,y,\delta_f,\vartheta) = \delta_f \, \ell n(y_f - t^*(s,y,\delta_f,\vartheta)) + (1-\delta_f) \, \ell n(y_m + t^*(s,y,\delta_f,\vartheta)) - \vartheta \, \mathbb{I}[t^*(s,y,\delta_f,\vartheta) < s].$$

Notice that $\tilde{V}_m(s,y,\delta_f,\vartheta) = \tilde{V}_k(s,y,\delta_f,\vartheta)$; call this function $\tilde{V}^*(s,y,\delta_f,\vartheta)$. Define the sum of the welfare weights for mothers and children to be $\tau^* = \tau_m + \tau_f$. The institutional agent's objective function simplifies to

$$[6'] \quad W(s,y,F_\omega) = E_{F_{\omega'}} \left\{ \tau_m R_m(\delta_m) + \tau_f R_f(\delta_m,\delta_f) + \tau_k R_k(\delta_m) \right\} + E_{F_{\omega''}} \left\{ \tau^* \tilde{V}^*(s,y,\delta_f,\vartheta) + \tau_f \tilde{V}_f(s,y,\delta_f,\vartheta) \right\};$$

where $F_{\omega'}$ denotes the judge's information set regarding values of δ_m and δ_f and $F_{\omega''}$ denotes the judge's information set regarding values of δ_f and ϑ.

Given differentiability of the function W, the solution to the institutional agent's optimization problem is obtained from the first order condition,

$$[10] \quad 0 = \frac{\partial W(s,y,F_\omega)}{\partial s} = \left(\frac{\partial}{\partial s}\right) E_{F_{\omega''}} \left\{ \tau^* \tilde{V}^*(s,y,\delta_f,\vartheta) + \tau_f \tilde{V}_f(s,y,\delta_f,\vartheta) \right\}$$

$$\Rightarrow \tau^* = \frac{\left(\frac{\partial}{\partial s}\right) E_{F_{\omega''}} \tilde{V}_f(s,y,\delta_f,\vartheta)}{\left(\frac{\partial}{\partial s}\right) E_{F_{\omega''}} \left\{ \tilde{V}_f(s,y,\delta_f,\vartheta) - \tilde{V}^*(s,y,\delta_f,\vartheta) \right\}},$$

where the last equality follows from the normalization $1 = \tau^* + \tau_f$.

There are some noteworthy features of this inverse optimum problem. First, it is not possibly to separately identify the welfare weights attached to the mother and the child. This result, which follows from our functional form assumptions, is consistent with the claim that child support and alimony are for all intents and purposes indistinguishable [except with respect to tax liability] since in either case the custodial parent is the agent responsible for allocating total household income and is under no legal obligation to spend it in any particular manner.[12] Second, since the father's child support transfer decision is independent of the mother's preference parameter, and since the child support order only affects the interpersonal welfare distribution through the father's transfer decision, the judge's optimal child support order is only a function of the joint distribution of the father's preference parameter and the direct cost of noncompliance. Third, the optimal child support order can be expected to critically depend on the nature of the judge's information set.

The solutions to the inverse optimum problem considered are obtained under the assumption that each judge treats parents as identical in the sense of being random draws from the joint distribution of $(\delta_m, \delta_f, \vartheta)$; this implies that no information concerning these parameter values can be credibly transmitted to the institutional agent at the time of adjudication of the case. We have already noted that the mother's preference parameter cannot affect the judge's allocation decision in any manner, so pre-order information concerning δ_m is of no value to the judge in determining s. Assume that the parameter ϑ is not known by any agent [including the father] prior to the setting of the order. The question remains as to whether information regarding δ_f can be credibly conveyed.

It may be reasonable to think that during the course of a marriage, whether ending in divorce or not, parents would acquire information about the value of their spouse's preference parameter. The question arises as to whether such private information can credibly be conveyed to the institutional agent. Consider the case in which $\tau^* = 1$; in this case the objec-

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[12]For discussions of this point see Lazear and Michael (1988, Chapter 8) and Del Boca and Flinn (1993).

tives of the mother and the institutional agent coincide. In such a situation it is optimal for the mother to truthfully reveal the father's value of δ_f - misrepresentation only leads to a reduction in her expected welfare. Conversely, the father will have an incentive to misrepresent his value of δ_f in such a case. Only when $\tau^* = 1$ or $\tau_f = 1$ will the institutional agent's objective correspond to those of one of the parents; in all other cases *both* parents will have an incentive to provide misleading information to the judge concerning the behavior of the father. Unless a mechanism can be found which insures truth-telling on the part of the parents, the judge must discount parental claims regarding the value of δ_f.[13]

We now turn to the consideration of the two specifications of $F_{\omega''}$ which will be used to construct a distribution of welfare weights across institutional agents. In the sequel we will assume that the parameters δ_f and ϑ are independently distributed in the population,[14] and in the information set of the institutional agent. In taking expectations with respect to δ_f in [10], the institutional agent is assumed to use the true population distribution of δ_f, the CDF of which is given by H. The specifications considered differ in their assumptions regarding the distribution of the direct cost of noncompliance utilized by the institutional agent. In the first specification, the judge acts as if all fathers have a value of $\vartheta = \infty$; if this were literally true noncompliance would never occur as long as the child support order was less than the father's income. In the second specification, the judge is assumed to utilize the true population distribution $G(\vartheta)$ in determining the optimal child support order.

Under the first specification with $\vartheta = \infty$ for all fathers, the child

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[13] Another justification for treating all fathers as random draws from a fixed distribution may be that when changing status from that of a father in an intact household to that of a noncustodial parent, the father's own preference weight may change in an at least partially unpredictable manner. In such a situation, *either* parent's predivorce information regarding δ_f, even if truthfully revealed, may be of limited value to the institutional agent.

[14] This assumption is made primarily for purposes of conducting the empirical work below. Since the parameter ϑ is never directly observed and δ_f can only be directly imputed from the transfer decision of a portion of the sample members, identification of any form of dependence between these two random variables is likely to be extremely tenuous. The reader can think of the independence assumption as a type of normalization.

support transfer of the father will be equal to $\max\{s, y_f - \delta_f y_t\}$. It is tedious but straightforward to show that in this case the function $E_{F_{\omega''}} \left\{ \tau^* \tilde{V}^*(s,y,\delta_f,\infty) + \tau_f \tilde{V}_f(s,y,\delta_f,\infty) \right\}$ is globally concave in s on the interval $[0, y_f]$, so there exists one unique optimal order. Furthermore, since $E_{F_{\omega''}} \tilde{V}^*(s,y,\delta_f,\infty)$ is nondecreasing in s and $E_{F_{\omega''}} \tilde{V}_f(s,y,\delta_f,\infty)$ is nonincreasing in s, from the last line of [10] we see that all welfare weights must be nonnegative.

