Child Support Obligations and Family Outcomes: Causal Evidence from Administrative Data*

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Abstract

Single-parent households are disproportionally disadvantaged, motivating governments to intervene through child support policies that mandate financial transfers from non-custodial parents to the custodial parents and children. We leverage non-linearities in Danish child support guidelines together with rich administrative data to provide causal estimates of the effects of child support obligations on family outcomes. We estimate that among families with formal child support agreements, a 1,000 DKK ($183) increase in a father's annual obligation is associated with a 573 DKK ($104) increase in his annual payment. However, we also show that a higher obligation reduces the likelihood that the father ever lives with his child, pointing to some substitution between financial and non-pecuniary investments. Further, we find that larger orders increase both parents' fertility with new partners. The maternal fertility response is consistent with a positive income-fertility relationship, while the paternal fertility response may reflect increased demand for new offspring as a result of reduced contact with existing children. Finally, we find evidence that some fathers may reduce their labor supply to avoid facing higher support obligations. Our findings suggest that government efforts to increase child investments through mandates on parents can be complicated by their behavioral responses to them.

JEL Codes: H4, I1, I3, J1, J2

Keywords: child support, family, divorce, children, father involvement, fertility

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1 Introduction

Family structure in many developed countries has changed dramatically over the last several decades. For children, growing up in a household with two married biological parents is no longer the pervasive norm that it was half a century ago. Their parents are now much more likely to get divorced, get remarried, give birth out of wedlock with multiple partners, or cohabit without legal marriage. As a consequence, whereas 9 percent of U.S. children under age 18 lived with only one biological parent in the household in 1960, over 26 percent do today. Many Western European countries have similar rates—for example, about 22 percent of British children, 18 percent of Danish children, and 15 percent of German children live with only one parent.[1]

Economists have long noted the inefficiencies in child investment that arise among separated parents: non-custodial parents have limited control over the allocative decisions of the custodial parents, precluding them from achieving Pareto-optimal allocations of their joint resources (Weiss and Willis, 1985). Indeed, data show that children growing up without both parents in the household are disproportionally disadvantaged. In the U.S., while the overall child poverty rate is 22 percent, children in single-mother households are nearly twice as likely to live below the poverty line. In Europe, the disparities across household types are similarly stark: for example, Danish children in single-mother households are over three times more likely to live in poverty than the overall child population.[2] Children in single-mother households also tend to have worse schooling, behavioral, and health outcomes relative to their counterparts living in two-parent households (Amato, 2005; Weitoft *et al.*, 2003).

As a result, many governments intervene in these families by implementing rules regarding child support obligations that mandate financial transfers from non-custodial parents—typically, fathers—to their children. In this paper, we use a new identification strategy and a rich administrative data set from Denmark to provide some of the first causal estimates of the effects of such government interventions on a wide range of family outcomes.

In principle, these interventions have two objectives: 1) to increase child investments closer to efficient levels, and 2) to reduce public spending by shifting the burden of support of single-mother households from government programs to the fathers. However, as custodial parents have

[1] Data for the European countries are from EU Community Statistics on Income and Living Conditions, 2007. Data for U.S. are from the 1960 Decennial Census and the 2013 Current Population Survey.

[2] Information on U.S. child poverty rates comes from the U.S. Census Bureau. Information on Danish child poverty rates comes from a report by UNICEF titled "Measuring Child Poverty", available here: http://www.unicef-irc.org/publications/pdf/rc10_eng.pdf.

full allocative power over how to spend the payments, these policies do not resolve the underlying collective-goods problem highlighted by Weiss and Willis (1985). For instance, non-custodial parents may view their obligations as taxes, which may not always benefit their children. Moreover, since child support determination is often linked to the custody arrangement (e.g., the child support mandate may be different depending on whether one parent has sole child custody or if the parents share custody), these obligations may affect parental decisions about child custody, as well as other voluntary and non-pecuniary investments and contact with children. As we describe further in Section 2, these decisions may in turn have downstream effects on a variety of other parental behaviors, including family formation with new partners and labor market activities. Because of these possible consequences, the implications for both family welfare and public spending are complex and theoretically ambiguous.

The existing evidence on the *causal* effects of child support mandates is very limited. Researchers are faced with two main challenges. First, child support obligations are not randomly assigned. For example, fathers who are ordered to pay more in child support usually have higher incomes, are more educated, have more stable jobs, and may have different preferences toward child investment relative to fathers who are ordered to pay less. It is thus difficult to disentangle the causal effects of child support orders on their families' outcomes from the possible influences of these other factors.

The second challenge stems from a substantial constraint on data availability, especially in the United States, where most of the existing work has been set (see Garfinkel *et al.*, 1998; Lerman and Sorenson, 2003; Cancian *et al.*, 2011 for some surveys). Most data sets measure outcomes for individuals in a given household, making it impossible to link children to their non-custodial parents. Additionally, because many of the existing studies use survey data sets such as the Current Population Survey, this literature relies heavily on self-reported measures of income, which may be missing or wrongly reported for a significant fraction of respondents (Weinberg, 2006). As such, researchers are unable to precisely identify child support obligations (which are based on parental income), and to our knowledge, no studies have exploited variation in child support guidelines across individuals with different incomes.

Our paper makes two primary contributions to address these challenges. First, we propose a new identification strategy that exploits non-linearities in Danish child support guidelines, which assign non-custodial parents different obligations according to their incomes, numbers of children, and years of separation. As described in more detail in Section 3, every year, all non-custodial parents

under formal child support agreements are required to pay the same base amount, regardless of their income levels. However, non-custodial parents with annual gross incomes above certain thresholds must also pay additional percentages of the base amount, which range between 25 and 300 percent, depending on the location of the threshold. The locations of these income thresholds also vary with the non-custodial parent's number of children. Moreover, in every year during our sample timeframe, the base amount has been increased above the rate of inflation, and the locations of the thresholds have been changed.

These guidelines create a unique source of non-linear variation in the obligations faced by non-custodial parents. For example, in any given year, non-custodial parents face different orders depending on their incomes and numbers of children. Additionally, over time, the guidelines have changed such that parents in some income ranges have experienced increases in real obligations, while parents in other income ranges have experienced decreases, with the magnitudes and signs of these changes differing depending on their numbers of children.

Our second contribution is to introduce a new administrative data set for studying these types of family interventions that contains information on the universe of children born in Denmark over 1985-2008 linked to their parents *regardless of their residence status* and has precise information on parental income, as described in detail in Section 4.

We leverage this administrative data together with the variation in child support mandates to comprehensively analyze the effects of non-custodial fathers' child support obligations on their payments to and contact with children, as well as both parents' subsequent family formation and labor market behavior, as we explain in Section 5.[3] Our analysis uses data on all parents who divorce, separate, or have a child outside marriage or cohabitation over 1999-2008.[4] For each father and in each year post-separation observed in the data, we calculate the annual child support obligation he should face based on his income and number of children *measured in the year of separation.* Put differently, these calculated obligations are based only on variation in the government-mandated guidelines, and do *not* take into account any changes to the father's income or number of children

[3]Our analysis focuses on studying the effects of *fathers'* child support obligations because they are much more likely than mothers to become the non-custodial parents in case of separation. For example, according to Statistics Denmark, in 2010, about 26 percent of children lived with only one biological parent. Out of them, 23 percent lived with only their mothers or their mothers and their partners, while 3 percent lived with only their fathers or their fathers and their partners. While we observe information on whether the father lives with his child post-separation, we purposely do not drop these fathers since we show that residence with the child is an outcome that can be affected by the child support obligation.

[4]As we detail in Section 4, we only consider divorces, separations, and out-of-wedlock births from 1999 onwards because child support guidelines prior to 1999 did not exhibit as much variation with respect to income and were often not enforced.

after separation, as such changes may reflect endogenous responses. To identify the causal effects of these obligations, we rely on an assumption that there are no omitted variables that systematically covary with the child support guidelines and differentially affect fathers across income levels, number of children, and years of separation. In support of this assumption, we provide evidence that our calculated obligations are uncorrelated with a variety of parental characteristics that are not used in setting them.

