Collegio Carlo Alberto

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Abstract

This paper examines the consequences of child support enforcement on custodial mothers' consumption decisions. We model the interaction in separated couples as a repeated game between the noncustodial father and the custodial mother who share a common good: the child. The mother exclusively controls the child's consumption, whereas the father can only influence the child's consumption indirectly through transfers to the mother. Initially, it is a double sided lack of commitment problem, where parents voluntarily agree on transfer payments and child expenditure, but can renege on their part of the contract at any time. Using the non-cooperative Nash-Stackelberg equilibrium as a threat point, we look for the Pareto frontier of Subgame Perfect Equilibrium payoffs and characterize the equilibrium of the model.

We then incorporate the legal background by allowing for strict child support enforcement. The enforcement equilibrium serves as the new threat point which supports the new Pareto frontier of payoffs. Relative to the old, no-enforcement threat point, enforcement delivers a higher utility to the mother, making it harder to satisfy her incentive for spending large amounts on the child. As a result, mothers will spend a larger fraction of their income on themselves and a lower fraction on the child.

We test that hypothesis using CEX data from years before and after the enforcement policies were implemented. The results indicate a significant increase in this ratio for mothers receiving child support, supporting the model prediction. On the other hand, there is no observable change in that ratio for mothers not receiving child support suggesting that their behavior was, as expected, unaffected by the new laws.

1 Introduction

This paper examines the consequences of child support enforcement on custodial mothers' consumption decisions. Previous studies of child support have two main limitations. First, they find enforcement to have positive effects on child support receipts, but say nothing about how these transfers are actually spent. Second, the play between parents is often depicted as a one-shot static game with a non-cooperative outcome, which may erroneously affect analytical results. This paper attempts to answer these two concerns. First by accounting for separated parents' long term incentives; secondly by analyzing theoretically the effect of strict enforcement of child support contracts on these incentives and most importantly on the consumption of father, mother and child; finally by testing the theoretical predictions using micro data from the Consumer Expenditure Survey.

Since the beginning of the 1980's, the problem of low economic status of children from divorced and separated couples, and its relation to the low child support payments from noncustodial parents, has received the attention of legislators and social scientists. Commonly cited causes were the generally low child support awards and more importantly, the poor rate of compliance of noncustodial fathers with their child support obligations, branding them as "deadbeat dads". As a remedy, federal and state governments have enacted strict policies to increase child support awards, as well as enforcing these awards, mainly through wage withholding. Wage withholding generally means that a percentage of the noncustodial father's paycheck is automatically transfered to the mother every month, without the father having any control over it. The hoped result is that higher child support payments would result in higher children's consumption. As this paper points out, this implication is not immediate as it tends to overlook important dynamics in the separated couple's interaction.[1]

To the question of why non-custodial fathers fail to pay child support to custodial mothers, one hypothesis put forward by Weiss and Willis (1985) relates the behavior of fathers to their lack of control over the allocation of their child support payments: once a mother receives the transfer, she is free to spend it as she wills, even if mainly on herself. Assuming that after a separation, a father cares only about his child and not about his ex-partner, he will have little motive to subsidize the mother's private consumption. Their paper models optimal divorce contracts which specify the allocation of resources within the marriage and after divorce, but these contracts remain static and sometimes ex-post inefficient.

In the literature that follows Weiss and Willis' paper, the interaction between parents is commonly depicted as a one shot static game with a Stackelberg equilibrium outcome. The mother takes her disposable income (her own income plus the transfer from the father) as inelastic and allocates it between her own consumption and the child's to maximize her period utility. Given the reaction function of the mother, the father decides on the optimal transfer given his own preferences. There are a few drawbacks to the static approach:

[1] This paper focuses on the moral hazard problem associated with the custodial parent's consumption decision but in the conclusion we mention other channels through which one-sided enforcement may have undesirable welfare effects.

From a theoretical point, it assumes that parents are myopic, an unlikely hypothesis given they play the game every month over years. If the mother knows that the father's transfer depends on her consumption choice, she should have an incentive to spend a higher fraction of the transfer on the child than what is predicted by the static model. Given the mother's disposition, the father will also choose to transfer a higher amount to her. Moreover, conducting comparative statics in a static model will not only limit their predictive power, but may also lead to incorrect predictions. For example, going from a noncooperative equilibrium with no child support enforcement to one with enforcement will necessarily increase children's consumption (as long as child support receipts increase as well). As will be shown below, this is not necessarily true in a dynamic model.

From an empirical standpoint, the static approach fails to account for the finding that the source of income matters for child expenditure (Del Boca and Flinn (1994)), and educational achievement (Argys and Peters (1998), Knox (1996)). More specifically, that a dollar of income from child support has a larger effect on child outcomes and child expenditure than other sources of income. Aughinbaugh (2001) shows empirically that the probability of future transfers from the father is positively linked to current child achievement.

Hence, the evidence suggests that the relationship in a divorced or separated couple is more realistically illustrated in a repeated game where parents behave strategically to adjust their transfer and expenditure choices every month according to the past actions of their partner. We model the interaction in separated couples as a repeated game between the noncustodial father and the custodial mother who share a common good: the child. The mother exclusively controls the child's consumption, whereas the father can only influence the child's consumption indirectly through transfers to the mother. Initially, it is a double sided lack of commitment problem, where parents voluntarily agree on transfer payments and child expenditure, but can renege on their part of the contract at any time. Using the non-cooperative Nash-Stackelberg equilibrium as a threat point, we look for the Pareto frontier of Subgame Perfect Equilibrium payoffs and characterize the equilibrium of the model. Theoretically, it is a similar problem to the one in Hauser (2007), though without the uncertainty and with easier to implement threat points.

We then incorporate the legal background by looking closely at the effect of the child support system reforms that have been introduced since the late eighties in the US. More specifically, we focus on two policies: the child support guidelines and the enforcement policies, which together specify that a given percentage of the father's income (usually around 17% for one child) be directly withheld and transferred to the mother every month, regardless of her expenditure choice. Rather than assuming that parents automatically revert to the enforcement equilibrium, the latter merely serves as the new threat point which supports the new Pareto frontier of payoffs. Relative to the old, no-enforcement threat point, the enforcement option delivers a lower utility for the father and a higher utility to the mother, making it harder to satisfy her incentive for spending large amounts on the child. In fact, the enforcement policies solve the commitment problem only on the father's side, but remain silent about how the mother ought to spend her income. As a result, mothers will spend a larger fraction of their income on themselves and a lower fraction on the child.

Using CEX data from years before and after the enforcement policies were implemented, we isolate child- and mother-specific expenditure categories for unmarried mothers with and without child support and regress the ratio of mother to child expenditures over period dummies and mother and child characteristics. The results indicate a significant increase in this ratio for mothers receiving child support, supporting the model prediction. On the other hand, there is no observable change in that ratio for mothers not receiving child support suggesting that their behavior was, as expected, unaffected by the new laws.

2 The US Institutional Framework

Since the beginning of the 1980's, the publication of disturbing statistics on the poverty levels of children from divorced and separated couples and their relation to the low child support payments from noncustodial parents has triggered fervent reactions among legislators as well as economists and social scientists. Beller and Graham (1988) report that in 1979, only 59% of custodial mothers had child support awards, and only half of those received the full amount, while the other half received partial or no payment. This low compliance with court awards was a problem even among noncustodial parents with high earnings. Since then, the government has enacted strict policies to increase child support payments including standardizing and increasing child support awards, as well as enforcing these awards through wage withholding, and interception of unemployment benefits and income tax returns. In spite of all the efforts, in 1997, about 60 percent only of mothers with child support awards received any payments.[2] Figure (1) from Sorensen and Hill (2004) depicts the percent of single mothers receiving child support, by marital and welfare status, over the period from 1977 to 2001. Figure (3) from Cancian and Meyer (2005) shows the average amount of child support, conditional on receiving it. At a first glance, no great improvement has been made overall during those years of big legislative changes, although that might be due to the chaging composition of non-married women, toward more single mothers.