The inverse optimum problem is not as simple to characterize in the second specification, in which the population distribution of ϑ is used in determining the optimal order.[15] When costs of noncompliance are not infinite, then it is not generally true that the function given in the second line of [10] is globally concave in s; to insure that the welfare weight is well-defined in this case it is in principle necessary to establish that the second partial of the welfare function with respect to s evaluated at the observed order is negative. Moreover, neither function $E_{F_{\omega''}} \tilde{V}^*(s,y,\delta_f,\vartheta)$ nor $E_{F_{\omega''}} \tilde{V}_f(s,y,\delta_f,\vartheta)$ is monotone in s, therefore it is possible to obtain a negative value of τ^* or τ_f. When either coefficient τ^* or τ_f is negative, *both* parents' and the child's expected welfare can be increased by a change in the observed order. Of course, since the objective function of the institutional agent [6] need not be strictly interpreted as a social welfare function, negative weights are still consistent with the assumption of utility maximization. We will return to this point in the empirical section below.

After solving the inverse optimum problem for the two different specifications of the judge's information set, we will be left with the quandry as to which set of preference weights to give the most credibility. While the second specification has the advantage of being consistent with rational

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[15] When the institutional agent considers the possibility of noncompliance in setting the order, his or her problem closely resembles that of a government planner determining optimal tax functions in the presence of tax evasion [see, *e.g.*, Sandmo (1981) and Cowell and Gordon (1988)]. Much of that literature allows the institutional agent access to policy instruments which partially determine the distribution of noncompliance costs; in our analysis this distribution is treated as exogenous.

behavior on the institutional agent's part within the narrow confines of the model proposed here, making explicit allowance for noncompliance in setting child support awards may induce fathers to individually or collectively engage in noncompliance so as to reduce future child support obligations. Furthermore, the institutional agent(s) setting the award [typically an individual judge or set of legislators] may be different than the set of institutional agents charged with the responsibility of enforcement. Then it may not be unreasonable to view the first set of weights as truly reflective of the preferences of institutional agents charged with issuing child support orders and assuming perfect enforcement. Differences in the first and second set of weights then would indicate the extent to which noncompliance phenemona subvert their intentions.

4. Econometric Model of Child Support Transfers

The sample can be thought of as being comprised of four groups of individuals, which are [*G1*] those fathers making no payment in the month, or $t = 0$; [*G2*] those fathers "partially complying" in the sense of making a transfer which is positive but less than the stipulated amount, or $0 < t < s$; [*G3*] those fathers making a payment exactly equal to the stipulated amount, or $t = s$; and [*G4*] those fathers "overcomplying" in the sense of making a transfer which is greater than the stipulated amount, or $t > s$. The contribution of members of these groups to the sample likelihood function is as follows.

G1: No Transfer

Only those fathers with preference parameter $\delta_f \geq y_f/y_t$ would make no transfer if it were not stipulated. From [4a], we have that conditional on δ_f, $\delta_f \geq y_f/y_t$, and the characteristics y and s, the probability of noncompliance is given by

$$P(t = 0|\delta_f,\delta_f \geq y_f/y_t,y,s) = P(\vartheta \leq D_0(\delta_f,y,s))$$
$$= G(D_0(\delta_f,y,s);\theta_G),$$

where θ_G is a finite-dimensional parameter vector which completely characterizes the distribution function G. With H denoting the distribution function of the preference parameter δ_f in the population of noncustodial fathers, and with θ_H denoting the finite-dimensional parameter vector which completely characterizes H, we have that the probability of a zero payment for a father with state variables (y,s) is

$$P(t = 0|y,s,\theta_G,\theta_H) = \int_{y_f/y_t}^{1} G(D_0(\delta_f,y,s);\theta_G)\ dH(\delta_f;\theta_H).$$

This probability represents the contribution of a member of *G1* to the sample likelihood, which we denote by L_{G1}.

G2: Partial Compliance

Individuals partially comply when they would voluntarily make a positive transfer to the mother less than the amount stipulated and when the direct cost of noncompliance is sufficiently low. A necessary condition for individuals to partially comply is for the value of their preference parameter to lie in the interval $((y_f-s)/y_t, y_f/y_t)$. The probability that such an individual will not comply with the order is given by $G(D_1(\delta_f,y,s);\theta_G)$. For an individual who partially complies, we can impute the value of his preference parameter since we observe his transfer and the income distribution of the parents. Since

$$t = y_f - \delta_f y_t,$$

$$\Rightarrow \delta_f = (y_f-t)/y_t.$$

The probability density function for the transfer t among this group of fathers is then given by

$$\tilde{h}(t;y,\theta_H) = h((y_f-t)/y_t;\theta_H)\ |\partial\delta_f/\delta t|$$

$$= h((y_f-t)/y_t;\theta_H)\ /\ y_t.$$

The contribution to the likelihood of an individual who partially complies is then equal to the product of the probability density function of the transfer and the probability that the noncompliance cost is sufficiently low given the implicit preference parameter of the father, or

$$L_{G2} = G(D_1((y_f - t)/y_t, y, s); \theta_G)\ \tilde{h}(t; y, \theta_H).$$

G3: Exact Compliance

It is necessary to distinguish between two distinct types [in terms of δ_f] of fathers belonging to this group. One subgroup consists of those who who would not make a positive transfer if not ordered to do so; these fathers have values of the preference parameter contained in the interval $[y_f/y_t, 1]$. The other subgroup consists of fathers who would make positive transfers even if not required to do so, but for less than the amount s; these fathers have values of the preference parameter which lie in the interval $((y_f - s)/y_t, y_f/y_t)$. The probability that a member of the first set of fathers exactly complies with the order is given by

$$P(t = s | \delta_f, \delta_f \in [y_f/y_t, 1], y, s, \theta_G) = 1 - G(D_0(\delta_f, y, s); \theta_G),$$

while the probability that a member from the second set of fathers exactly complies is given by

$$P(t = s | \delta_f, \delta_f \in ((y_f - s)/y_t, y_f/y_t), y, s, \theta_G) = 1 - G(D_1(\delta_f, y, s); \theta_G).$$