Our results point to important parental behavioral responses to the child support mandates, as detailed in Section 6. We show that over the time of separation observed in the data, a 1,000DKK ($183) increase in a father's average annual child support obligation is associated with a 430DKK ($78) increase in his average annual payment. This estimate represents an intent-to-treat (ITT) effect as our data include all separated parents, regardless of whether they have a formal child support agreement. Scaling by an approximate formal agreement rate of 75 percent (Skinner *et al.*, 2007) implies a treatment-on-the-treated (TOT) relationship of a 573DKK ($104) increase in payments for every 1,000DKK increase in obligations. Our results thus suggest that child support mandates are moderately effective at increasing financial transfers from non-custodial fathers to children. However, the lack of a one-for-one relationship is also consistent with mandated payments partially substituting for voluntary payments that some fathers would have made in the absence of the orders, and with imperfect order compliance.

Next, we examine how the child support obligation affects the likelihood that a father resides with his child post-separation. In Denmark, fathers who share in physical custody are not mandated to make child support payments; hence, a higher obligation may increase the incentive for the father to live with his child at least part of the time so to avoid making a larger payment. However, mothers, who have substantial say in custody decisions, have the opposite incentive to refuse to share custody and instead receive the higher payment. Moreover, fathers may consider financial transfers as partial substitutes for other forms of non-pecuniary investments and contact with children, which would also lead to a negative relationship between child support obligations and paternal physical custody rates. We find that this latter force seems to dominate in our data—an additional 1,000DKK in the average annual child support obligation leads to a 1.8 percent reduction in the likelihood that a father resides with his child in at least one year post-separation.

We also analyze the impacts of child support obligations on parental subsequent fertility. We show that a 1,000DKK increase in the average annual child support obligation leads to 2.7 and 3.1 percent increases in the subsequent fertility rates of mothers and fathers, respectively. Both

parents are more likely to have additional children while married to or cohabiting with new partners, while mothers are also more likely to have children outside these unions. The finding that higher obligations raise maternal fertility is consistent with a positive income-fertility relationship, which has been documented in other studies analyzing child tax and welfare benefits in Western Europe and Canada (Laroque and Salanié, 2008; Brewer *et al.*, 2012; Milligan, 2005). For fathers, the positive relationship between child support obligations and subsequent fertility may be explained by our result on father-child co-residence, which implies that fathers with higher obligations have less attachment to their existing children and more time available to invest in new offspring within new unions.

Finally, we find that fathers change their labor market behavior in response to child support obligations, while mothers do not. The fathers in our sample face different incentives with regard to labor supply depending on whether their incomes are above or below the guideline thresholds. Non-custodial fathers with separation year incomes below the first threshold must all pay the same lump-sum base amount; for them, a child support order represents a negative income shock, which is predicted to reduce leisure and increase labor supply. In contrast, fathers with separation year incomes above the first and subsequent thresholds must pay additional percentages of the base amount; for them, the obligation also imposes a substitution effect. These higher-income fathers face a competing incentive to reduce their labor supply in order to avoid paying the supplemental amounts.

Our results show that a $1,000$DKK increase in the average annual child support obligation reduces overall paternal labor force participation by about 0.15 percent. This average treatment effect masks important heterogeneity, however. As predicted, fathers with separation year incomes below the first guideline threshold actually increase their labor supply. The reduction in labor force participation is therefore driven entirely by fathers with separation year incomes above the first threshold, which is consistent with their child support obligations representing income taxes that can disincentivize labor supply. This labor supply decline reflects transitions into disability insurance and discretionary early retirement programs. As such, we provide novel support for the relationship between the relative value of labor market participation and the take-up of these programs, which has been previously documented both in Scandinavia (Bratsberg *et al.*, 2010; Bingley *et al.*, 2011) and in the U.S. (Black *et al.*, 2002; Autor and Duggan, 2003).

As we discuss in Section 7, our findings suggest that government interventions into families with divorced and unmarried parents can result in important parental behavioral changes that can

distort their intended impacts on child investment levels, public spending, and overall family welfare. While fathers respond to child support orders with increased financial transfers to their children, they also reduce their contact with them. Moreover, the increases in both parents' subsequent fertility rates point to possible reductions in the allocation of resources toward the existing children whom child support guidelines are meant to help. Finally, the decreases in paternal labor supply among higher-income fathers demonstrate the market distortions generated by the "tax-like" nature of child support mandates. Our results suggest that although child support mandates may shift some of the cost of single-mother household support from welfare programs to the non-custodial fathers, they also pass part of this cost on to other government programs such as disability insurance and early retirement.

In sum, our results highlight the role of parental agency in family resource allocation, and suggest that government efforts to increase child investment levels through mandates on parents can be complicated by their behavioral responses to them.

2 How Might Government-Mandated Child Support Orders Affect Family Outcomes?

Child support mandates have theoretically ambiguous effects on family outcomes. In this paper, we pay particular attention to the effects of child support obligations on the outcomes of parents *who have already separated*. However, child support orders, which, in theory, make separation and family formation more costly for non-custodial fathers and increase custodial mothers' bargaining power, may also influence the rates of divorce and separation among parents who are still together, as well as the rates of childbearing outside marriage and cohabitation among men and women who are not yet parents.

Indeed, other policies, such as unilateral divorce laws and joint custody reforms, which aim to affect the outcomes of families with divorced and unmarried parents, have been shown to also impact divorce and marriage rates (Stevenson and Wolfers, 2006; Wolfers, 2006; Halla, 2013). Such effects can complicate the study of outcomes among separated parents because of bias due to the treatment (in our setting, the child support order) being correlated with selection in or out of the sample of analysis. However, this issue is not empirically relevant in our context. As discussed in detail in Section 6, we find no relationship between child support obligations and the likelihood of parental separation in our data.

Consequently, this section presents a general framework for understanding the channels through

which the non-custodial parents' child support obligations could affect our primary outcomes of interest observed *after separation*. As noted above, throughout this paper, we treat fathers as the non-custodial parents and mothers as the custodial parents.

2.1 Conceptual Framework

Consider a set of separated parents with one child between them, where mothers are denoted by subscript m and fathers are denoted by subscript f. Each parent obtains utility from child quality, Q, their own private adult consumption, C, and their leisure time, L.[5] Utility from child quality is comprised of two components: Q^0 (current child quality), Q^1 (child quality from a possible subsequent child). For simplicity, we do not explicitly model the distinction between future children born within and outside marriage/cohabitation; however, we discuss how incorporating this distinction into the model would affect the main conclusions further below and in Appendix Section B. For each parent $i \in \{m, f\}$, denote the number of subsequent children by n_i, where n_i can take on integer values $\{0, 1, 2, \ldots\}$.

Additionally, we assume that child quality is a function of two types of investments: financial, F, and time, K. Denote the financial and time investments in the current child by F^0 and K^0, respectively. For mothers' subsequent children, financial and time investments are F_m^1 and K_m^1, respectively; for fathers' subsequent children, financial and time investments are F_f^1 and K_f^1, respectively.

Thus, in terms of time allocation, each parent must divide his/her time between work in the labor market (denoted by H), time investments into children, and leisure. Each parent $i \in \{m, f\}$ earns wage w_i in the labor market, and total time available is denoted by T.

Following the literature (e.g., Weiss and Willis, 1985; Willis, 1999; Roff and Lugo-Gil, 2012), we assume that the separated parents do *not* bargain cooperatively and instead face a static Stackelberg game. In this setting, the non-custodial father can make two types of transfers to the custodial mother: a financial transfer, s, and a time transfer, t. The custodial mother chooses how to allocate these transfers. Intuitively, we can think of the time transfer as representing the amount of extra time freed up for the mother as a result of the father spending time with their child. The mother

[5]Note that our framework differs from that of Neal (2004), whose model assumes that "absent fathers do not enjoy any consumption gains from having children". We instead follow Willis (1999) by assuming that non-custodial fathers in fact obtain utility from child quality. This assumption is arguably more realistic in our setting, where an estimated 20 percent of Danish children with divorced or separated parents have fathers who share in their physical custody (Bjarnason and Arnarsson, 2011), and another 45 percent have non-custodial fathers who visit with them at least every other weekend (Kampmann and Nielsen, 2004).

moves first and maximizes her utility conditional on the father's transfers. The father then chooses his optimal s and t given the mother's response functions.

For subsequent children, we assume that the parents expect to bargain cooperatively with new partners. Each parent i expects to be responsible for fraction λ_i^F of the total financial investment and fraction λ_i^K of the total time investment per subsequent child born.