1. **Child support guidelines:**

   Often, parents undergoing a divorce or a separation fail to agree privately on a contract, and turn to a higher authority to set child support awards. Until the late eighties, these awards were decided on a case by case basis, and were mainly left up to the judge's discretion. The Child Support Amendments of 1984 required all states to adopt guidelines by 1987 based on a numerical formulation, in the aim of standardizing and increasing child support awards. Guidelines are state specific, and are usually calculated as a function of the noncustodial parent's income, the number of children, and rarely, the custodial parent's income. Although some awards contain automatic adjustment clauses or are specified as a percentage of income, many are simply set to be 15 to 20% of the noncustodial parent's gross income at the time of separation, and adjust only every few years.[3]

[2] Lerman and Sorensen (2003).

[3] The Wisconsin standard, for example, dictates 17% of the gross income of the father for one child.

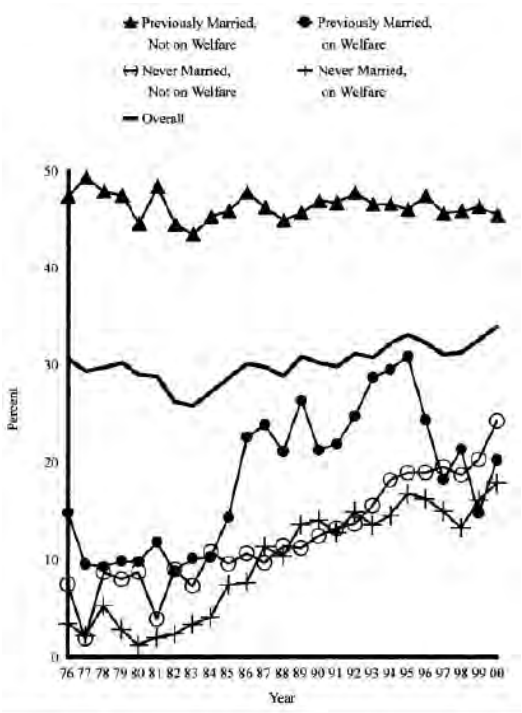

Figure 1: Percent of Mothers Receiving Child Support (Data from CPS, 1977-2001) (Source: Sorensen and Hill 2004)

Figure 2:

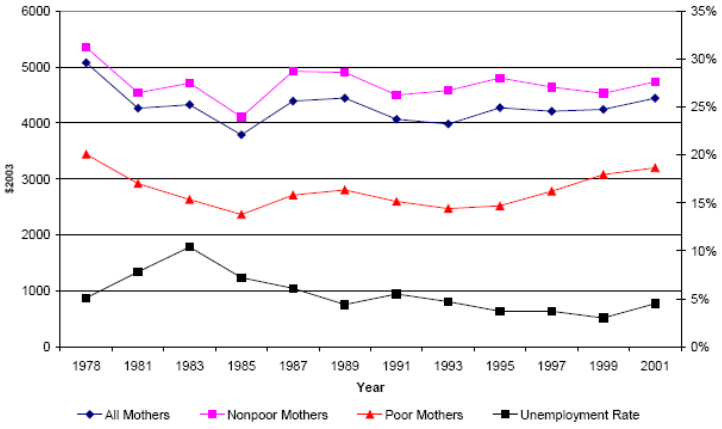

Figure 3: Average Amount Received among Mothers Receiving Child Support (left scale) and Unemployment Rate (right scale). (Source: Cancian and Meyer (2005))

2. **Child support enforcement policies:**

   The second obstacle to tackle, beside dealing with the amount ordered, was the amount actually paid by noncustodial fathers. Until the mid-eighties, custodial mothers had to file separately for child support enforcement, which often required them to hire a lawyer and go to court to obtain an order, a too costly and complicated procedure. The Amendments of 1984 established wage withholding when payments were 1 month overdue. In 1988, some states adopted an automatic wage withholding policy from the time of the order. This policy was extended to all cases in 1994, and states grew more vigorous in their enforcement measures, including income tax refund interception, and unemployment benefits interception. The benefits from harsher enforcement are clear in the sense of guaranteeing that mothers don't fall into total destitution. Many studies have reinforced that claim by comparing total payments before and after the passing of these laws, however there are no studies, as far as we know, which have examined specifically child welfare as a result of those laws.

3 Environment

The model is borrowed from Hauser (2007) and relies on its theoretical characterization of the optimal equilibria. We lay down the model again but for technical details and some of the results derivation, the reader is invited to refer to the cited paper.

The game is played by a divorced or separated couple who have a child together. Both parents are altruistic and care about the child, but they do not care about each other's welfare, hence they derive utility from their private consumption and from the child's consumption. The mother has custody of the child and is the only one capable of spending directly on her. The father can merely influence his child's consumption indirectly through making transfers to the mother to increase her disposable income.[4] Time is discrete and parents discount future utility at rate β. The father and mother's incomes are denoted by Y^F and Y^M respectively, with total income $\mathbf{Y} = Y^F + Y^M$.[5] Transfers are unilateral from the father to the mother, which is in fact a consequence, once we assume the father has a substantially higher income than the mother.[6]

Let f_τ and m_τ be the consumptions of the father (F) and the mother (M) at time τ, and let c_τ be that of the child. The father's lifetime utility at τ can be written as

$$\sum_{r=0}^{\infty} \beta^r u\left(f_{\tau+r}, c_{\tau+r}\right)$$

[4] There may be goods which the father could purchase directly for the child. Still, as long as they constitute only a fraction of total desired child consumption, the analysis will still go through.

[5] The whole analysis goes through if one allows for random incomes. For a complete analysis, see Hauser (2007).

[6] Del Boca and Riberio (2001) report that the ratio of father's income to mother's income is 2.35 in their sample from the NLS High School Class of 1972, 1986 wave.

and the mother's utility as

$$\sum_{r=0}^{\infty} \beta^r z\left(m_{\tau+r}, c_{\tau+r}\right)$$

where $u(\cdot,\cdot)$ and $z(\cdot,\cdot)$ are homothetic functions, strictly increasing in the levels of the private goods f and m respectively, and in the level of the child's consumption c.

Before proceeding further, it would be useful to visit and clarify some of the model's assumptions. These assumptions are convenient for getting a clear understanding of the incentives at play and the effect of child support policies on them. The realism of these assumptions is naturally questioned once one aims for an applied approach, so we will try to address the potential concerns in this section.

1. **Infinite horizon:**

   We assume an infinitely repeated interaction between the parents. In reality, once the child grows up and becomes independent, the support payments stop, marking the end of the dealings between parents. To justify the infinite horizon hypothesis, we assume a probabilistic death or maturing of child (who may decide to go to college, for example, or may need extra support, extending the contract time), making it hard to see for certain the time of the last period. This is not a perfect validation, since this probability of maturing becomes increasingly large as time goes by, making the discount factor smaller along with it, and the temptation to deviate larger. Still, empirically there is no evidence that compliance decreases with the age of the child per se. Evidence of family ties (as proxied by time since divorce, time spent in marriage, visitation frequency or joint custody, remarriage of parents) having any effect on compliance is also mixed, with many studies finding no effect.[7] On the other hand, compliance decreases with time when there exists a child support enforcement order simply because it becomes harder to track down fathers when they frequently change jobs or move, but that is already outside of the voluntary contract.

2. **Voluntary agreements:**

   Parents can voluntarily agree on a set of transfers from the father to the mother, and child expenditures by the mother, but both can renege on their part of the contract at any time. This was especially true in the years before the child support reform and the establishment of the enforcement office, but continues to hold even today, as many couples prefer "bargaining in the shadow of the law", rather than seeking a legal solution in court. In fact, as evidence to how many parents privately agree on child support payments, Argys and Peters (2003) report that only about half of divorced parents had court-ordered awards, with the rest reaching an agreement without going to court. Moreover, parents who had voluntary agreements achieved higher awards, payments and compliance rates. Figure (4) taken from Cancian and Meyer (2005) shows the percentage of custodial mothers with child a support order from 1970 to 2001, with that percentage increasing slightly over 50 percent in the last decade.