The unconditional probability of exact compliance, which is the likelihood contribution L_{G3}, is then

$$P(t = s | y, s, \theta_G, \theta_H) = \int_{y_f/y_t}^{1} \{1 - G(D_0(\delta_f, y, s); \theta_G)\}\ dH(\delta_f; \theta_H) + \int_{(y_f - s)/y_t}^{y_f/y_t} \{1 - G(D_1(\delta_f, y, s); \theta_G)\}\ dH(\delta_f; \theta_H).$$

G4: Overcompliance

When a father transfers more than is stipulated, we are able to discern his exact value of δ_f as was true in the partial compliance case. Unlike the partial compliance case, we learn nothing about the distribution of ϑ from individuals who overcomply since the probability of overcompliance depends only the father's value of δ_f and the state variable y and s. Thus the likelihood contribution for members of this group is simply

$$L_{G4} = \tilde{h}((t;y,\theta_H).$$

With all the required pieces defined, the sample log likelihood function is given by

$$\mathcal{L}(\theta_G,\theta_H) = \sum_{\{t=0\}} \ln(L_{G1}) + \sum_{\{0<t<s\}} \ln(L_{G2}) + \sum_{\{t=s\}} \ln(L_{G3}) + \sum_{\{t>s\}} \ln(L_{G4}).$$

The model is completely characterized by the parameters which describe the distributions of the fathers preference parameter and the direct cost of noncompliance. Let $\theta \equiv (\theta'_G\ \theta'_H)'$. Then the maximum likelihood estimate of the parameter vector θ is given by $\hat{\theta} = \arg\sup_{\theta\in\Omega} \mathcal{L}(\theta)$, where Ω is the parameter space, the characteristics of which are determined by the functional forms of the distribution functions G and H.

For the econometric model to be logically consistent, we must restrict our choice of G, the distribution of the direct cost of noncompliance, to those parametric distributions which have support on the positive real line. Similarly, our choice of H must come from the set of parametric distributions which have support on the unit interval. Realistically speaking, the distributions we choose must be characterized by a very low dimensional parameter vector if we are to have any hope of precisely estimating the parameter vectors characterizing the distributions. This is especially true with respect to the distribution of ϑ, since this random variable is never directly observed. In the case of the random variable δ_f, its value is directly imputable for the portion of the sample which partially- or over-complies; for this reason, we can expect precise estimation of θ_H to be an easier task than for θ_G when θ_G and θ_H are similiarly dimensioned.

We have estimated the econometric model for two choices of functional forms for G and have utilized a beta distribution and a restricted beta distribution [the power function distribution] for H. The two distributions used for G are the exponential, which has a CDF given by

$$G(x;\theta_G) = 1 - \exp(-\theta_1 x); \quad \theta_1 > 0; \quad x > 0;$$

and the half-normal distribution, with CDF given by

$$G(x;\theta_G) = 2\ (\Phi(x/\theta_1) - .5); \quad \theta_1 > 0; \quad x > 0;$$

where Φ denotes the cumulative distribution function of a standard normal random variable. The CDF associated with δ_f is given by

$$H(x;\theta_H) = B(\theta_2,\theta_3)^{-1} \int_0^x \xi^{(\theta_2-1)} (1-\xi)^{(\theta_3-1)} d\xi;$$

$$\theta_2 > 0; \quad \theta_3 > 0; \quad x \in [0,1];$$

where the normalizing constant $B(\theta_2,\theta_3) = \int_0^1 \xi^{(\theta_2-1)} (1-\xi)^{(\theta_3-1)} d\xi$ is termed the beta function. When the parameter $\theta_3 = 1$, the beta specializes to the power function distribution, which has the CDF

$$H(x;\theta_H) = x^{\theta_2}; \quad \theta_2 > 0; \quad x \in [0,1].$$

Under these distributional assumptions, the log likelihood function $\mathcal{L}$ is characterized by [at most] three parameters, and the parameter space $\Omega = \mathbb{R}^3_+$. The log likelihood is continuously differentiable over the interior of the parameter space, and all standard regularity conditions for consistency and asymptotic normality of the maximum likelihood estimator of θ will be satisfied provided that the true parameter vector θ_0 is an interior point of Ω. While $\mathcal{L}(\theta)$ is not globally concave over Ω, we found that the maximum likelihood estimates reported below were attained no matter which point in Ω was used as a starting value in the optimization algorithm.[16]

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[16]For each of the four specifications of the structural model which were estimated, between five and ten different starting values were used.

5. Empirical Results

The data used in this paper are gathered from court and payment records of divorce, separation, annulment, and paternity cases in 18 counties in Wisconsin. The population of cases from which the original sample was drawn is defined as all family court cases involving a child under 18 years of age. In each of the 18 counties between 150 and 200 cases over the period 1980-1986 were randomly selected, with approximately equal numbers of cases being selected each year. The source of virtually all information available in the survey is administrative records; consequently, there is extensive information regarding monthly child support order and payment amounts and court appearances and very little regarding the demographic characteristics of the former household members.

We work with a relatively small subset of the original sample in the empirical work reported below. Naturally, we restrict our sample to divorce cases, since divorce is a basic premise of the model. Furthermore, only cases in which mothers were awarded sole physical custody were selected,[17] and all cases are from the years 1980-82 when "mandatory guidelines" regarding the setting of child support orders were not operative.[18] To increase within-sample homogeneity for purposes of conducting the behavioral analysis only divorced parents with one child were chosen for inclusion in our sample.

Due to the extensive amount of missing data on the few demographic variables available, the empirical analysis utilizes only information on the incomes of the parents at the time of the divorce order, the size of the monthly support order, and the actual payment made in the sixth month from

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[17] Of the total sample of divorce cases from the 1980-1982 period involving one child, approximately 85 percent stipulated a custody arrangement of this type.

[18] Since 1984 most child support orders in the State of Wisconsin have been determined mechanically by a rule which specifies the ordered amount to be a fixed proportion of the noncustodial parent's gross income [in cases of sole physical custody], where the proportion is an increasing function of the number of children involved in the action. For purposes of analyzing child support orders in the absence of external constraints on the institutional agent's choice, we wished to exclude cases adjudicated under these conditions.

the beginning of the child support obligation period.[19] The selection of the sixth month was largely arbitrary, though not completely. We attempted to choose a period which was not too close to the start-up date [so as to preclude procedural problems faced by parents and institutions at the initiation of this process unduly influencing behavioral inferences] and not too distant from the onset of obligations [so that the history of the payment process would not be the dominate determinant of the payments made in the reference month[20]].