More concretely, suppose parental utility, $\forall i \in \{m, f\}$, is represented by the following function:

$$U\Big(Q^0, Q_i^1, n_i, C_i, L_i\Big)$$
$$= \beta_i U_c\Big(Q^0(F^0, K^0),\ \ n_i * Q^1(F_i^1, K_i^1)\Big) + (1-\beta_i)U_a\Big(C_i, L_i\Big)$$

where $U_c(\cdot)$ represents utility from children, $U_a(\cdot)$ represents utility from adult activities, and β_i, $0 < \beta_i < 1$, represents the weight each parent places on his/her preferences toward children relative to other adult consumption goods.[6]

The mother chooses the optimal current and subsequent child investments, the number of subsequent children she will have, and her own adult consumption and leisure by solving the following maximization problem:[7]

$$\max_{F^0, K^0, n_m, F_m^1, K_m^1, C_m, L_m}$$
$$\beta_m U_c\Big(Q^0(F^0, K^0),\ \ n_m * Q^1(F_m^1, K_m^1)\Big) + (1-\beta_m)U_a\Big(C_m, L_m\Big)$$
$$\text{s.t.} \quad F^0 + n_m \lambda_m^F F_m^1 + C_m$$
$$= w_m\Big(T - L_m - K^0 + t - n_m \lambda_m^K K_m^1\Big) + s$$

The father then maximizes his indirect utility function, taking into account the maternal optimal response functions for current child investments, $F^0(s,t)^*$ and $K^0(s,t)^*$, which can be expressed in terms of his monetary and time transfers (s and t, respectively). He chooses his optimal financial and time transfers for the current child, the number of subsequent children he will have, his investments into subsequent children, his adult private consumption, and his time spent in leisure. Additionally, we assume that for the current child, the father is subject to a child support mandate, R, which

[6] While we do not make any assumptions about a particular functional form of the utility function in this discussion, we note that the utility function in this framework must allow for corner solutions as n_i is allowed to be set to zero. More formally, it must be that $\lim_{x \to 0} U'(x) \neq \infty$.

[7] Prices of consumption goods are normalized to 1 for simplicity.

depends on his earned income and his time transfer, and is defined further below. The father thus solves the following problem:

$$\max_{s,t,n_f,L_f,F_f^1,K_f^1}$$

$$\beta_f U_c\Big(Q^0(F^0(s,t)^*, K^0(s,t)^*),\ \ n_f * Q^1(F_f^1, K_f^1)\Big)$$

$$+(1-\beta_f)U_a\Big(w_f(T - L_f - t - n_f\lambda_f^K K_f^1) - s - n_f\lambda_f^F F_f^1,\ \ L_f\Big)$$

$$\text{s.t.} \quad s \geq R(w_f H_f, t)$$

The child support obligation for the current child, $R(w_f H_f, t)$, is set according to the father's earned income, $w_f H_f$, and his time transfer, t, in a way similar to the actual Danish child support guidelines that we study. In particular,

$$R(w_f H_f, t) = \begin{cases} \xi & \text{if} \quad w_f H_f \leq \overline{Y} \quad \text{and} \quad t \leq \bar{t} \\ \xi + \tau & \text{if} \quad w_f H_f > \overline{Y} \quad \text{and} \quad t \leq \bar{t} \\ 0 & \text{if} \quad t > \bar{t} \end{cases}$$

for some $\xi > 0$, $\tau > 0$, $\overline{Y} > 0$, and $\bar{t} > 0$. In other words, we assume that the guidelines are set such that fathers must pay a base amount, ξ, regardless of income. Fathers with incomes above some threshold, $\overline{Y}$, face an additional obligation in the amount of τ. Additionally, child support orders are no longer in effect once fathers make high enough time transfers, t (i.e., if $t > \bar{t}$). For example, in our context, fathers who share in physical custody of their children do not need to pay child support.

Denote the father's optimal financial transfer by:

$$s^* = \max\Big(s^{unc},\ R(\cdot)\Big)$$

where s^{unc} denotes the (unconstrained) solution to the father's optimization problem if the child support mandate constraint is not binding.

2.2 Effects of Child Support Mandates on Parental Behaviors

The purpose of government mandates on child support is to increase fathers' financial transfers to their children. Do they accomplish this goal? And what are the impacts on other parental behaviors

such as fathers' time transfers, both parents' subsequent fertility decisions, and both parents' labor market behaviors?

Let us consider two order schemes: $R_1(w_f H_f, t)$ and $R_2(w_f H_f, t)$, with $\xi_2 > \xi_1$ and $\tau_2 > \tau_1$. What happens to parental behaviors when we increase the child support obligation from R_1 to R_2? Our model highlights the theoretical ambiguity of this question with regard to the following parental behaviors:

Fathers' Financial Transfers Will s^* increase when fathers are faced with R_2 instead of R_1? Consider three possible cases that depend on what the financial transfers would have been in the absence of government intervention:

First, if $s^{unc} \geq R_2$, we have a case where a father optimally transfers as much or more than what is mandated under the higher order, R_2. This father will not alter s^* in response to a switch from the lower to the higher order.

Second, if $R_1 < s^{unc} < R_2$, we have a case where, without any mandates, a father would optimally pay more than the lower order, R_1, but less than the higher order, R_2. When faced with a change from the lower to the higher order, it may be optimal for the father to just increase s^* from s^{unc} to R_2. Note that the magnitude of this increase is strictly less than the difference between the two order schemes, $R_2 - R_1$. However, as discussed further below, some (higher-income) fathers may also respond by lowering their labor supply so to reduce their R_2 obligations from $\xi_2 + \tau_2$ to ξ_2. If $\xi_2 < s^{unc} < \xi_2 + \tau_2$, then we may even see a decrease in s^* from s^{unc} to ξ_2.

Third, if $s^{unc} \leq R_1$, we have a case where a father would optimally pay less than the lower order in the absence of government intervention. There are two possibilites for these fathers as well. Some fathers may simply increase s^* exactly from R_1 to R_2 (either from ξ_1 to ξ_2 or from $\xi_1 + \tau_1$ to $\xi_2 + \tau_2$). However, as before, if some fathers respond by lowering their labor supply, s^* may instead change from $\xi_1 + \tau_1$ to ξ_2, which may reflect either an increase or a decrease in optimal payments, depending on whether ξ_2 is smaller or larger than $\xi_1 + \tau_1$.

Thus, while increases in child support orders are predicted to increase some fathers' financial transfers to their children, this relationship is complicated by other paternal behaviors, and may not be one-for-one on average. Some fathers may just substitute for non-mandated transfers that they would have made in the absence of government intervention. Additionally, labor supply responses may even lead to a perverse relationship between child support mandates and actual payments for some fathers.

Below, as we discuss the implications for other parental behaviors, we focus on cases where the child support mandates are binding. Clearly, parents for whom the mandates are never binding do not alter their behaviors.

Fathers' Physical Custody of Children Paternal physical custody is our only proxy for paternal time investments, t. How will optimal t^* change when a father is faced with R_2 instead of R_1? There are two opposing forces at work for fathers who are predicted to increase their financial transfers in response to the higher mandate (these incentives are flipped for fathers for whom child support mandates and payments are negatively related).

On the one hand, since fathers who make high enough time transfers (i.e., $t \geq \bar{t}$) do not face the child support mandate, a higher order may lead to an increase in t^* as the father can forego a larger financial cost by being above $\bar{t}$. Consequently, a higher order may be associated with an increased likelihood of the father having some physical custody of his child.

On the other hand, the higher order increases the maternal incentive to actually receive the higher mandated financial transfer by ensuring (via her optimal response functions) that the father's time transfer does not exceed $\bar{t}$. Put differently, when faced with the higher order, the mother has a greater incentive to make sure that the father does not share in physical custody so that she instead can receive a higher monetary transfer.[8] Consequently, a higher order may be associated with a lower likelihood of the father residing with his child. Moreover, since child quality is a function of both financial and time investments, and since higher orders increase financial investments, F, there may be additional downward pressure on paternal optimal time transfers, t^*, due to properties of the child quality function (i.e., if financial and time investments are at all substitutes).

Both Parents' Subsequent Family Formation We are also interested in what happens to parental subsequent fertility, as measured by the numbers of children with new partners that parents will have: n_f and n_m. Again, consider cases where higher child support mandates are predicted to increase fathers' financial transfers.

For fathers, a higher order represents a larger negative income effect, which may lead to a reduction in subsequent fertility. However, as described above, higher orders may also lead to less

[8] In practice, parents can either agree on a custody arrangement informally or they can go to the court if they are unable to reach an agreement. Hence, if the mother refuses to share physical custody, the father can in principle take the issue to court. However, prior to a reform in October 2007, which made joint custody the default determination, courts were likely to rule in favor of maternal sole custody. Thus, it is reasonable to assume that, during our sample time frame of 1999-2008, mothers had substantial influence over the custody decision.

time spent with existing children, t^*, which may free up time available to invest in future children and thus have an offsetting positive effect on paternal future fertility.