[7] Del Boca and Flinn (1990), Chambers (1979), Cassetty (1978), Beron (1990)

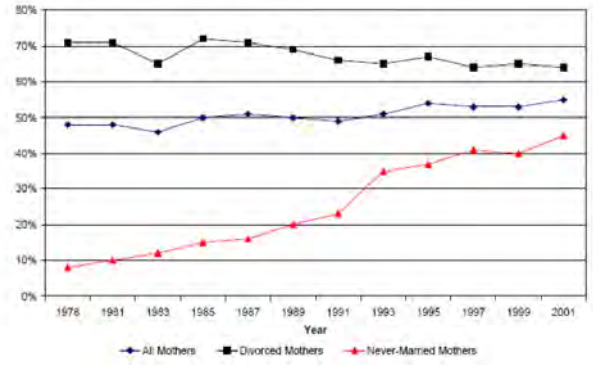

Figure 4: Percentage of Mothers with Child Support Order (Source: Cancian and Meyer (2005))

3. **The information structure:**

   All information is public, so parents observe each other's income and expenditure. How reasonable this assumption is depends on the degree of contact between the parents, and between the father and child. It will be sensible in particular if the father stays in close contact with his child and is able to check whether he's receiving the expected consumption. Argys and Peters (2003) report that "only 13% of fathers who settled without assistance have no contact with their children, compared to 24 percent of fathers with court-ordered settlements." Moreover, if the mother is aware that the transfers she receives are mitigated by the fact that the father cannot observe the expenditure on the child, she could make an effort to circumvent this problem, for example, by showing evidence of expenditure and income to him.

In the next two parts, we contrast the implications from perfect one-sided enforcement in the case of a static model with those in the case of a dynamic model. While the static model yields an unambiguous increase in transfers and in children's consumption, the dynamic model sheds the light on the mother's incentive problem and reveals that the enforcement may in certain cases be countereffective.

4 The Static Game

Suppose, as has been assumed so far in the literature, that the game which parents play is a one-shot game where the transfer and consumption decisions are made once and sequentially. The unique equilibrium for this case is the Stackelberg (or noncooperative) equilibrium, where for any transfer t of the father, the mother takes t, assimilates it with her own income, and solves the following problem:

$$\hat{c} = \arg\max_{C} z(Y^M + t \,\square\, C, C).$$

The mother's optimal decision is defined by the following first order condition

$$z_m(Y^M + t \square \hat{c}, \hat{c}) = z_c(Y^M + t \square \hat{c}, \hat{c}) \tag{1}$$

This defines $\hat{c}$ in a straightforward division rule which depends only on the level of post-transfer income. Given the homotheticity assumption on the utility function, the mother will always pick consumption in a specific ratio, say $\frac{Y^M + t \square \hat{c}}{\hat{c}} = \frac{\alpha}{1 \square \alpha}$.

Given the mother's reaction function, the father solves his problem

$$\begin{aligned} \hat{t} = \arg\max_{T} \quad & u(Y^F \square T, \hat{c}) \\ \text{s.t.} \quad & z_m(Y^M + T \square \hat{c}, \hat{c}) = z_c(Y^M + T \square \hat{c}, \hat{c}) \end{aligned} \tag{2}$$

Let the transfers and consumption allocation corresponding to the Stackelberg equilibrium be denoted by t^{st} and c^{st}. The resulting lifetime utilities for the father and mother are respectively

$$\begin{aligned} V_{st} &= \frac{1}{1 \square \beta} u(Y^F \square t^{st}, c^{st}) \\ W_{st} &= \frac{1}{1 \square \beta} z(Y^M + t^{st} \square c^{st}, c^{st}) \end{aligned}$$

What happens when we introduce one-sided enforcement in the picture? If the transfer implied by the enforcement authorities t_{enf} is smaller than the Stackelberg transfer, the mother gets no advantage out of it and parents prefer to remain at the Stackelberg equilibrium. The enforcement in this case is not binding.

However, if the transfer implied by the enforcement authorities is greater than the Stackelberg transfer, the outside options of the parents are no longer equal to their Stackelberg values. In fact, letting V_{enf} and W_{enf} denote the values parents get if they were to revert to the enforcement equilibrium, it is evident that $V_{st} > V_{enf}$ and $W_{st} < W_{enf}$. The new mother and child consumption will be determined by the following condition

$$z_m(Y^M + t_{enf} \square c_{enf}, c_{enf}) = z_c(Y^M + t_{enf} \square c_{enf}, c_{enf})$$

with $\frac{Y^M + t_{enf} \square c_{enf}}{c_{enf}} = \frac{\alpha}{1 \square \alpha}$. Clearly then, $c_{enf} > c^{st}$, both mother and child benefit in equal proportion from the enforcement policy and are better off.

As the following section will show, this rationale doesn't hold immediately once we allow for more strategic interaction between the parents.

5 The Dynamic Game

As motivated in the introduction to this paper, the interaction between parents can best be described as a long term, repeated one where parents strategically choose their transfers and consumption according to the history of play and to the available outside option. We

first look for the best achievable payoffs given the Stackelberg equilibirum punishment, then we incorporate the legal background by allowing for child support enforcement, where enforcement means the automatic withdrawal of some fixed percentage of the father's income every month. This policy will raise the outside option for the mother, making it more difficult for her to sustain the same level of child expenditure as before the introduction of the law. More specifically, for some group of mothers, the model predicts a rise in their consumption relative to the child's, and possibly a decrease in the child's consumption. This section lays out the mechanism by which we reach this implication. The next section presents the empirical analysis: using CEX data, we compare mother to child consumption ratios before and after the introduction of the enforcement laws for mothers with and without child support, and find the evidence backing the theory.

5.1 First Best Allocation

In order to better understand the incentive problems which parents face in this context, it is useful to characterize the first best allocations where both can commit to a set of transfers and consumptions. We can solve for these allocations by writing down the planner's problem where the parents' incomes are pooled in one resource constraint. Letting μ be the relative weight on the mother's utility, the planner's problem at τ is

$$\begin{aligned} \max_{\{f_{\tau+r},m_{\tau+r},c_{\tau+r}\}_{r=0}^{\infty}} \quad & E_\tau \sum_{r=0}^{\infty} \beta^r \left[u(f_{\tau+r},c_{\tau+r}) + \mu z(m_{\tau+r},c_{\tau+r})\right] \\ \text{s.t.} \quad . \quad & f_{\tau+r} + m_{\tau+r} + c_{\tau+r} = Y^F + Y^M \quad \text{for all } r. \end{aligned}$$

The first order conditions imply the following relation holds for all dates

$$\begin{aligned} u_f(f,c) &= u_c(f,c) + \underbrace{\mu z_c(m,c)} \\ z_m(m,c) &= z_c(m,c) + \underbrace{\frac{1}{\mu} u_c(f,c)} \end{aligned}$$

Consider a hypothetical case where each parent could decide on how much consumption to allocate to the child out of the available budget, without taking into account the other parent's action. The mother's decision would be given by $z_m(m,c) = z_c(m,c)$. Similarly, the father would set $u_f(f,c) = u_c(f,c)$. These are the parents' *individual optimality conditions* which in the first best are never satisfied, since the additional terms on the right hand side of the first order conditions will never be equal to zero simultaneously. This is a standard result in settings with public goods since the social planner internalizes the effects of public good consumption decisions on both agents' utilities. Note that as the relative Pareto weight of the mother increases, the first best will prescribe a consumption which is increasingly aligned with her individually optimal consumption, thus decreasing the wedge between them, and vice versa for the father.

This already gives an idea why, in a setting with a lack of commitment, parents may not be able to achieve the first best allocation. Although the First Best achieves the largest

joint surplus for them, it always dictates a level of child consumption that is too high, relative to their ideal consumptions. Generally, when a parent's Pareto weight is low, he or she will be tempted to deviate from the first best and pick the consumption combination which maximizes his or her period utility. The constrained optimal contract will find a "middle ground" solution which will bring parents closest to the first best payoffs, while still satisfying their incentive constraints.