The final sample consists of 482 cases.[21] All the data are expressed in terms of 1980 dollars. Mothers and/or fathers who reported a monthly income of less than $\$_{1980}280$ dollars at the time of the divorce settlement were assigned a monthly income equal to $\$_{1980}280$ under the rationale that potential welfare payments and/or minimum wage earnings were available which had at least that value.[22] The assignment of $\$_{1980}280$ was made for 18 percent of the mothers and 3 percent of the fathers in the final sample.

We first turn to a description of the data. Table 1 contains some summary statistics for the total sample and for four groupings of sample members defined in terms of the relationship between the amount transferred and the amount owed by the father [note that all amounts are expressed in hundreds of 1980 dollars]. Over the total sample, the pretransfer income of fathers [$\$_{1980}1194$] is 91 percent higher than the pretransfer income of

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[19] In previous empirical analyses of the compliance decision [Del Boca and Flinn (1991)] using slightly different samples and variable definitions than those employed here, we found that the age and education distributions of the parents, age of the child, and the duration of the marriage had little effect on compliance behavior when conditioning upon the parental income distribution and the amount of the child support order.

[20] In a fully dynamic model of the interactions between divorced parents, the history of the order and payment process could be expected to strongly influence the behavior of the divorced parents as each carries out actions which punish or reward the ex-spouse for previous transfers and/or expenditures on the children.

[21] We also excluded cases in which the father transferred more than three times the amount owed in the sixth month of the obligation period. This final inclusion condition resulted in the loss of 7 cases from the prior total of 489.

[22] Variations in this figure of plus or minus $\$_{1980}50$ had no substantial effect on any behavioral inferences drawn in the analysis below.

TABLE 1

Descriptive Statistics

(All Amounts in 100's of 1980 Dollars)

Variable	*Mean*	*St. Dev.*	*Minimum*	*Maximum*
		Total (N = 482)		
t	1.747	2.062	0.000	18.000
s	2.614	1.645	0.080	12.000
y_m	6.247	3.142	2.800	26.130
y_f	11.939	7.805	2.800	99.000
		t = 0 (N = 170)		
s	2.438	1.718	0.080	10.830
y_m	6.131	3.038	2.800	22.430
y_f	12.085	7.863	2.800	64.000
		$0 < t < s$ (N = 147)		
t	2.216	1.491	0.150	9.000
s	2.862	1.537	0.650	9.880
y_m	6.320	2.880	2.800	16.030
y_f	11.772	8.595	2.800	99.000
		t = s (N = 84)		
t=s	2.301	1.347	.400	8.000
y_m	6.552	3.069	2.800	16.380
y_f	12.205	7.404	2.800	57.510
		$t > s$ (N = 81)		
t	3.986	2.707	.260	18.000
s	2.860	1.871	.250	12.000
y_m	6.041	3.844	2.800	26.130
y_f	11.658	6.607	2.800	50.780

mothers [$\$_{1980}625$]. Average child support payments [$\$_{1980}175$] are only 67 percent of average child support orders [$\$_{1980}261$]. There is substantially more dispersion in the distribution of child support transfers than in the distribution of orders [as is evident from examination of Figures 1A and 1B], primarily because of the large number of sample members [35 percent] who make no transfer in the reference month. The coefficient of variation associated with the pretransfer distribution of mother's income is quite similar to the coefficient of variation associated with the pretransfer distribution of father's income.

Looking across the lower four panels of Table 1, we find that there are few notable differences in means and standard deviations across the four groups. The pretransfer income of fathers has a somewhat higher mean in the groups which make transfers of either zero or the ordered amount s. As one would expect, the group which "overcomplies" has a substantially higher mean transfer and exhibits more variability in transferred amounts than do the other groups.

In Tables 2 and 3 we present some descriptive evidence on the relationship between child support orders and transfers and the other variables included in the analysis. In each table OLS estimates of various regression functions are presented; the reported coefficients, standard errors, and hypothesis tests are consistent under the assumption that the error terms are independent across observations in the sample and are mean independent of the regressors. No assumptions are made regarding the variances of the error terms except that they are finite. It is interesting to note that the regression function estimates given in Table 2 can be legitimately viewed as approximations to the behavioral rules of noncustodial fathers and institutional agents within the context of the model we have developed.[23]

[23]This is due to the fact that the state variables which characterize the institutional agent's problem are the parental incomes, which are regressors appearing in the specifications reported in columns 1 through 3 of Table 2. Similarly, the state variables characterizing the noncustodial father's transfer decision are s and y, which are included in all specifications in columns 4 through 6. In our model there exist no unobservable characteristics associated with the institutional agent or the father [which would be included in the error terms of the regression functions] which are not independent of the observed state variables. Therefore the assumption of mean independence of the error term is not inconsistent with the economic

Table 2 contains regression function estimates in which the dependent variable is either the child support order or the actual transfer. As we can see from the results in columns 1 through 3, the father's income at the time of the divorce settlement is an important determinant of the child support order. Conversely, the mother's income at the time of the divorce is not an important determinant of the order. Qualitatively these findings are consistent with the relationships between these variables which would be generated using the "mandatory guidelines" adopted by the State of Wisconsin in the mid-1980's; these prescribed that child support orders only be a function of the [noncustodial] father's income and the number of children covered under the order [which is one for all cases in our sample].

The results reported in column 2 indicate that the ordered amount is better described as a function of linear and quadratic terms in the income of the father rather than solely a linear term. The signs on the coefficients associated with the functions of father's income indicate that child support orders are concave in this variable. The test statistic reported at the bottom of column 2 has a $\chi^2(2)$ distribution under the null hypothesis that all quadratic terms have associated coefficients of zero.[24] In column 3 we add the interaction between the pretransfer incomes of the father and the mother. The test statistic reported at the bottom of this column has a $\chi^2(1)$ distribution under the null hypothesis that the interaction term should not appear in the regression function which includes the linear and quadratic functions of parental incomes; apparently we are justified in ignoring this interaction in describing child support orders using the regression function approach.

In columns 4 through 6 of Table 2 we present regression function estimates of child support transfers as functions of the parental income distribution and the child support order. Looking across these three columns

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model.