For mothers, higher orders constitute larger positive income effects, resulting in greater demand for subsequent children. However, mothers also face an opposite incentive to lower subsequent fertility in response to the possible reduction in the paternal time transfer, t^*, which lowers their time available to invest in subsequent children.[9]

Moreover, as we model more explicitly in Appendix B, there can be important implications for parental subsequent fertility *outside* marriage and cohabitation. In particular, suppose parents make their decisions regarding future fertility outside unions based on their expectations of the transfers they will have to give and receive, and that these expectations are non-decreasing functions of current transfers. This implies that the increase in the obligation raises the expected cost of having more children out of wedlock or cohabitation for fathers, making subsequent paternal fertility within unions less costly relative to fertility outside unions. In contrast, mothers have larger incentives for childbearing outside unions because the receipt of higher payments for existing children increases their expectations of child support transfers associated with subsequent offspring from new partners.

Both Parents' Subsequent Labor Market Behavior Finally, we examine what happens to parental labor market outcomes post-separation.

Fathers face opposing labor supply incentives. For a father with earnings below the threshold, $\overline{Y}$, the child support order is simply a flat negative income shock in the amount of ξ. This shock is predicted to reduce demand for leisure and increase labor supply. In contrast, a father with an income above the threshold faces a type of tax on earnings. This higher-income father has an incentive to lower his labor supply in order to reduce his income and avoid paying the additional τ amount.

For a mother, the child support order is simply a positive income shock that is not dependent on her own earned income. As such, we may expect an increase in maternal demand for leisure and therefore a reduction in her labor supply. Additionally, maternal labor supply may also be affected by possible changes to her time available to work due to impacts on the father's time transfer, t^*.

[9]Note, however, that these fertility effects for fathers and mothers are relevant insofar as we hold the fertility responses of the other parents constant. As these parents are all arguably in the same matching market post-separation, the net effects on overall parental fertility rates also depend on the numbers of men and women and their relative bargaining powers.

2.3 Existing Evidence on Child Support Mandates in the U.S.

The existing literature has examined the effects of government mandates on child support mostly by using variation across U.S. states in either child support enforcement spending or the implementation of specific policies (such as automatic wage withholding and license revocation for non-payment). Several such studies have shown that child support enforcement policies and spending are correlated with higher formal child support payments (Freeman and Waldfogel, 2001; Cancian *et al.*, 2007). The effects on other non-mandated forms of involvement are mixed: Nepomnyaschy (2007) finds fathers who pay more child support increase contact with their children, while Nepomnyaschy and Garfinkel (2010) show that child support enforcement is associated with lower voluntary payments.

With regard to family formation, to the best of our knowledge, no previous work has examined subsequent fertility patterns of mothers and fathers who have already separated. However, there is evidence that greater child support enforcement is negatively correlated with overall non-marital fertility rates, possibly implying that a deterrence effect on men may dominate the opposite effect on women (Case, 1998; Huang, 2002; Plotnick *et al.*, 2004; Aizer and McLanahan, 2006).[10]

Finally, the evidence on the effects on parental labor supply is also inconclusive. For example, Freeman and Waldfogel (1998) find no correlation between child support enforcement and fathers' work behavior, while Holzer *et al.* (2005), Roff and Lugo-Gil (2012), and Cancian *et al.* (2013) show a negative relationship between child support mandates and paternal formal labor supply.[11]

On the whole, the existing literature cannot yet paint a complete picture of the implications of government interventions into families with divorced and unmarried parents. Moreover, studies may be limited in their ability to establish causal relationships as child support enforcement spending and the timing of policy implementation may be correlated with other state time-varying factors that could affect family welfare (e.g., local labor market conditions, other welfare programs, changes to population demographics, etc.). Additionally, by relying on survey data sets, most of the existing work cannot actually identify child support obligations faced by fathers because of the substantial noise in self-reported income measures.

Most recently, two papers have advanced the literature by leveraging proprietary data from Wisconsin to study the impacts of child support on parental employment and cohabitation decisions.

[10] There is also some evidence that higher child support payments are correlated with lower subsequent remarriage rates among fathers (Bloom *et al.*, 1998).

[11] For mothers, Hu (1999) demonstrates that child support payments may reduce welfare participation and increase labor force participation.

In the first paper, Cancian *et al.* (2013) exploit the fact that birthing costs are charged to unmarried fathers as child support when their children's births are covered by Medicaid. Using variation in birthing costs across 23 counties over time, they find that higher child support arrears are associated with lower subsequent earnings from the formal labor force among low-income fathers. In the second paper, Cancian and Meyer (2014) study a randomized experiment conducted on approximately 700 single mothers who entered Wisconsin's Temporary Assistance for Needy Families (TANF) program between September 1997 and July 1998. This experiment randomly assigned TANF participants to receive either partial or full child support payments, and the authors find that women receiving full payments were less likely to cohabit with new partners.[12]

Our work builds on this literature by developing a new identification strategy and using administrative population-level data to lend causal estimates of the effects of child support mandates on a comprehensive set of family outcomes that includes measures of paternal investments in their children, parental subsequent fertility, and parental labor market behavior.

3 The Danish Child Support System

Most Western governments have implemented rules regarding child support. For example, in the United States, Congress mandated that states establish formal child support guidelines in 1984, under which a non-custodial parent is required to pay a fixed percentage of his income (or the combination of his and the custodial parent's income) to his children every month.

In Denmark, the setting for our research, child support guidelines date back to the 19th century when the Act on the Maintenance of Illegitimate Children of 1888 delineated a "standard rate of maintenance" for children whose biological parents had separated. Currently, all issues related to divorce, separation, and child support are handled by a central government body called the County Governor's Office. Parents who have sole physical custody of their children can request a formal child support agreement from this agency, which then assigns child support obligations to the non-custodial parents according to guidelines described in detail below. The non-custodial parent must

[12]While these recent studies provide important novel evidence on the relationship between child support mandates and selected parental outcomes in Wisconsin, some questions about causal inference and external validity remain. In particular, for the first paper, the identifying assumption is that the differences in birthing cost trends across counties are uncorrelated with other time-varying variables that might have independent relationships with the outcomes of interest. Since differences in birthing costs are closely related to differences in underlying health, which in turn can be driven by a variety of factors (e.g., seasonality in fertility patterns that results in systematic variation in parental characterstics across birth months (Buckles and Hungerman, 2008), and environmental factors differentially affecting health outcomes across birth months (Currie and Schwandt, 2013)), unobservable variables not included in the regression analysis could exert some bias on the estimates. In the second paper, while the experimental research design lends a credible causal interpretation, the relatively small sample size makes it difficult to extrapolate the findings to a more general population.

start payments in the year when he no longer lives with his children (i.e., married parents who separate do not need to wait until they are divorced).

Of course, not all separated and divorced parents institute a formal child support agreement, either because they share physical custody of their children or because they establish an informal arrangement. Without a formal agreement, parents do not face any mandates from the government regarding child support payments. However, recent evidence suggests that most parents do seek government intervention in determining child support payments—for example, in 2006, 75 percent of separated parents had a formal child support agreement.[13]

Non-custodial parents who are on public assistance and under a formal agreement have child support payments automatically deducted from their benefits and transferred to the custodial parents by the municipality government. Non-custodial parents who are not on social assistance must make payments directly to the custodial parents themselves. If they do not comply with their orders, then custodial parents can inform the County Governor's Office, which then issues reminders for due payments to the non-custodial parents. In case of further non-compliance, cases are turned over to the tax authorities who can withhold tax benefits or refunds from the non-custodial parents or even seize their assets.

The guidelines state that a non-custodial parent's child support obligation is based solely on his gross income and his number of children under age 18 in each year. Note that child support mandates are only based on the number of children of whom the parent does not have custody; the mandates do *not* take into account the number of children that a non-custodial parent has in a subsequent marriage or cohabitation union. The obligation consists of a "normal amount" and an "extra amount", the sum of which all non-custodial parents must pay regardless of income. Non-custodial parents with incomes above certain thresholds must also pay an additional percentage of the "normal amount" that ranges between 25 and 300 percent. The locations of the thresholds are different depending on the number of children. Moreover, in every year, both the "normal" and "extra" amounts are increased above the rate of inflation and the locations of the thresholds have been changed.[14]

As a result, there is substantial non-linear variation in the child support orders faced by non-

[13]This information comes from a survey of country child support regimes conducted by Jonathan Bradshaw, Anne Corden, Jacqueline Davidson, Dan Meyer, Christine Skinner and Jun Rong Chen at the Social Policy Research Unit at the University of York in 2006. Please see http://www.york.ac.uk/inst/spru/research/childsupport/denmark.pdf and Skinner *et al.* (2007) for more details.