5.2 Subgame Perfect Equilibria

Assuming that there is no outside enforcement, parents cannot commit to the behavior prescribed by the first best equilibrium. We then look for self-enforceable contracts, meaning incentive compatible agreements from which agents will not want to deviate. At this point, it is useful to understand the incentives and disincentives of the parents from engaging in a long term agreement, instead of playing non cooperatively. For the father, the benefit from making transfers to the mother is to increase the child's consumption. The price he has to pay in return is that these transfers are taxed by the mother, who will privately consume a part of them. Hence, any self-sustaining agreement should ensure that the father gains enough from it to still make the optimal transfers. On the other hand, the benefit of this arrangement to the mother is that it increases her disposable income. In return, she has to distort her expenditure choice in favor of of a higher consumption of the child. So a self-sustaining agreement should guarantee that once the mother receives the father's transfer, she would spend it in the agreed way.

5.2.1 Strategies

The interaction between parents involves a two-part decision making process in each period. At the beginning of period, the father makes a nonnegative transfer: $t \in [0, Y^F]$ and consumes his post-transfer income $f = Y^F \square t$. The mother decides how to split her post-transfer income between the child c, and herself $m = Y^M + t \square c$. Define an allocation $\{t_\tau, c_\tau\}_{\tau=1}^{\infty}$ to be a vector of state-dependent transfers and public good consumptions. A period τ history in this game consists of a sequence of realizations for t and c:

$$h^\tau = (t_1, c_1, t_2, c_2, ..., t_{\tau \square 1}, c_{\tau \square 1})$$

A strategy for the father at τ is a mapping from possible histories at τ into a transfer. The mother's strategy is a mapping from possible histories and current transfer amounts into child consumption.

A subgame-perfect equilibrium specifies:

1. A strategy for the father such that his transfer after any history is optimal, given the mother's consumption strategy;

2. A consumption strategy for the mother given the observed history and current period transfer.

5.2.2 Stage Game Equilibrium

The aim is to characterize the Pareto frontier of subgame-perfect equilibrium payoffs. Payoffs in the Pareto frontier need to rely on punishment threats in case one of the parents deviates from the agreement. A natural punishment is the Stackelberg outcome of the stage game, which is also the lowest equilibrium payoff of the static game.[8]

Hence, an allocation $\{t, c\}$ is subgame perfect if it satisfies:

$$\frac{1}{1 \square \beta} u \left(Y^F \square t, c \right) \geq V_{st}$$

$$\frac{1}{1 \square \beta} z \left(Y^M + t \square c, c \right) \geq z \left(Y^M + t \square \hat{c}, \hat{c} \right) + \beta W_{st}$$

Consider an allocation $\{t, c\}$ satisfying the conditions of the proposition above, and let the parents follow a strategy whereby they transfer and consume the amounts dictated by the allocation as long as both have done so in the past, otherwise, they revert to the noncooperative equilibrium. We say that these strategies form a contract.

5.2.3 Efficient Equilibria Under Lack of Commitment

Definition *A subgame perfect allocation is efficient if and only if there is no other subgame perfect allocation that Pareto dominates it, and an optimal contract is one which implements such an allocation.*

Let $\mathbf{V}$ be the maximal payoff the father can obtain in a subgame perfect equilibrium, and $\mathbf{W}$ be that attainable by the mother. Define the function $V : [W_{st}, \mathbf{W}] \square\!\!\rightarrow [V_{st}, \mathbf{V}]$ to be the following:

$$\begin{aligned} V(W) \quad = \quad & \max_{\{t,c\}} \frac{1}{1 \square \beta} u(Y^F \square t, c) \\ & \text{s.t.} \quad \{t, c\} \quad \text{is a subgame perfect allocation.} \\ & \frac{1}{1 \square \beta} z(Y^M + t \square c, c) = W \end{aligned}$$

One can think of the father as choosing the allocation $\{t, c\}$ to maximize his utility, while providing the mother with an ex-ante promised lifetime utility W, and satisfying the incentive constraints. The function V is the Pareto frontier of subgame perfect equilibrium payoffs.

The fact that the mother is the sole provider of the public good means that the father's transfer, and subsequently the child's consumption, are bounded above by the mother's private consumption and continuation value. For example, even if the father had a very high income and wanted to split that income between his private and public consumptions, he would be restricted in doing so since any large transfer to the mother that is not matched by a substantial private consumption or continuation utility for her, would lead her to deviate.

[8] The Stackelberg equilibrium is not the worst punishment, but it is easiest and most natural to implement. If parents are sophisticated enough, they could take advantage of the long horizon to specify the minmax payoffs as punishments. Again, see Hauser (2007) for details on how to implement the worst punishments.

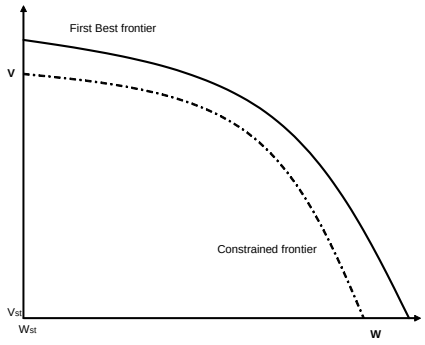

Figure 5: First Best and Constrained Pareto Frontiers 1

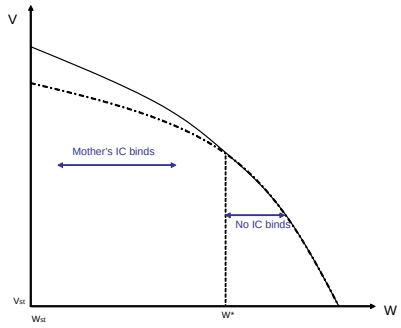

Figure 6: First Best and Constrained Frontiers 2

Figures (5) and (6), which represent the generic Pareto frontiers of payoffs from the unconstrained and constrained problems, illustrate this fact. When drawing the utility possibility frontier, the origin depicts the Stackelberg values for both agents. Values on the X-axis denote the mother's lifetime utility, W, while those on the Y-axis denote the father's lifetime utility, $V(W)$. Hence, the parents will only enter the contract if their ex-ante values exceed their Stackelberg values, otherwise there are no gains from contracting. In the first picture, the constrained Pareto frontier lies entirely beneath the first best frontier, meaning that no values combinations which are feasible under the first best are so in the constrained problem. In the second picture, the constrained and first best frontiers partially overlap, meaning that for some values of the mother, neither parent's incentive constraint binds, and the first best allocation is sustainable at these points.

The fact that the father's deviation value equals the Stackelberg value means that his incentive constraint will only bind at one point: when his value from the contract is V_{st}. On the other hand, the mother's incentive constraint may bind for a multitude of values since her deviation utility depends on the father's transfer (so her deviation value is actually greater than her Stackelberg value). So in reality, only the scenario in figure (6) may occur.[9]

[9] The figure implies that if the mother's incentive constraint binds for some value W of hers, it will also

Let μ be the multiplier associated with the promise keeping constraint, and λ^m, ϕ^f the multipliers associated with incentive constraint for the mother, and the nonnegativity constraint respectively. The first order conditions and the envelope condition imply the following:

$$\begin{aligned}
\frac{u_f(f,c)}{u_c(f,c)} &= 1 \square (\mu + \lambda^m) \quad \frac{z_c(m,c)}{u_c(f,c)} \square \frac{\lambda^m z_m(m^*, c^*) \square \phi^f}{u_c(f,c)} \Bigg) \\
\frac{z_m(m,c)}{z_c(m,c)} &= 1 \square \frac{1}{(\mu + \lambda^m)} \frac{u_c(f,c)}{z_c(m,c)}
\end{aligned}$$

where $\hat{m}$ and $\hat{c}$ refer to the deviation consumption levels of the mother. In the case of homothetic preferences, the ratio of marginal utilities depends only on the ratio of consumptions, and not on the individual levels of consumption. This means that we can write

$$\begin{aligned}
\frac{u_f(f,c)}{u_c(f,c)} &= h\left(\frac{c}{f}\right) \\
\frac{z_m(m,c)}{z_c(m,c)} &= g\left(\frac{c}{m}\right)
\end{aligned}$$

Again, one can see that for a given promised utility, if the mother's incentive constraint doesn't bind, the parents will be able to achieve the first best allocation in the contract. The first order conditions imply that as the mother's relative Pareto weight μ increases (so as we move right on the Pareto frontier), her private consumption increases both in absolute terms, and relative to the public good level $\left(\partial \left(c^{FB}/m^{FB}\right)/\partial\mu < 0\right)$, hence shrinking the wedge between her individually optimal consumption and her actual consumption. The reverse holds for the father.