[24]The test statistics reported at the bottom of certain columns in Tables 2 and 3 are computed under the null hypothesis that any coefficients associated with variables appearing in that column's specification and the specification in the column immediately to the left of it are jointly equal to zero. All these test statistics have distributions which are $\chi^2(m)$ under the null hypothesis, where m is the number of coefficients jointly equal to zero under the null.

TABLE 2

OLS Regression Estimates of Child Support Order and Child Support Transfer Functions

(Eicker-White Asymptotic Standard Errors in Parentheses)

	Child Support Orders $E(s)$			*Child Support Transfers* $E(t)$		
	1	*2*	*3*	*4*	*5*	*6*
Constant	1.921 (.337)	.690 (.292)	.559 (.527)	-.187 (.291)	.140 (.497)	.980 (.523)
s				.727* (.118)	.740* (.316)	.534 (.296)
y_m	-.032 (.021)	-.062 (.052)	-.039 (.090)	.027 (.027)	-.032 (.067)	-.207* (.108)
y_f	.074* (.027)	.229* (.027)	.239* (.051)	-.011 (.011)	-.029 (.021)	-.036 (.041)
$s^2/100$					.051 (4.782)	1.987 (5.387)
$y_m^2/100$		.174 (.227)	.134 (.233)		.345 (.375)	.643 (.373)
$y_f^2/100$		-.248* (.041)	-.253* (.049)		.026 (.023)	.034 (.026)
$sy_m/100$						3.164 (2.642)
$sy_f/100$						-.738 (.981)
$y_m y_f/100$			-.148 (.630)			.401 (.348)
Test Stat. [see footnote 24 in text]		*37.003* *[p<.0001]*	*.055* *[p=.814]*		*2.138* *[p=.544]*	*4.265* *[p=.234]*

we see that the only reasonably strong determinant of transfers in these regression functions is the size of the order [and then only the linear term]. Given the behavioral model of compliance developed above, we feel that the lack of significant determinants of child support transfers indicates that a regression function comprised of second-order polynomials in the state variables provides a poor approximation to the true population conditional expectation function $E(t|y,s) = \iint t^{**}(\delta_f,\vartheta,y,s)\ dH(\delta_f;\theta_H)\ dG(\vartheta;\theta_G)$, where t^{**} is the transfer rule completely determined by the values of the two random variables and the parental income distribution and child support order.

In Table 3 we provide more descriptive evidence regarding the relationship between payments, orders, and the parental income distribution. In columns 1 through 3 we have regressed the indicator variable associated with making a positive payment on polynomials in the state variables. Summarizing these results, the probability of a positive transfer appears to be a concave function of the order and a convex function of the father's income. The results in column 3 indicate that allowing for higher order interactions between the state variables is statistically important in accounting for the probability of a positive transfer.

Columns 4 through 6 contain estimates of the regression function of transfers *conditional* on the transfer being positive; this function is estimated using the subsample of 312 cases in which the father made a positive transfer in the sixth month. As was the case in columns 4 through 6 of Table 2, the only consistently strong determinant of the size of a positive transfer is the size of the order. It also continues to be true that only the coefficient associated with s is statistically significant. As before, we attribute the lack of significance of the regression coefficients to the poor quality of the quadratic regression function as an approximation to the population conditional expectation function.

As we indicated in Section 4, the behavioral model of child support transfers was estimated under four different functional form assumptions regarding the distributions of the two random variables which appear in the model. The maximum likelihood estimates of the four specifications along with their associated asymptotic standard errors appear in Table 4. One attractive feature of these results is the relative precision with which all

TABLE 3

OLS Regression Estimates of the Probability of a Positive Transfer and the Transfer Function given Positive Transfers

(Eicker-White Asymptotic Standard Errors in Parentheses)

	Prob. of a Transfer $E(\mathbf{1}[t>0]) = P(t>0)$			*Transfer Given Positivity* $E(t \mid t>0)$		
	1	*2*	*3*	*4*	*5*	*6*
Constant	.575 (.067)	.518 (.107)	.723 (.157)	-.174 (.244)	.674 (.362)	.104 (.530)
s	.029 (.015)	.128* (.040)	.117* (.051)	1.051* (.077)	.687* (.179)	.696* (.213)
y_m	.005 (.007)	.001 (.019)	-.041 (.026)	.007 (.026)	-.080 (.065)	-.020 (.121)
y_f	-.003 (.003)	-.013 (.007)	-.024 (.012)	-.002 (.008)	.001 (.024)	.062 (.038)
$s^2/100$		-1.052* (.444)	-.789 (.562)		4.245 (2.423)	5.900 (3.533)
$y_m^2/100$		.020 (.098)	.089 (.105)		.506 (.392)	.408 (.476)
$y_f^2/100$		.014* (.007)	.021* (.009)		-.004 (.022)	-.035 (.024)
$sy_m/100$			.201 (.432)			.123 (2.792)
$sy_f/100$			-.129 (.183)			-.946 (1.260)
$y_m y_f/100$			-.216* (.107)			-.400 (.347)
Test Stat. [see footnote 24 in text]		*7.361 [p=.061]*	*8.787 [p=.032]*		*5.172 [p=.160]*	*3.743 [p=.291]*

parameters are estimated.

Recall that the parameter θ_1 characterizes the distribution of the direct cost of noncompliance to the noncustodial father measured in utils. As we explained above, we can expect it to be difficult to precisely identify the form of the distribution function of this random variable since ϑ is never directly observed. However, across the four specifications of the behavioral model at least the median of the distribution appears to be stable, assuming the values .052, .059, .055, and .063. Other summary measures such as means and variances are less stable across the four specifications, however.

The parameters θ_2 and θ_3 describe the distribution of the father's preference parameter δ_f in the population. Figures 3A-3D depict the probability density functions of this random variable implied by the point estimates associated with specifications 1-4, respectively. Specification 3A noticably differs from 3B only in the upper tail of the distribution, and the same is true when we compare 3C and 3D. In both the cases of exponentially distributed and half-normally distributed ϑ, likelihood ratio tests indicate that the power function distribution assumption regarding δ_f should be rejected. The likelihood ratio test statistic computed from columns 2 and 1 of Table 4 is equal to 7.278; the probability of this value under the null is .007. Similarly, the likelihood ratio test statistic computed from columns 4 and 3 is equal to 5.852; the probability of obtaining this value under the null is .016. In interpreting this result, recall that the individuals most likely to make no transfer or to partially comply are drawn from the upper tail of the preference parameter distribution. Since 35 percent of the sample make no transfer and 30 percent partially comply, we should expect variations in upper tail behavior of the preference parameter distribution to strongly affect the predictive performance of the model.