[14]According to the County Governor's Office, these changes are meant to follow average wage development in Denmark.

custodial parents depending on their incomes, their numbers of children, and the year. This variation is displayed in Figures 1 and 2, which plot the child support orders by year for families with one child in nominal and real year 2000 DKK, respectively, and in Appendix Figures 1 and 2, which plot the child support orders by year for families with two children in nominal and real year 2000 DKK, respectively.[15]

The structure of the child support mandates leads to the following sources of variation: 1) in the same year, non-custodial fathers face different child support orders depending on their income and the number of children they have, 2) at the same amount of real income, non-custodial fathers face different child support orders depending on the year and the number of children they have, and 3) non-custodial fathers with the same number of children face different child support orders depending on their income and the year.

Notably, the guidelines have changed in such a way that over different time periods, fathers in some income ranges have experienced increases in real obligations, while fathers in other income ranges have experienced decreases.[16] For example, fathers with real incomes below 275,000DKK ($50,199) have seen an increase in real orders in each year over 1999-2008; fathers with real incomes around 300,000DKK ($54,762) experienced a decrease over 1999-2001 and then an increase over 2001-2008; while fathers with real incomes around 350,000DKK ($63,889) witnessed an increase over 1999-2002, a decrease over 2002-2003, an increase over 2003-2005, a decrease over 2005-2006, an increase over 2006-2007, and a decrease over 2007-2008.

Moreover, the magnitudes of these increases and decreases are different across time periods, income ranges, and the number of children. In particular, in our main sample of analysis consisting of one- and two-child families with fathers earning between 175,000 and 505,000DKK over 1999-2008, annual child support obligations have ranged between 9,395DKK ($1,705) and 42,136DKK ($7,649) in year 2000 terms. These orders represent between 3 and 15 percent of fathers' annual real gross incomes.[17] Finally, non-custodial parents face a strong incentive to make their payments—all

[15]Information on annual child support guidelines comes from *Statsforvaltningen*. For more information, please see http://www.statsforvaltningen.dk/site.aspx?p=6404.

[16]Note that there has also been a level shift between 1999 and 2000 for fathers of all incomes due to the introduction of the "extra amount". The annual "extra amount" was introduced in 2000, and has varied from 1,224DKK ($221) to 1,270.11DKK ($229.53) per child in year 2000 terms during our analysis timeframe.

[17]In the U.S., most states follow either the "Income Shares" or the "Percentage of Income" formula in determining child support orders. Under the "Income Shares" formula, non-custodial parents have to pay a share of the net *joint* income of both parents: between 18 and 24% for families with one child and between 28 and 37% for families with two children. The "Percentage of Income" formula only considers the non-custodial parent's gross income (as in Denmark): non-custodial fathers have to pay 17% of gross income if they have one child and 25% if they have two children. See Garfinkel *et al.* (1994) for more information. While these orders represent higher percentages of non-custodial fathers' incomes than those in Denmark, it should be noted that non-compliance rates are quite high in

child support payments above the "extra amount" are tax-deductible for them, and the value of the deduction amounts to an average compensation for around one third of the payment through the tax system.

As described in more detail in Section 5, we leverage this variation in child support obligations in a type of "triple-difference" analysis, comparing fathers who have different incomes, different numbers of children, and separate, divorce, or have a child outside marriage and cohabitation in different years, while controlling flexibly for the main effects and double interactions of income, number of children, and year.[18] The effects of child support obligations are thus only identified by quasi-exogenous variation in the mandates and not by any other factors.

4 Data

We merge two administrative data sets from Denmark for this analysis. We link birth records data for all children born in Denmark over 1985-2008 and their siblings with information on their parents available from the population register for every year that they reside in Denmark. From the population register, for each parent, we observe his/her income from different sources, cohabitation and marital status, labor market behavior (employment, labor force status, and annual wages), and educational attainment in every year, as well as demographics such as exact date of birth and country of origin.

Analysis Sample To construct our analysis sample, we begin with all fathers who are observed in the population register data in every year over 1998-2010. We then limit the sample to fathers who either 1) were married to or cohabiting with their oldest children's mothers at the time of childbirth (or in 1998 for oldest children born before), or 2) had a first child between 1999 and 2008 while not married to or cohabiting with the child's mother. For each father, the year in which he either is no longer observed to reside with his oldest child's mother or has a first child while not married to or living with the child's mother is referred to as the "separation year". We limit to the

the U.S. According to data from the 2010 Current Population Survey Child Support Supplement, out of all children with divorced and unmarried parents, 51% had mothers who reported having any formal child support agreement. Out of them, 41% had mothers who reported receiving all the child support that was due in the previous year, with 35% reporting that they received zero child support.

[18] Since the thresholds in the guidelines induce discontinuities in obligations, one might in principle try to employ a regression discontinuity (RD) design in this setting as well. However, in practice, since the thresholds are quite close together in the income distribution (for example, in some cases, the thresholds are just 5,000DKK apart), there are not enough observations immediately surrounding each threshold to implement an RD. Moreover, the fact that there are multiple thresholds in each year and for each number of children makes it challenging to center the observations around any particular threshold.

124, 114 fathers with separation years between 1999 and 2008. We only consider separations from 1999 onwards because child support guidelines prior to 1999 did not exhibit as much variation with respect to income and were often not enforced.[19] We choose 2008 as the final separation year to allow for at least three years of post-separation observations in the data.

Finally, the sample is limited to fathers who had either one or two children aged less than 18 at the time of separation and who had annual incomes between 175, 000 and 505, 000DKK (approximately \$31, 979 and \$92, 957, respectively) in the separation year. This income range is chosen because it constitutes a 100, 000DKK window surrounding the range of the first three thresholds in the child support formula, where much of the variation occurs.[20] We drop fathers with more than two children at the time of separation because they constitute a relatively small fraction of the sample (10%) and experience much of the child support formula variation at higher income levels where the data contain fewer observations. These restrictions create a panel of 73,325 fathers linked to their children and their children's mothers. Our analysis uses one observation per father.[21]

Assigning Child Support Obligations For each father, we calculate the child support order he should face in each year post-separation based on his gross income in the separation year and his number of children with the oldest child's mother aged less than 18 years. For example, for fathers who separate in 2005, child support obligations are calculated for every year over 2005-2010. Note that these calculated orders account for the father's children aging out of child support by turning 18, but do not take into account any new children that he might have with subsequent partners. Additionally, these orders do not account for any changes in the father's income post-separation. We do this because changes in income and the number of children post-separation may occur in response to child support obligations and thus are potentially endogenous. As such, the variation in child support obligations comes from variation in what the father would have to pay based on

[19] Child support guidelines before 1999 had fewer thresholds above which fathers had to pay an additional percentage of the "normal amount". Additionally, according to the County Governor's office, these guidelines were much less enforced relative to today. In supplementary analyses we have estimated our main regressions adding in data from 1993-1998. The results are qualitatively similar to those presented here, although the relationship between child support orders and payments is weaker, likely due to the lower level of enforcement.

[20] The thresholds refer to the values of income above which non-custodial fathers must pay an additional 25, 50, and 100 percent of the "normal amount"; these were 275, 000, 290, 000, and 315, 000DKK in 1999 and 350, 000, 370, 000, and 405, 000DKK in 2008, for example.

[21] The 73,325 observations represent unique fathers who are linked to their oldest children's mothers. However, mothers can appear multiple times in these data as they can have multiple first births with different partners from whom they separate. As such, when we analyze mothers' outcomes, we only consider their first separation spells and are left with 72,097 unique mother observations.

changes in the guidelines, *holding constant any possible behavioral responses*. We then calculate average annual child support orders for each father over the time of separation as well as over different time spans (e.g., the first 2, 3, 4, and 5 years of separation).