5.2.4 Efficient Equilibria Under Strict Enforcement:

What happens to this equilibrium when we introduce enforcement? Again, if $t_{enf} < t^{st}$, the mother still prefers, in case she chooses non-cooperation, to revert to the Stackelberg equilibrium and the outside options are unaffected. However, if $t_{enf} > t^{st}$,then $V_{st} > V_{enf}$ and $W_{st} < W_{enf}$. Looking again at the mother's incentive constraint, one can see that raising the mother's outside option means that a set of the lower lifetime utilities of the mother (from W_{st} to W_{enf}) cannot be sustained anymore, but also that: for some values where the first best was achievable, the mother's incentive constraint will start to bind. Moreover, even for values where her incentive constraint was binding, the old allocation will not be incentive compatible any longer.

The mother's incentive constraint at the time of introducing the new law will be:

$$z(Y^M + t' \square c', c') + \beta W' \geq z(Y^M + t' \square \hat{c}', \hat{c}') + \beta W_{enf}$$

bind for all $\tilde{W} < W$. Indeed, this is shown in prop ?? below.

where the primes indicate the new equilibrium transfer, child consumption and promised continuation value. A standard result of two-sided lack of commitment models is that if one agent's incentive constraint binds in some particular state, she is compensated with higher consumption and continuation value.[10] In the presence of a public good, it is not trivial to see how the mother will be compensated when her incentive constraint binds. Is it better to provide her with a higher consumption of the private good, or of the child's consumption?

The father can compensate the mother in three ways: by increasing her continuation utility, increasing her disposable income, or, for a given level of disposable income, by shifting her expenditure from c to m. Because of the new incentive constraint, and using the envelope condition of the optimization problem, one can write the following first order condition:

$$V'(W') = V'(W) \square \lambda_m$$

which by the concavity of the Pareto frontier, implies that the mother's continuation utility is indeed higher than before. In addition, since the transfer enters positively on both sides of the mother's incentive constraint, increasing her disposable income would exacerbate her problem by granting her a larger income with which to abscond. As opposed to the standard lack of commitment case, here, the mother's problem is alleviated by allowig her a lower fraction of income, but still letting her increase her private consumption relative to the child's, which necessarily falls. The intuition is the following. Enforcement increases the mother's outside value. When the mother's incentive constraint binds, the contract dictates compensation through a smaller wedge in her individual optimality condition, i.e. she is allowed to spend a smaller proportion of her disposable income on the child than in the first best. This makes it more costly for the father to keep the mother in the contract, so he chooses to transfer less to the mother, and consume more himself. Hence, both parents' ratios of private to child consumptions rise.[11] Notice that this is also different from the insurance case with no public good, where one agent's constraint binding always means a lower consumption for the other agent.

The following proposition summarizes

Proposition 1 [12]

1. *For the values where the mother's incentive constraint binds, compared to the old equilibrium, c is lower, and m/c and f/c are higher. Moreover, the father"s value from the contract is lower, while the mother's is higher. If the mother's promised utility was at a point where her new incentive constraint doesn't bind, then nothing changes under the new equilibrium.*

2. *If the mother's incentive constraint binds for some value W it binds for all for all $\tilde{W} < W$.*

Figure 5 illustrates the new constrained Pareto frontier.The dotted blue line depicts

[10] A standard example is Kocherlakota (1996)

[11] Comparing m to m^{FB} analytically without further assumptions on functional forms is not possible, but

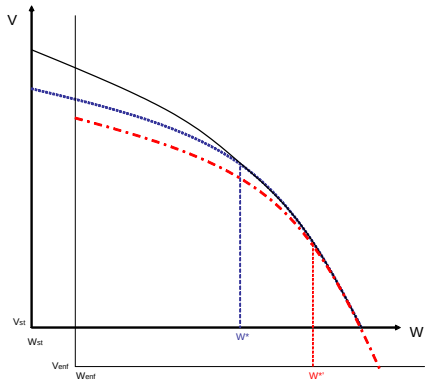

Figure 7: Old and New Pareto Frontiers

the old constrained frontier, while the red dashed line depicts the new frontier. Some self-enforcing equilibria for which the mother's values are very low are rendered unsustainable. For a mother situated at her lowest lifetime utility under the contract, the strict enforcement of court-ordered payments helps her to move to a higher lifetime utility. The benefits from harsher enforcement are clear in the sense of guaranteeing that mothers do not fall into total destitution. The problem with enforcement, as we see it, is that it hurts the strategic incentive for the mother to spend an increased amount of the child support payments on the child. So increased child support may not necessarily translate into increased child expenditure.

Can we say anything about the overall welfare effects? The answer is that without further specifications on the parents' preferences and altruism levels, it is impossible to draw welfare implications. Take the two extremes: in the case of a couple where the father does not care at all about the child, the Stackelberg equilibrium will imply no transfers to the mother. In fact, the Stackelberg equilibrium is the only outcome of the game. Here, enforcement will necessarily increase the mother and the child's welfare unambiguously. On the other hand, if the mother doesn't care about the child, transfers will be zero in the Stackelberg equilibrium but positive in the equilibrium of the dynamic game (since the mother will spend on the child if only to keep on receiving future transfers). Under this scenario, enforcement will most probably be detrimental to the child, and may even lead the mother to choose the noncooperative equilibrium in which she received the court-ordered support but spends nothing on the child. Of course, these are two extremes, but there are no obvious reasons to believe that mothers are more altruistic than fathers, or the opposite.

The question we would like to answer in the next section is: in reality, did the mandatory child support payments raise the ratio of mother to child expenditure m/c?

numerical computations show that for CES and square root utility functions, m is higher than m^{FB}.

[12] Proofs for a similar proposition can be found in Hauser (2007). Proofs adapted to this specific proposition forthcoming.

6 Empirical Analysis

Since there exists very little data relating parents living in separate households, we limit myself to implications which can be tested using only data on single mothers and their children, where single mother means any female head of household living with her own children and no other adults. The ideal would be to have panel data which would follow single mothers across time and record any change in their consumption pattern which might result from the introduction of the new policies. Unfortunately, we don't know of any panel data containing sufficiently detailed information about individual consumption within a household, as usually consumption items are aggregated in large categories. This study uses cross-sectional data from the Consumer Expenditure Survey (CEX), which is recognized as the largest and most comprehensive survey of consumer expenditure behavior in the United States. The CEX has the advantage of recording very detailed consumption expenditure, and allows to ascertain, for a subset of items, whether the expenditure was for the mother or the child.

6.1 Methodology

The aim is to compare the ratio of mother to child expenditure before and after the introduction of the policies. Since the new laws were introduced gradually in different states, we pick years with a big enough lag in order to leave time for the new laws to take effect[13]. To this end, we use data from the years 1986, 1987 and 1988 and data from the years 2000, 2001 and 2002. We combine the data from 1986, 1987, and 1988 (which we call the PRE years) and the data from 2000, 2001 and 2002 (which we call the POST years) in order to end up with a large enough number of observations for our study. The CEX follows households over a period of one year, recording quarterly data about family characteristics, income (including income from child support and alimony), and detailed expenditure. Each quarter, a new wave of around 5,000 households enter the survey and replace those households which have completed already four quarters of interviews. Hence, within each of the PRE and POST data, there will be households with one, two, three or four interviews. Every quarter, yearly income from different sources and quarterly expenditure are reported. Instead of using income as a control variable in the regressions, we choose total expenditure, since self-reported income is often imprecise, whereas expenditure data is meticulously collected in the CEX. For households with more than one interview, since all that is needed is ratios of consumption, we take expenditure to be the average quarterly expenditure over the number of interviews. All monetary values are adjusted to account for inflation using the consumer price index from the Bureau of Labor Statistics. For the baseline case, only households who have had at least three interviews are kept in order to limit extreme seasonality effects and have a more consistent dataset.