While the densities plotted in Figures 3A-3D show a large concentration of the population of noncustodial fathers in the upper tail of the preference parameter distribution, one should not draw the inference that divorced fathers are less concerned with the welfare of their children than are divorced mothers for at least two reasons. First, the distribution estimated refers only to the population of *noncustodial* fathers. If the weight given to the child's welfare by a divorced parent is an increasing function of the

TABLE 4

ML Estimates of the Child Support Transfer Decision
(Asymptotic Standard Errors in Parentheses)

(N = 482)

Parameter	*Distribution Function of* ϑ			
	Exponential		*Half-Normal*	
	1	*2*	*3*	*4*
θ_1	13.371	11.679	.082	.094
	(1.770)	(1.586)	(.011)	(.013)
θ_2	2.356	1.938	2.311	1.937
	(.140)	(.183)	(.136)	(.183)
θ_3	1.000	.738	1.000	.761
		(.080)		(.084)
$\mathcal{L}(\hat{\theta})$	-527.472	-523.833	-530.176	-527.250

FIGURE 3A
PDF of δ_f from Col. 1

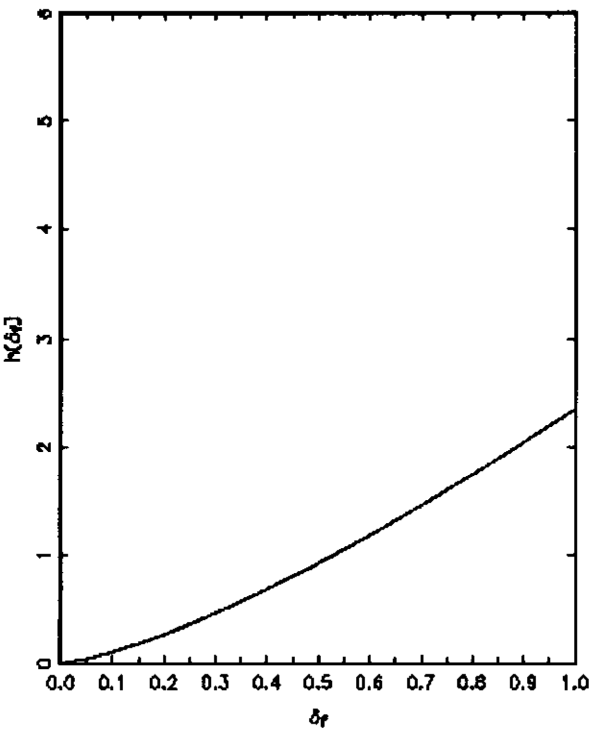


FIGURE 3B
PDF of δ_f from Col. 2

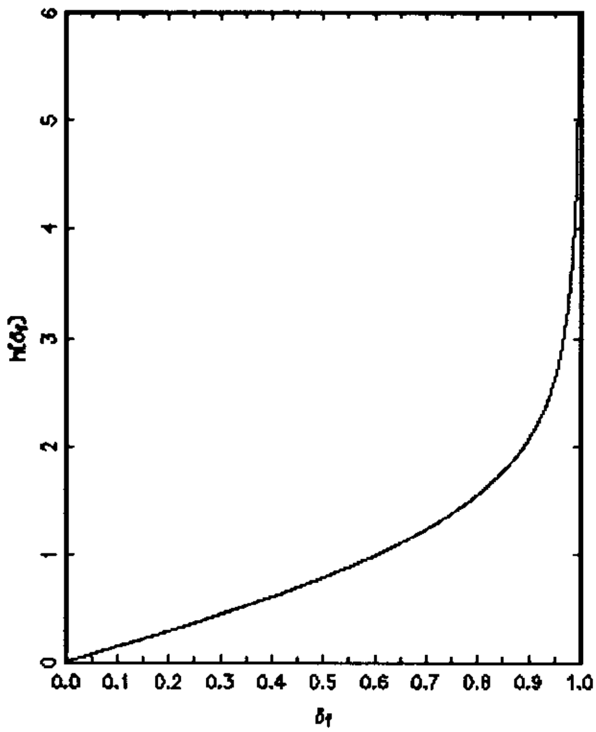


FIGURE 3C
PDF of δ_f from Col. 3

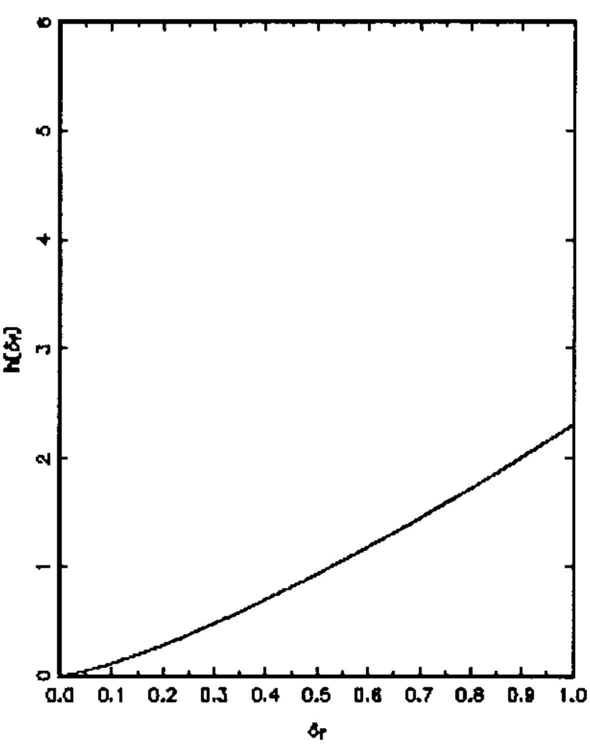
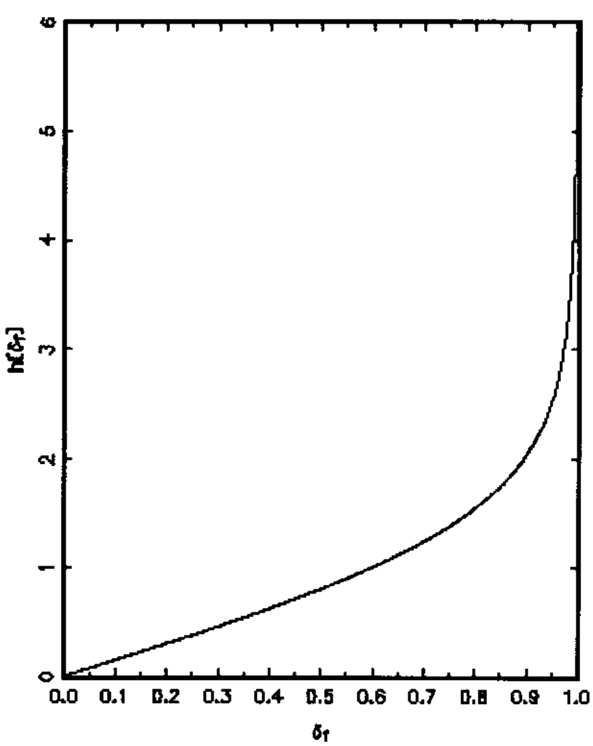