Importantly, as described above in Section 3, not all of the fathers in our sample actually face these child support orders since only about 75 percent of parents have a formal agreement (Skinner *et al.*, 2007). Nevertheless, we include *all* divorced and separated parents in our sample because we do not have information on whether they have formal agreements in our data. Additionally, as goverment-mandated child support obligations could impact the likelihood that parents choose to establish such an agreement, selecting the sample on this potentially endogenous variable could be problematic. Thus, estimates of the relationship between child support mandates and payments in our sample represent intent-to-treat (ITT) effects. To provide approximate treatment-on-the-treated (TOT) magnitudes, we sometimes scale them by the 75 percent formal agreement rate.

Data on Child Support Payments and Physical Custody Arrangements Our data on actual child support payments come from the population register, which records annual monetary transfers made by non-custodial parents to their children that are tax-deductible and reported to the tax authorities. In other words, we only observe any payments made above the "extra amount". Additionally, as non-custodial parents do not need to have a formal agreement in order to receive the tax deduction for transfers made to their children, the variable we observe includes both payments that are mandated by formal agreements and additional payments not mandated by the government. Since our data have no information on whether parents have formal agreements or on the actual orders that they face, we cannot distinguish between mandated and non-mandated payments.

The population register also contains information on the parents' and children's primary residences. Thus, we can observe some fathers sharing in physical custody based on whether they are registered at the same primary residence as their children. This measure captures both joint and sole-father physical custody arrangements since children can only be registered at one primary residence. Put differently, it is possible that a child who is registered at her father's home also spends part of the time living with her mother. However, this measure does not capture other joint custody arrangements in which the child is registered at the mother's home.

Summary Statistics Table 1 provides some summary statistics on selected variables available in our data. Column 1 reports information on all fathers in our sample, while columns 2-4 split the sample by parental relationship status—previously married, previously cohabiting, and never-married/non-cohabiting, respectively. The average separation year real gross income for fathers in our sample is about 286,300DKK (in year 2000 terms), which is slightly higher than the average real income of 262,000DKK for all Danish men over the same time period. Similarly, mothers in our sample, who have an average real gross income of 205,600DKK in the separation year, are somewhat wealthier than the overall population of Danish women during this time who made 191,300DKK.[22] Additionally, previously married parents tend to be more advantaged than previously cohabiting parents, who in turn are more advantaged than never-married/non-cohabiting parents. In particular, these parents are older, wealthier, and more educated than their unmarried counterparts.

Table 1 also presents information on the average annual child support orders that we calculate and the payments we observe. We report both the annual full child support orders as well as the annual tax-deductible orders (i.e., orders net of the "extra amount") so that we can more accurately compare them to the tax-deductible payments we see in our data. For all fathers in our sample over the time of separation, the average annual full order is 16,830DKK, the average order net of the "extra amount" is 15,180DKK, while the average annual payment net of the "extra amount" is 9,211DKK.

Differences Between Average Orders and Payments We investigate the discrepancy between calculated orders and observed payments further in Appendix Table 1. Here, we show that, on average, fathers pay about 61 percent of the tax-deductible order that we calculate using the child support guidelines. This gap is partially driven by the 19 percent of sample fathers who make zero child support payments post-separation. These "non-payers" are likely comprised of two groups: 1) fathers without formal child support agreements (including those who have full or joint physical custody of their children), and 2) fathers who are completely non-compliant with their orders.[23]

While we inherently cannot distinguish between these two groups in our data, we provide some indirect evidence suggesting that joint and sole-father physical custody arrangements likely play

[22]Information on average incomes for Danish men and women comes from Statistics Denmark.

[23]A third possibility in our data is that some fathers make child support payments but do not report them to the tax authorities. However, given that all payments above the "extra amount" are tax deductible, this seems unlikely as fathers have a strong incentive to report these transfers.

a large role in explaining the zeros. Specifically, in our data, among the 6 percent of fathers who are registered at the same primary residence as their oldest children in all years after separation, nearly two-thirds make zero child support payments. Additionally, recent data suggest that out of all Danish children aged 11-15 who had split parents in 2005-2006, about 20 percent lived in either joint or sole-father physical custody arrangements—a number very close to the percentage of "non-payers" that we observe in our sample.[24] Of course, since our data contain younger children (e.g., the median age of the oldest child at the time of separation is 5 years in our data), this estimate may overstate the rate of non-sole-mother physical custody arrangements for our sample. Nevertheless, these estimates suggest that a substantial fraction of "non-payers" in our data may be attributable to fathers who have either joint or sole physical custody of their children.

In Appendix Table 2, we examine how the prevalence of non-payment varies with paternal characteristics. On average, older and more educated (those with a university degree or higher) fathers are more likely to pay zero child support relative to their younger and less educated counterparts. These differences may reflect that more advantaged parents are usually more likely to have joint custody arrangements (Nielsen, 2011).[25]

Finally, while the "non-payers" account for some of the gap between average orders and payments, they do not explain all of it. Among those who pay a strictly positive amount, fathers on average pay 76 percent of the tax-deductible order that we calculate. In fact, we find that 65 percent of the fathers in the sample pay more than zero but less than their calculated order, while 16 percent pay the amount of the order or more. The "underpayment" likely results from imperfect compliance and from the fact that we observe both mandated and voluntary payments in one variable where voluntary payments do not need to follow any guidelines. "Overpayment" is most common among previously married parents and is likely driven by voluntary transfers. Moreover, all discrepancies shown in Appendix Table 1 are partially driven by our assignment of orders based on fathers' incomes and numbers of children in the year of separation. If fathers alter their incomes or have additional children in the years post-separation, then we would not capture how their orders are adjusted to reflect these changes.

Importantly, these issues highlight that child support orders should not be used as instruments for child support payments in instrumental variables analyses as they could affect family outcomes

[24]Specifically, 10 percent lived in joint physical custody arrangements and 10 percent lived with either only a father or a father and his partner. See Bjarnason and Arnarsson (2011) for more details.

[25]However, we do not see the same gradient when we split the sample by income: fathers with separation year incomes higher than the sample median of 277,602 (in year 2000 DKK) are slightly less likely to pay zero child support than their lower-income counterparts, although the difference is quite small.

through a number of channels (e.g., changes to custody arrangements or transitions between formal and informal agreements) in addition to their impacts on the actual payments. In other words, the "exclusion restriction" assumption is likely not satisfied. Consequently, our analysis estimates "reduced-form" effects of child support mandates on a variety of family outcomes, and examines the possible mechanisms by exploring the effects of orders on fathers' actual payments to and contact with their children.

5 Empirical Methods

In an ideal research setting, one would randomly assign child support obligations to non-custodial fathers and then compare the family outcomes of fathers with higher orders to those of fathers with lower orders to identify their causal effects. Of course, such an experiment is both ethically and financially infeasible, especially on a large scale. As such, we implement an empirical design that uses quasi-exogenous variation in the Danish child support guidelines with the goal of approximating a randomized experiment as well as possible.

In particular, for each father i who separated from his oldest child's mother in year t, with k number of children aged less than 18, and with T total years post-separation observed in the data, we estimate models of the form:

$$Y_{itk} = \beta_0 + \beta_1 * \Big[\frac{1}{T}\sum_{j=0}^{T} CSorder_{ik,t+j}\Big] + \gamma' X_{it} + \delta_t + f(income_{it})$$

$$+ \alpha_{kt} + \sum_{j=1}^{T} \alpha_{k,t+j} + \delta_t * f(income_{it}) + \alpha_{kt} * f(income_{it}) + \delta_t * \alpha_{kt} + \epsilon_{itk} \qquad (1)$$

where Y_{itk} is an outcome of interest such as the father's average annual child support payment during the time of separation or an indicator for whether he has subsequent children. $\Big[\frac{1}{T}\sum_{j=0}^{T} CSorder_{ik,t+j}\Big]$ is the father's average annual child support order in thousands of real year 2000 DKK during the time of separation based on our calculations using the child support guidelines as described above.

The vector X_{it} includes controls for a variety of family characteristics measured *in the year of separation*: father's age and age squared, dummies for the father's education (less than high school, high school, vocational/short-term higher ed, college/university, and missing), an indicator for the father being from Western Europe, mother's age and age squared, dummies for the mother's education (less than high school, high school, vocational/short-term higher ed, college/university,

and missing), an indicator for the mother being from Western Europe, mother's total income in year 2000 DKK, oldest child's age and age squared, youngest child's age and age squared, and indicators for original parental relationship status (married, cohabiting, never-married/non-cohabiting).

We also include fixed effects for the year of separation, δ_t, fixed effects for the number of children under age 18 in the year of separation, α_{kt}, and a flexible function of the father's real gross income in the year of separation, $f(income_{it})$, as well as all the double interactions between them. Moreover, we include indicators for the father's number of children still under age 18 in each year post-separation (but not including any new children born post-separation), denoted by $\sum_{j=1}^{T} \alpha_{k,t+j}$. The key coefficient of interest is β_1, which measures the effect of a $1,000$DKK increase in the average annual child support order on the outcome of interest.