The subject households are single mother households, which include divorced, separated, widowed and never married mothers. The model predicts that as the regulation on child support enforcement becomes more widespread, a larger proportion of single mothers in

[13] Unfortunately, there are too few observations to divide the sample among the different states.

the contract will be incentive constrained, and as a result, will spend a lower fraction of their income on their children, and a higher fraction on themselves. On the other hand, less fathers are expected to be incentive constrained, which would also contribute to raising mothers' expenditure relative to children's. Of course, We cannot tell a priori which mothers precisely would be affected by these new laws, so we look for mothers receiving child support PRE and POST who had limited or no access to enforcement before 1988. In terms of application, that group translates into relatively poor mothers, or at least mothers who are not at the high end of the earnings ranking. We pick mothers whose total expenditure is below the 75th percentile (although once that assumption is relaxed, the evidence remains supportive here as well). The reason is that until the mid-eighties, custodial mothers could obtain an enforcement order, but they had to file separately for it, which often required them to hire a lawyer and go to court. This task would prove too costly and complicated for many mothers, particularly those with lower incomes. Other reasons cited for not applying for an enforcement order were that fathers had little income anyway, couldn't be located, or earned their wages through illegal activities. Again, all these factors are not likely to reflect characteristics of partners of high income mothers. So while the new laws might have affected all mothers, it seems less probable that they impacted the richer ones. Single mothers with child support may or may not have an enforcement order in execution, but comparing this group PRE and POST, there will be on average more mothers with a binding incentive constraint and more mothers with an effective enforcement order (as defined by the father transferring the court-ordered fixed percentage of his income) in the POST years.

Any change in the ratio m/c between the two dates is not indicative if taken on its own. Any number of factors other than the effect of the new laws could be put forward as an explanation, the most obvious being a change in the relative price of child goods to adult goods. For this, we take as a control group single mothers without child support in the PRE and POST years. These mothers are outside the contract, and have no access to the enforcement mechanism. This group will in general not be affected by the new laws, so whatever change one might see in their consumption pattern will be solely due to other factors. One may worry here about a potential selection bias, for why would these mothers still not have access to child support, although enforcement is readily available for all? One class of reasons has to do with fathers who are absent (deceased, in jail, unreachable[14] etc..) or for any of the reasons mentioned above. Certainly, the causes may be due to the mothers as well, and although the following analysis controls for all observable characteristics that we think may be of relevance, there may be significant unobservable characteristics which distinguish mothers in the study group from those in the control group. This remains one of the limitations of the study, but as a first attempt, we can look at some demographic features in search for some clues. Table 1 lists the summary statistics for a few of the characteristics of the women in the two groups. The two seem very similar in terms of most characteristics, especially in the recent POST years. This is a surprising fact, since one would expect the access to enforcement to be linked to greater disparities between the two groups. For example, although the labor force participation is equal in recent years, the

[14] While some women may have enforcement orders, the enforcement office is not always successful in getting a hold of the fathers.

table shows a considerably lower initial point for mothers without child support, indicating that the increase in the working fraction has been greater for mothers without than that for mothers with support. Finally, while total expenditure is roughly the same for the two groups, a considerable portion is provided by child support for the women receiving it.

The next challenge is to identify expenditure which is unambiguously the mother's or the child's. Many household items like cars, household appliances and utilities are common goods which probably benefit both mothers and children. Making a decision on who benefits most from them and in what proportion would be arbitrary. Other items such as food, holidays and entertainment expenses are also impossible to break down into individual consumptions without data at the individual level. Hence, we follow Del Boca and Flinn's (1994) (henceforth D&F) approach by defining child goods to be children's clothing, children's footwear, and miscellaneous items such as toys, playground equipment and TV and computer games, and mother goods to be women's clothing and footwear, and miscellaneous items such as electric personal care appliances, newspapers and magazines, and jewelry. This definition also has the advantage of comparing items that are similar in nature and durability. One limitation is that it constitutes a relatively small fraction of total consumption expenditure (around 7%). Though, once rent and other durable expenses are accounted for, this fraction becomes considerably larger.

We also define two broader categories of child goods and mother goods. The broad child goods definition comprises the items above plus expenditure on sporting equipment and recreational lessons. While it is difficult to argue for certain that these goods were not meant for the mother's consumption, it seems more likely that they were acquired for the children than for the mother' use. The second broad definition of child goods includes education. The broad definition of mother goods includes the above definition plus alcohol. These are clearly adult consumption items, however we treat them differently because their consumption may be related to some unobservable characteristics of the mother. The detailed definitions are as follows:

Child goods:

$c_1 \equiv$ children's clothing + children's footwear + miscellaneous (infants' equipment, TV and computer games, toys, games, tricycles, battery powered riders, playground equipment, fees for participant sports on out of town trips)

$c_2 \equiv c_1+$ sporting goods and recreational lessons (Bicycles, recreational lessons or other instructions, equipment for hunting and fishing, winter and water sports, and other sports)

$c_3 \equiv c_2+$ educational expenses (Tuition, school books, supplies and equipment for day care, nursery, elementary school and high school; food, board, housing and private school bus)

Mother goods:

$m_1 \equiv$ women's clothing + women's footwear + miscellaneous (car phone, newspapers, magazines, periodicals, wigs and hairpieces, electric personal care appliances including rental and repair, jewelry)

$m_2 \equiv m_1+$ alcohol

We combine these different categories in order to create three measures of mother to child ratio:

1. m_1/c_1 : This is our baseline measure, which we will use for most of our regressions below.

2. m_2/c_2 : This is a broader measure with the advantage of constituting a larger fractions of total expenditure.

3. m_1/c_3 : This measure includes education in child's consumption, and as will be seen later, the only problematic measure in terms of supporting the theory.

We are then set out to compare the ratio of mother to child expenditure m/c in the PRE years to the ratio in the POST years. Unless otherwise specified, regressions will be run on the sample of single mothers with at least three interviews and total expenditure in the 75th percentile.

6.2 Results

All tables and regressions can be found in the appendix.

6.2.1 The effect of policy change on children's relative consumption:

As a first step, we conduct two similar regressions: one for mothers with support, and the other for mothers without support, where the independent variable is the baseline ratio m/c. We define single mothers with child support to be those who have received at least one hundred dollars of child support over the past year. The reason for this cutoff value instead of zero is because any smaller amount would hardly trigger a strategic behavior on the part of mothers. As in D&F, the measure of child support income includes child support income plus alimony. Since we run two regressions over two sub-samples, we leave for these two regressions only all mothers who had one or more interviews, and end up with a sample of 462 mothers with child support, and 1288 mothers without support. We define a *post* dummy, which is one for the POST years, and zero for the PRE years; the work status dummy takes value one if the mother has worked at least 26 weeks in the last year, and zero otherwise; the welfare dummy takes value one if the mother has received at least one hundred dollars of welfare benefits over the past year, and zero otherwise. Other independent variables include age (linear and quadratic), race, education, a dummy indicating whether the household is urban, the log of child support if the mother is receiving child support, and the log of total expenditure. We include variables for number of children, number of girls aged 16-18, number of boys and girls aged 2-15, and number of infants. This leaves the number of boys aged 16-18 as the omitted category. Finally, in line with my argument above, we restrict the sample to mothers with total expenditure in the 75th percentile of single mothers' expenditure. Table 2 reports the baseline ratios m_1/c_1 for mothers receiving and not receiving child support, weighted by household weight, where c_1 is average child expenditure (total child expenditure divided by number of children). Despite the large standard errors on the expenditure values, one can already notice that in the PRE years, the ratios are very close for the two groups (for mothers with one child, around 1.57 if they have support and 1.59 if they have no support), whereas in the POST

years, the ratio for mothers with support is significantly higher (2.04, versus 1.72 for mothers without support).