FIGURE 3D
PDF of δ_f from Col. 4



amount of time spent with the child, then *any* noncustodial parent would be expected to weight their own consumption more heavily than they would if they had custody of the child.[25] Therefore, this preference distribution cannot be viewed as representative of the distribution of preferences in the population of *all* divorced fathers, and more importantly should really be thought of as being endogenously determined within a more general model in which custody decisions are also considered. Second, since the distribution of the preferences of custodial mothers is not estimable within our model, there is no way to compare the weights given to the child's welfare by *custodial* mothers and *noncustodial* fathers. For these reasons, one should not draw any inferences regarding relative concern for the welfare of the child on the part of divorced mothers and fathers from these estimates.

We now consider the implications of our estimates of the distributions of δ_f and ϑ and the actual child support awards made for the implicit preferences of institutional agents. In the first specification of the inverse optimum problem, all fathers were assumed to transfer *at least* the amount of the order s to the mother. The distribution of the sum of the weights attached to the expected utilities of the mother and the child [τ^*] under this specification of the transfer decision is depicted in Figure 4A. As was noted in Section 3, under the assumption of perfect compliance τ^* is an element of the unit interval by construction. The distribution appears very symmetric, and this is reflected in the fact that the mean and median are both equal to .408. Under the assumption of perfect compliance, it appears that institutional agents give a higher weight [on average] to the expected welfare of the noncustodial father than they do to the combined expected welfare levels of custodial mothers and the child. One possible explanation for this result is that noncustodial fathers are being compensated for the loss of continuous contact with their child.[26]

Figure 4B contains the distribution of τ^* obtained from the second

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[25] For an analysis of compliance decisions when parental preferences are partially determined by custody arrangements see Del Boca and Flinn (1991).

[26] It is often claimed [see, *e.g.*, Weitzman (1985)] that many fathers who make custody claims do so strategically so as to reduce the level of child support orders and alimony payments when they eventually cede custody rights to the mother.

FIGURE 4A

Dist. of $\tau*$: Compliance

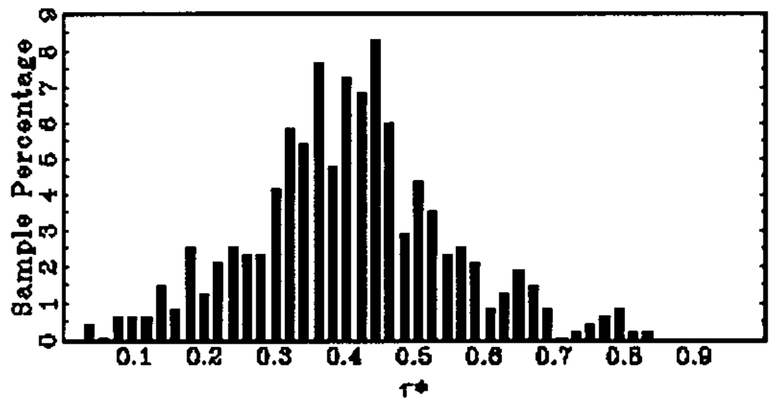


FIGURE 4B

Dist. of $\tau*$: Noncompliance

$|\tau*| < 5$

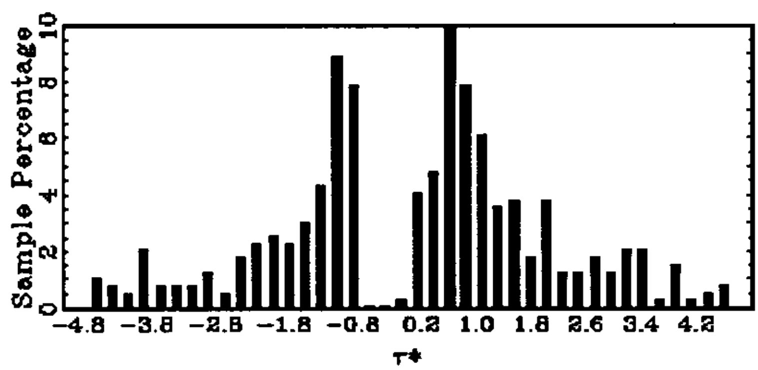
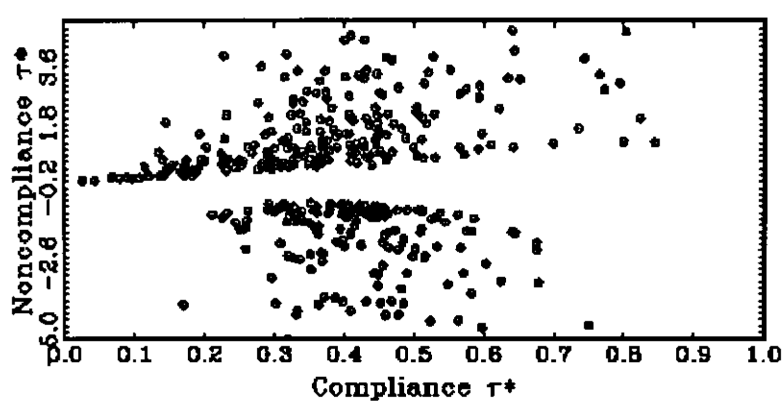


FIGURE 4C

Welfare Weights under Two Regimes



specification of the inverse optimum problem in which it is assumed that institutional agents utilize their knowledge of the actual transfer decision rule of noncustodial fathers in setting the order; for purposes of presentation in Figure 4B we only include the 395 cases in which the absolute value of τ^* is less than 5. While the distribution is still relatively symmetric, it has several somewhat disturbing features. Most notable is the fact that only 22 percent of all cases produce a value of τ^* in the unit interval. This means that the expected welfare of *both* of the parents *and* the child would have been improved in 78 percent of the cases for some set of choices of s not including the observed value. While the objective function of the institutional agent given in [6] is not necessarily interpretable as a social welfare function, the fact that Pareto optimality conditions are violated for such a large proportion of the sample leads one to question the assumptions under which this set of weights were determined.