Additionally, while our baseline estimates represent the effects of average annual obligations over all the years of separation, we also investigate the timing of their impacts more closely. For these analyses, we estimate the following models:

$$Y_{ik,t+\tau+1} = \beta_0 + \beta_1 * \Big[\frac{1}{\tau}\sum_{j=0}^{\tau} CSorder_{ik,t+j}\Big] + \gamma' X_{it} + \delta_t + f(income_{it})$$

$$+ \alpha_{kt} + \sum_{j=1}^{\tau} \alpha_{k,t+j} + \delta_t * f(income_{it}) + \alpha_{kt} * f(income_{it}) + \delta_t * \alpha_{kt} + \epsilon_{ik,t+\tau+1} \qquad (2)$$

where τ ranges between 1 and 5. In other words, for years $\tau \in [1,5]$—the first five years of separation—we study the relationship between outcomes measured in year $t+\tau+1$ and obligations averaged over the preceding post-separation years only (i.e., years t to $t+\tau$).

Identifying Assumption The identifying assumption for the estimation of equations (1) and (2) is that there are no variables that systematically covary with the child support guidelines and differentially affect fathers who have different incomes, numbers of children, and separate in different years. Note that the fixed effects for the year of separation control for any overall trends in parental outcomes over the time of our analysis and absorb any effects of national policies that may have been implemented in any given year.[26] Moreover, by including fixed effects for the number of children and interacting them with year fixed effects, we control for the fact that one- and two-child families may be different and may have different trends over time. Finally, we allow for a flexible

[26] Additionally, the year of separation fixed effects control for differences in the length of separation time, T, observed in our data.

relationship between the father's annual separation year income and the outcomes of interest (e.g., we include different order polynomials as well as some non-parametric specifications controlling for small income bins), and allow for this relationship to be different over time and across families with different numbers of children by including interactions between $f(income_{it})$ and the fixed effects for separation year and number of children.

While the identifying assumption is fundamentally untestable, we conduct some indirect tests to evaluate its plausibility. Specifically, we present evidence that our primary treatment variable is uncorrelated with parental characteristics not used in setting child support obligations. For this analysis, we estimate versions of equation (1), omitting the controls in vector X_{it} and with the following variables measured in the year of separation as outcomes: father's age, mother's age, indicators for the father's and mother's education levels (university, vocational/short-term higher education, high school only), and mother's income in year 2000 DKK. The results, presented in Table 2, show that child support orders have no statistically significant relationships with any of these variables.

These results are reassuring as they support the conjecture that the variation in child support mandates, conditional on the father's income, year of separation, and his number of children, is essentially random, at least based on observable characteristics. Nevertheless, we also examine the robustness of our results to different specifications, and test for sample selection bias by studying the relationship between child support orders and the likelihood of divorce or separation; see Section 6 for more details.

6 Results

6.1 Child Support Payments and Father-Child Contact

We begin with a graphical analysis of the relationship between our calculated child support orders and the actual child support payments observed in the data. Appendix Figure 3 shows the correlation between fathers' average tax-deductible child support obligations and child support payments, without controlling for any other variables. There is a strong positive linear relationship, with a slope of about 0.56. However, this graph does not account for the factors that are correlated with both the obligations and payments, such as the father's income. Thus, Figure 3 accounts for all the variables that determine the variation in the child support formula. In particular, we compute the residuals in both child support obligations and actual payments by regressing each variable on a full set of fixed effects for and double interactions between the number of children, year of

separation, and 20,000DKK (approximately \$3,630) bins of father's real income in the separation year. We then plot the relationship between these residuals. Figure 3 suggests that, even once we account for the variation in child support obligations across fathers with different incomes, numbers of children, and separation years, there is still a strong positive relationship between orders and payments. The slope of the linear fit on the correlation is about 0.4.

We next turn to the regression analysis. Table 3 presents results from estimating equation (1) for the following outcomes measured post-separation: average annual child support payment, an indicator for paying zero child support in all years, an indicator for paying zero child support in at least one year, and an indicator for the father living with his oldest child in at least one year.[27] In these specifications, the $f(income_{it})$ function is captured by indicators for 20,000DKK bins in the father's real separation year income.

Column 1 shows that a 1,000DKK increase in the average annual child support order is associated with about a 430DKK increase in the average annual payment. Recall that since our data contain all fathers, regardless of whether they have a formal agreement or not, this estimate represents an ITT effect. Scaled by the approximate 75 percent formal agreement rate from 2006, we obtain a TOT relationship where a 1,000DKK increase in orders induces a 573DKK increase in payments. The lack of a one-for-one correlation between orders and payments likely reflects imperfect compliance and the possibility that mandated payments are adding to or partially substituting for voluntary payments that some fathers would have made in the absence of the orders, as hypothesized in Section 2.

In column 2, we see that there is no significant correlation between the order amount and the likelihood of paying zero child support in all post-separation years, suggesting that fathers with higher orders are no more or less likely to have full or joint physical custody during *all* years of separation, or to not comply entirely. However, we do see in column 3 that fathers facing higher obligations are less likely to pay zero in at least one post-separation year. Column 4 shows that this effect is likely driven by a reduction paternal physical custody rates: a 1,000DKK increase in the average order is associated with a 1.8 percent decrease in father-child co-residence post-separation, evaluated at the sample mean.

[27] In all of the regression analyses, we use the average full annual child support order as the explanatory variable of interest rather than the tax-deductible order net of the "extra amount". We do this because, conceptually, we are interested in the effects of actual child support obligations faced by fathers rather than only those that can be reported to the tax authorities. In practice, however, the regression results using average orders net of the "extra amount" are identical to those reported here as the "extra amount" does not vary across the father's income and so all variation in the "extra amount" is entirely absorbed by the interactions between the year of separation and the number of children.

As discussed in Section 2, there are two opposing forces on paternal physical custody. On the one hand, relative to fathers with lower child support obligations, fathers facing larger obligations may have a greater incentive to avoid paying them by instead sharing in physical custody. On the other hand, mothers have the opposite greater incentive to receive the higher payments by making sure that fathers do not share in physical custody. Additionally, fathers facing higher orders (and thus making higher financial transfers) may be more likely to substitute away from other forms of non-pecuniary involvement with their children. Our empirical results suggest that the latter effect seems to dominate in our sample, leading to a negative relationship between obligations and paternal physical custody rates.

In Figure 4, we investigate the timing of the paternal physical custody effect during the length of separation. This figure presents the coefficients and 95% confidence intervals from five separate regressions of equation (2). In particular, for years $x \in [1, 5]$—the first five years of separation displayed on the x-axis—each regression uses an indicator for the father living with his oldest child in year $x + 1$ post-separation as the dependent variable and the average annual obligation over the preceding post-separation years (0 to x) as the explanatory variable. The results suggest that the magnitude of the reduction in the paternal physical custody rate is increasing over the length of separation, although the confidence intervals are large enough such that we cannot reject that all five coefficients are equal.

We test the robustness of these results across different specifications in Appendix Tables 3-8. As outcomes, we look at average child support paid and an indicator for the father living with his child in at least one year post-separation. Appendix Tables 3 and 4 consider four alternative polynomial functions of father's income: linear (column 1), quadratic (column 2), cubic (column 3), and quartic (column 4); the main specification from Table 3 is replicated in column 5 for ease of comparison. Appendix Tables 5 and 6 consider four alternative "bin" indicator functions of father's income: 50,000DKK bins (column 1), 25,000DKK bins (column 2), 20,000DKK bins (column 3; same as the main specification), 15,000DKK bins (column 4), and 10,000DKK bins (column 5). Appendix Tables 7 and 8 consider four alternative samples based on father's income windows surrounding the first three thresholds in the child support formula: 20,000DKK (column 1), 40,000DKK (column 2), 60,000DKK (column 3), 80,000DKK (column 4), and 100,000DKK (column 5; same as the main sample of analysis). For both outcomes, across the additional 24 regressions, the coefficients are of the same sign and of similar magnitude as those reported in Table 3. Moreover, 20 out of the 24 coefficients are statistically significant at the 5 percent level. These robustness tests provide

support for the validity of the identification strategy and the strength of the results.