We regress the ratio m/c over a number of characteristics of the mother and children as well as the *post* dummy, for each of the mother groups. The outcomes are reported in the Appendix in Regression 1 and Regression 2. For each group, the three columns denote regressions with an increasing number of controls. The *post* dummy is positive and significant at the 5 percent level for mothers with child support in all three regressions, and it is mostly negative and always insignificant for mothers without child support. This suggests that the ratio m/c has increased for mothers with support in the POST years, while it remained about the same for mothers without support, in line with the theory's prediction. As for the magnitude of the coefficient in front of the *post* dummy, for mothers with child support and the case with most controls, it is 0.83, which is quite large, given an initial ratio m/c of 1.57, and a POST ratio of 2.04. So the *post* dummy seems to explain more than 100 percent of the increase in that ratio. This definitely supports my theory, but given the possibility that that there could be some omitted variables whose effect the *post* dummy picks up, and given the expenditure categories under check constitute a small percentage of total expenditure, we refrain from pushing the result too much.

Do the other coefficients in the regression make sense? One significant variable for both groups is the number of children. As expected, the ratio m/c is decreasing in the number of children. It is also negatively decreasing in the number of children below the age of 16. The work status dummy is positive and significant at the 10 percent level for mothers receiving support, perhaps because working mothers are less dependent on fathers for support. For mothers with no support, those with a high school degree show higher mother to child consumption ratios, while college education seems to have no effect. Finally, total expenditure seems to have no significant effect on the ratio m/c, especially when other characteristics of the mother are taken into account, suggesting that the assumption of homothetic preferences is not inappropriate in our setting.

6.2.2 Sensitivity Analysis:

The next few regressions set out to confirm the robustness of the result from the first two regressions by using several specifications of child and mother consumption categories and different expenditure cutoffs. We interact the *post* dummy with the mother's group to obtain three new dummy variables:

$post * control = 1$ if *post* and the mother receives no child support, 0 otherwise.

$post * test = 1$ if *post* and the mother receives child support, 0 otherwise.

$pre * test = 1$ if *pre* and the mother receives child support, 0 otherwise.

The default state is when the mother receives no support and the date falls in the *pre* years.

In Regression 3, we regress the baseline ratio m/c against the dummies $post{*}control, post{*}test$ and $pre{*}test$ along with all the variables mentioned above. The objective is to find out whether the change in these ratios after the introduction of the new regulation was significantly larger for mothers in the test group than for those in the control group. We conduct an F-test with the null hypothesis being $H0 : (post * test \square pre * test) \neq post * control$,

and the alternative $HA : (post * test \square pre * test) = post * control$. Even with few controls such as age, age squared, total expenditure and work status, the null hypothesis cannot be rejected with a 95 percent confidence interval. Once other controls are added, the result becomes even more significant at the 2 percent level.

Regression 4 expands the consumption categories to include alcohol, sports and recreation goods. Again, we find a solid support of the previous regression since the null hypothesis easily passes the 95 percent confidence interval, meaning that the difference in expenditure patterns between the two groups holds for an even wider set of goods than taken in the baseline case.

Regression 5 shows the effect of accounting for education in the child goods category. While the findings have been supportive so far, including education expenses renders the results insignificant, as the null hypothesis cannot be rejected only at the 60 percent confidence interval. A potential reason is that tuition, or the consumption of items such as school books and supplies is fairly inelastic and dictated by the school itself. Other items, such as private tutoring or extra help costs, which are more flexible and may reflect the choice of the mother, are unfortunately not included in the dataset. Another possibility is that some fathers pay directly for schooling, which would not be reflected in the present measure of expenditure.

Regressions 6 and 7 tackle the expenditure cutoff point, by restricting the sample to mothers who are below the 65th percentile of expenditure (Regression 6) or by including women with expenditure up to the 85th percentile (Regression 7). In a separate work which we do not report here, we ran the same regression using different expenditure cutoff points. Generally, results were still significant as women with high expenditures were included (as reflected by Regression 7), but less so as they approached the 100th percentile. This is in line with the prediction that the enforcement laws would affect mostly women who were more constrained in obtaining an enforcement order before but now can readily have access to it.

The empirical exercise presented here is simple, but the results are strongly in favor of my theory. One additional piece of information one may think would matter is the exact marital status of the mother. In this analysis, we have treated all single mothers equally, although one may think that some categories (like never married mothers) may have been more affected by the policies. Surprisingly, the inclusion of dummies for marital status had but a small effect on the regressions and their coefficients were consistently insignificant.

The fact that no information about fathers is available can be a restriction. The model assumes that noncustodial fathers cannot spend directly on their children, which may not be entirely true in reality, especially if the father stays in close contact with the child. As mothers spend a lower fraction of their income on children, the fathers may increase the number of in-kind transfers and gifts to children as a compensation. Unfortunately, the data does not allow for that measurement.

7 Conclusion

We present a simple model of interaction between separated parents where the main tension is their lack of commitment to play the first best equilibrium. As the sole public good provider, the mother may find it too costly to supply a high level of child consumption even after she's received a transfer from the father, which would lead to the underprovision of the child consumption. We show how one-sided enforcement of child support contracts can worsen the custodial mother's moral hazard problem and lead her to spend a higher fraction of her income on her private consumption and a lower fraction on the child than in the absence of enforcement.

Despite the numerous studies on child support compliance and the effects of the enforcement policies on support payments, little attention has been paid to the role of mothers as an equally important determinant of children's welfare. The analysis in this paper pushes the study of mother and child welfare one layer further, but the results should be read carefully. For a given interval of the mother's value, increasing her outside option will result in a decrease in the child's consumption. Nevertheless, for mothers who were receiving less than the child support guidelines or whose values were among the lowest in the contract, the enforcement policies are definitely propitious, and may raise both child and mother's welfare. This raises the issue of who benefits the most from these policies, and whether some system of accountability should be established for custodial parents receiving child support. This may include a call for mothers to provide regular evidence of their expenditure on the children. Another possible method would be to minimize the transfer amounts by increasing the father's share of direct spending on the child. To this effect, fathers could routinely be required to provide health insurance, schooling costs, summer camp costs or extra-curricular activities costs.

Although begging for further investigation, the findings in this paper are supported by previous studies. Hernandez, Beller and Graham (1995) examine changes in the effects of child support payments on the educational attainment of children during the 80's. They find that while child support income had a stronger impact on educational attainment of children than other sources of income, this effect was lower after the mandatory child support laws. If there exists a positive correlation between child expenditure and education, or if educational attainment is used as a signal for expenditure, this could suggest that as the enforcement threat grew larger, mothers could invest less in their children's education without fear of retaliation from the fathers. A second example is Flinn (2000), who also argues that expenditure on children may decrease as a result of enforcement policies, though following a different reasoning. There, with the help of a coordinator, parents can agree on a cooperative equilibrium which results in high child support payments and child expenditure. Once the coordinator becomes a contract-enforcing judge, parents necessarily revert to the non-cooperative enforcement equilibrium with possibly negative welfare results.

For simplicity, the model focused on one channel through which child support enforcement could affect the relative bargainng powers of parents, and hence the achievable set of outcomes. There are other possible aspects worth watching for policymakers, and exploring for researchers. For instance, it is often observed that the custodial parent would use

visitation rights as a punishment and bargaining tool. Several papers report a correlation between payments and contact with children, measured by time spent together, regularity of visits, etc. One can see how, under self-enforcing contracts, mothers would have a higher incentive to keep fathers close in order to reinforce their altruism toward their children, while with perfect enforcement, such an incentive is weakened. Another factor is labor decisions. In reality parents' labor decisions may be affected by their nonlabor income, and by the child support amount they're supposed to pay. So there may be moral hazard issues which this model (which has no leisure value or cost of working) doesn't capture. For the mother, guaranteeing her income from child support will have a negative effect on her labor supply and earnings from work. The effects of this on children are ambiguous, and probably depend on their age. For the father, the support obligation is similar to an income tax which may have either a positive or negative effect on hours worked.