One possible interpretation of these results is that preferences of institutional agents unable or unwilling[27] to consider the possibility of noncompliance when setting orders are well-characterized by the distribution of weights given in Figure 4A. Once noncompliance considerations are added to the institutional agent's problem the resulting distribution of implicit preference weights [Figure 4B] bears little resemblence to the one depicted in Figure 4A. The lack of correspondence between the weights computed in the two inverse optimum problems is shown in Figure 4C; the pattern exhibited in the figure may be taken as an indication of the considerable extent to which noncompliance subverts the intentions of "naive" institutional agents.

We conclude the empirical analysis by asking the following question: If all institutional agents considered the possibility of noncompliance when setting orders and assigned a weight of one to the combined expected welfare of mothers and children, what would the distribution of optimal awards be? The answer to this question is given in Figures 5A and 5B. Comparing the distributions in 5A and 1A, we see that the distributions of "optimal" and actual orders have similar shapes though the distribution of optimal awards would appear to be stochastically dominated by the distribution of actual awards. In Figure 5B we plot the relationship between actual and optimal

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[27] Due to moral hazard considerations, for example.

FIGURE 5A
Distribution of 'Optimal' Awards

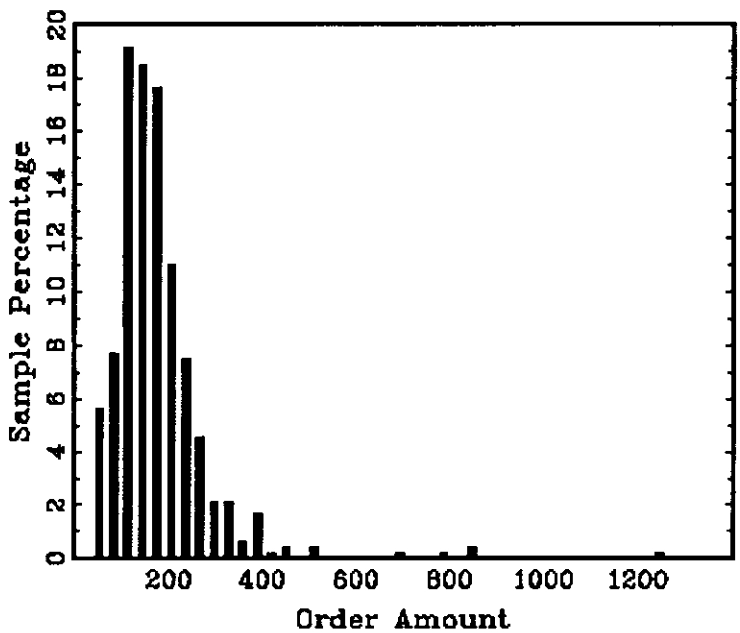
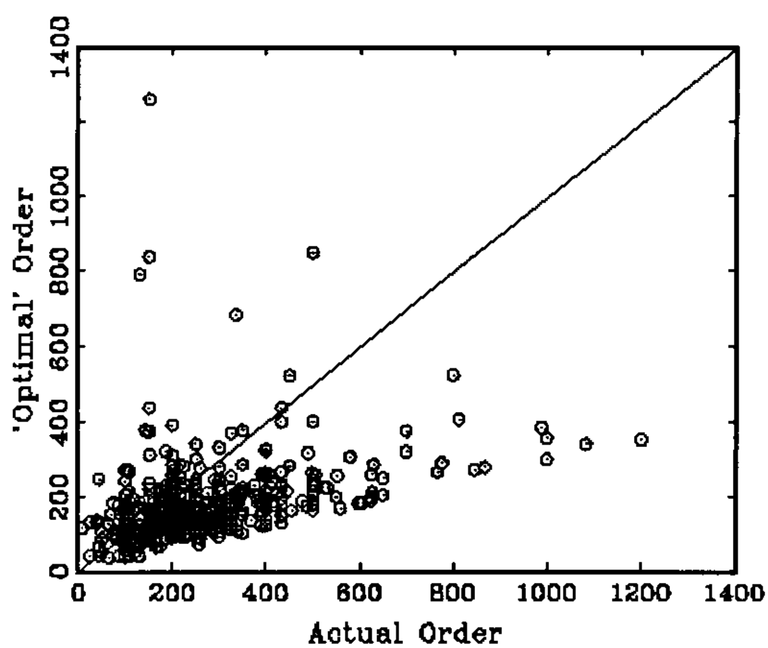


FIGURE 5B
Actual and 'Optimal' Awards



awards. There is a moderate degree of correlation between the two [.387]. Much more noteworthy is the fact that optimal awards exceed actual awards in only 22 percent of the cases. Under the extreme assumption that the objective of institutional agents is to set orders so as to maximize the expected welfare of mothers and children facing a fixed distribution of types of noncustodial fathers, "optimal" child support awards would have generally been set at *lower* levels than those which were observed.

6. Conclusion

We have attempted to provide a framework within which both the child support compliance decisions of noncustodial fathers and the child support awards set by institutional agents can be coherently interpreted. The parsimoniously parameterized model of child support transfers is able to capture all of the relevant features of the actual transfer distribution. More importantly, we showed how behavioral parameter estimates obtained from such an analysis could be used to conduct an investigation of the child support award decision. We provided some empirical evidence on the implicit preference weights of institutional agents to support our contention that noncompliance phenemona seem to be largely ignored in the setting of child support awards within our sample. We would quickly add that while such behavior on the part of institutional agents might be characterized as "irrational" within our narrow model, the orders made may well be perfectly "rational" within a more general framework in which the distribution of noncompliance costs is determined endogenously.

The most striking implication of our empirical results is that to increase the expected welfare levels of custodial mothers and their children *given stable distributions of fathers' characteristics* child support awards should be decreased for the vast majority of our sample members. Put another way, larger child support orders can only potentially lead to increases in the expected welfare levels of children and mothers if costs of noncompliance to noncustodial fathers are simultaneously [stochastically] increased and/or the rewards of making transfers, through changes in visitation rights or the father's decision-making authority regarding expenditures on children, are enhanced.

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