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Table 1
Summary Statistics

	No child support		With child support	
	Pre (N=520)	Post (N=733)	Pre (N= 220)	Post (N=225)
Mother's age	33	35	33	34
High school	.63	.78	.82	.87
College	.06	.11	.06	.13
Work dummy	.44	.73	.64	.73
Number of children	1.93	1.93	1.9	1.94
Expenditure	$9,065	$11,140	$10,352	$11,455
Child support amount			$3,321	$4,179

Table 2
Expenditure in Data (Baseline Case)
(Standard deviation in parentheses)

	No child support		With child support	
	Pre (N=520)	Post (N=733)	Pre (N= 220)	Post (N=225)
m/c	1.59	1.72	1.57	2.04
	(2.87)	(3.26)	(2.56)	(3.75)
m	277	363	315	403
	(306)	(427)	(320)	(400)
c	221	279	244	266
	(220)	(300)	(249)	(244)

Regression 1

Regression of the baseline ratio m/c for single mothers with child support
(mothers with one or more interviews)
(Absolute value of t-statistic in parentheses)
Sample size = 462

	(1)	(2)	(3)
Constant	2.346	1.867	3.172
	(0.57)	(0.47)	(0.78)
post	0.758	0.824	0.835
	(2.04)*	(2.34)*	(2.33)*
Age	-0.264	-0.304	-0.335
	(1.53)	(1.80)	(1.99)*
Age^2	0.005	0.005	0.005
	(2.08)*	(2.11)*	(2.27)*
Black	-0.760	-0.858	-0.661
	(1.76)	(2.09)*	(1.58)
Urban	0.459	0.439	0.497
	(0.77)	(0.78)	(0.87)
High school	0.159	0.547	0.337
	(0.30)	(1.10)	(0.66)
College	-0.202	-0.137	-0.107
	(0.31)	(0.22)	(0.17)
log(total expenditure)	0.307	0.509	0.442
	(0.90)	(1.56)	(1.34)
# Children	-0.459	2.676	2.621
	(2.56)*	(4.93)**	(4.84)**
Girls 16-18		-0.144	-0.011
		(0.25)	(0.02)
Boys 2-15		-3.536	-3.438
		(6.31)**	(6.10)**
Girls 2-15		-3.395	-3.291
		(6.23)**	(6.03)**
Infants		-2.063	-1.849
		(3.34)**	(2.98)**
Welfare			-1.377
			(1.55)
Work dummy			0.815
			(1.96)
log(child support)			0.066
			(0.38)
R-squared	0.09	0.19	0.20

* significant at 5%; ** significant at 1%

Regression 2

Regression of the baseline ratio m/c for single mothers without child support (mothers with one or more interviews)
(Absolute value of t-statistic in parentheses)
Sample size = 1288

	(1)	(2)	(3)
Constant	2.068	2.325	1.704
	(1.16)	(1.32)	(0.88)
post	-0.066	-0.108	-0.197
	(0.32)	(0.55)	(0.96)
Age	-0.151	-0.218	-0.225
	(2.33)*	(3.31)**	(3.41)**
Age^2	0.003	0.003	0.003
	(2.96)**	(3.48)**	(3.59)**
Black	-0.396	-0.412	-0.396
	(1.93)	(2.07)*	(1.98)*
Urban	0.169	0.165	0.162
	(0.49)	(0.50)	(0.49)
High school	0.574	0.663	0.626
	(2.43)*	(2.89)**	(2.69)**
College	0.302	0.335	0.301
	(0.83)	(0.96)	(0.86)
log(total expenditure)	0.227	0.316	0.286
	(1.30)	(1.86)	(1.66)
# Children	-0.381	1.299	1.321
	(3.88)**	(5.01)**	(5.09)**
Girls 16-18		0.695	0.687
		(2.55)*	(2.52)*
Boys 2-15		-1.916	-1.909
		(7.20)**	(7.18)**
Girls 2-15		-1.872	-1.875
		(6.91)**	(6.92)**
Infants		-1.533	-1.515
		(4.89)**	(4.81)**
Welfare			0.901
			(1.14)
Work dummy			0.268
			(1.20)
R-squared	0.05	0.11	0.11

* significant at 5%; ** significant at 1%

Regression 3

Regression of the baseline ratio m/c for single mothers with and without child support
(Absolute value of t-statistic in parentheses)
Sample size = 690

	(1)	(2)	(3)
post∗control	-0.20 (0.24)	-0.27 (0.24)	-0.37 (0.25)
post∗test	0.83 (0.55)	0.72 (0.51)	0.52 (0.53)
pre∗test	-0.32 (0.27)	-0.45 (0.29)	-0.58 (0.39)
F	4.12	4.67	5.89
p-value of F-statistic	0.043	0.031	0.015
controls	age, age^2, expenditure work status	(1) + race, education	(2) + urban, child support amount, composition of kids

Regression 4

Regression of the ratio m/c including alcohol, sports and recreation goods for single mothers with and without child support
(Absolute value of t-statistic in parentheses)
Sample size = 690

	(1)	(2)	(3)
post∗control	-0.32 (0.26)	-0.36 (0.26)	-0.47 (0.26)
post∗test	0.67 (0.56)	0.58 (0.53)	0.25 (0.53)
pre∗test	-0.36 (0.28)	-0.46 (0.30)	-0.68 (0.38)
F	4.10	4.17	5.08
p-value of F-statistic	0.043	0.041	0.024
controls	age, age^2, expenditure work status	(1) + race, education	(2) + urban, child support amount, composition of kids

Regression 5

Regression of the ratio m/c including education, for single mothers with and without child support
(Absolute value of t-statistic in parentheses)
Sample size = 690

	(1)	(2)	(3)
post∗control	-0.04 (0.19)	-0.03 (0.18)	-0.11 (0.18)
post∗test	-0.09 (0.21)	-0.09 (0.20)	-0.21 (0.28)
pre∗test	-0.26 (0.22)	-0.30 (0.22)	-0.39 (0.27)
F	0.56	0.73	1.08
p-value of F-statistic	0.454	0.391	0.293
controls	age, age^2, expenditure work status	(1) + race, education	(2) + urban, child support amount, composition of kids

Regression 6

Regression of the baseline ratio m/c for single mothers with and without child support and total expenditure < 65th percentile (mothers with one or more interviews)
(Absolute value of t-statistic in parentheses)
Sample size = 810

	(1)	(2)	(3)
post∗control	-0.32 (0.25)	-0.37 (0.25)	-0.372 (0.24)
post∗test	0.42 (0.49)	0.33 (0.46)	0.31 (0.47)
pre∗test	-0.31 (0.28)	-0.46 (0.30)	-0.54 (0.33)
F	3.38	4.01	5.24
p-value of F-statistic	0.066	0.045	0.022
controls	age, age^2, expenditure work status	(1) + race, education	(2) + urban, child support amount, composition of kids

Regression 7

Regression of the baseline ratio m/c for single mothers with and without child support and total expenditure < 85th percentile (mothers with one or more interviews)
(Absolute value of t-statistic in parentheses)
Sample size = 1146

	(1)	(2)	(3)
post∗control	-0.25 (0.23)	-0.24 (0.23)	-0.20 (0.22)
post∗test	0.04 (0.37)	-0.02 (0.36)	0.14 (0.38)
pre∗test	-0.36 (0.24)	-0.46 (0.25)	-0.43 (0.26)
F	2.27	2.55	3.87
p-value of F-statistic	0.132	0.110	0.049
controls	age, age^2, expenditure work status	(1) + race, education	(2) + urban, child support amount, composition of kids