In sum, these results suggest that, while government-mandated child support orders are moderately effective in increasing fathers' monetary payments to children, they may also crowd-out other forms of father involvement, such as voluntary payments and sharing in the physical custody of the child.

6.2 Parental Subsequent Family Formation

After showing the relationship between child support obligations and measures of father involvement, we proceed to examine parental fertility behavior post-separation. Tables 4 and 5 present results for family formation outcomes for the mothers and fathers, respectively.

We find that, for both parents, higher child support orders lead to increased subsequent fertility with new partners. In particular, the first columns in both tables show that each 1,000DKK increase in the child support order is associated with 2.7 and 3.1 percent increases in the likelihoods of mothers and fathers having more children, respectively. Notably, as seen in columns 2-4, fathers increase their fertility only within marriage or cohabitation, while mothers increase their fertility both in and outside these unions. Appendix Tables 9 and 10 test the sensitivity of these results to different polynomial functions of the father's income and show that the estimated coefficients are quite stable across specifications.

We also explore the timing of the fertility effects for mothers and fathers in Figures 5 and 6, respectively. For fathers, fertility increases materialize after 4 to 5 years post-separation, while for mothers, the positive impacts on fertility are present 3 and 5 years after separation.

As we discussed in Section 2, the positive impact on maternal fertility is consistent with higher child support orders generating greater income effects. The magnitude of our estimate—a 2.7 percent increase for every 1,000DKK increase in obligations—is comparable to estimates in the existing literature on the income-fertility relationship. For example, after converting the estimates from Canadian dollars to Danish krones, Milligan (2005) finds a 3.4 percent increase in fertility associated with a 1,000DKK increase in tax benefits in Quebec. In France, the relevant relationship is a 4 percent increase in fertility for every 1,000DKK increase in benefits (Laroque and Salanié, 2008). In the UK, there is a slightly more modest 2 percent increase in fertility for every 1,000DKK increase in welfare benefits stemming from a 1999 reform (Brewer *et al.*, 2012).[28]

[28]More precisely, Milligan (2005) finds that a $1,000 (in Canadian dollars) increase in tax benefits increases fertility by 17%. $1,000 Canadian dollars is approximately 5,000DKK. Laroque and Salanié (2008) find that 100 Euros per month (i.e., 1,200 Euros per year) increase higher-parity fertility by 37%. 1,200 Euros is approximately 8,957DKK.

For fathers, higher obligations represent larger negative income shocks, which might on their own disincentivize subsequent fertility. However, we showed above that higher obligations are also associated with a reduced incidence father-child co-residence. Consequently, fathers facing higher orders may have less attachment to their existing children and thus more demand for new offspring with new partners. In fact, column 5 of Table 5 shows that the fertility increase is driven by fathers who do not reside with their older children post-separation.

Finally, the fact that fathers facing larger obligations only increase fertility within marriage or cohabitation is consistent with them expecting higher costs of children born outside these unions. In contrast, higher orders for mothers are associated with increased fertility both in and outside new partnerships, consistent with larger orders signaling expectations of higher future transfers to them if they are separated.[29]

6.3 Parental Labor Market Behavior

We next analyze the effects of child support orders on parental labor market outcomes. Tables 6 and 7 present the results on post-separation labor market behavior for fathers and mothers, respectively. We find that, on average, higher orders are associated with a reduction in the amount of time fathers spend in the labor force. Specifically, each 1,000DKK in the child support order reduces the fraction of years post-separation during which they have any positive labor income by 0.15 percent and increases the proportion of years they spend not in the labor force ("NILF") by 4.2 percent at the respective sample means. In contrast, we find no consistent evidence of changes to maternal labor market behavior.

Appendix Table 11 shows that the result on paternal labor force participation is robust across different polynomial functions of the father's separation year income. Further, by studying labor market outcomes that are measured both before and after separation, we can test for placebo effects on paternal labor force participation pre-separation. Specifically, in Figure 7, in addition to looking at the timing of effects post-separation, we also study whether obligations in the year of separation are correlated with paternal labor force participation in the five years *before* separation. We find

Brewer *et al.* (2012) find that the mean £900 increase in welfare benefits following a 1999 reform led to a 15% increase in fertility among low-income married women. £900 is approximately 8,300DKK. The muted response in the U.K. may be in part due to an accompanying work incentive that likely reduced fertility.

[29] In supplementary analyses, we have also examined other family formation outcomes. We find no effects of child support orders on overall post-separation remarriage and cohabitation rates (without conditioning on fertility). Additionally, we do not see any changes in the observable characteristics of the parents' new partners. Note that since our data only contain individuals who become parents over 1985-2010, we cannot examine the changes in the characteristics of new partners who do not have any biological children during this time period.

that the coefficients in the years before separation are all very close to zero, and that the positive effect on the likelihood of the father being out of the labor force begins to materialize about 3 years following separation.

We explore the overall negative effect on paternal labor force participation further in columns 6-8 of Table 6, and find that it seems to be driven by transitions into disability leaves and retirements (including discretionary early retirements).[30] In contrast, we find no effects on exiting the labor force to receive welfare benefits, as this transition is likely unrealistic for the majority of our (relatively higher-income) sample fathers due to the associated strict means-testing.

Moreover, although these results point to higher obligations being associated with lower paternal labor supply on average, they conceal important heterogeneity in responses. As discussed in Sections 2 and 3, the structure of the child support guidelines creates divergent labor supply incentives depending on where the father's income is located relative to the guideline thresholds. In particular, only fathers with incomes above the first threshold have an incentive to reduce their labor supply in order to avoid paying the additional percentages of the "normal amount". For fathers with incomes below the first threshold, the obligation is simply a flat lump-sum. For them, this negative income shock is, if anything, predicted to increase labor supply.

In fact, as we show in Table 8, our results are consistent with these predictions. In these regressions, we include an interaction term with an indicator for the father's separation year nominal income being above the first threshold in the child support guidelines in that year.[31] We find that fathers with separation year incomes below the first guideline threshold actually have the opposite-signed effects on labor supply. In contrast, the decline in labor force participation is driven entirely by fathers with separation year incomes above the first threshold.

However, although fathers with incomes above guideline thresholds have incentives to reduce their earnings and thus lower their child support obligations, the *relative* value of such an action varies across fathers. Put differently, some fathers will save a larger fraction of their incomes than others by reducing their child support orders. We therefore examine whether the labor supply

[30] In Denmark, individuals mainly receive disability income through the Social Disability Pension (SDP) program. SDP is granted based on several medical and social criteria, and there are three levels depending on the degree of work capacity. Eligibility for the lowest level depends on work capacity having been reduced to below half the normal level, based on an evaluation using a combination of health and social criteria. Thus, although transitioning from the labor force and into disability leave is not costless, the subjectivity in the eligibility requirements leaves room for behavioral responses on this margin that may be unrelated to changes in fathers' actual health conditions. The main retirement program in Denmark is the Old Age Pension program, for which individuals are eligible starting at age 65. The Post-Employment Wage (PEW) program is the program for early retirement, for which individuals are eligible during ages 60-64. Other eligibility requirements for the PEW include sufficient contributions to the Unemployment Insurance fund and being in the labor force at age 59. See Larsen and Pedersen (2012) for more information.

[31] The location of the first threshold ranges from 275,000DKK in 1999 to 350,000DKK in 2008.

response we observe is correlated with these expected savings.

More specifically, for each father, we calculate the average annual real savings in child support obligations, as a percentage of his real separation year income, that would accrue if his income were below the first guideline threshold in each year post-separation. For instance, a father who earns 425,000DKK, separates in 2000, and has two children under age 18 throughout the length of separation faces an average annual obligation of 36,606DKK in year 2000 terms. If he reduced his income such that it fell below the first guideline threshold in each year post-separation, his average annual obligation would be 22,056DKK in year 2000 terms—a reduction of 14,550DKK, representing about 3.4 percent of his separation year income. We calculate this value for all fathers in our sample (note, that it is equal to zero for fathers whose separation year incomes are always below the guideline thresholds). Then, we re-estimate equation (1), substituting this calculated percentage as the key explanatory variable.

Appendix Table 12 presents the results from these specifications. We find that reductions in paternal labor supply are greater when the relative value of such a reduction is higher. In particular, each additional percent of paternal separation year income in child support obligation savings is associated with a 1 percentage point increase in the fraction of years the father spends out of the labor force, and either in retirement or on disability leave. In other words, fathers who have the most to gain (in terms of child support savings) from exiting the labor force are the ones who are most likely to do so.

Overall, as postulated in Section 2, the decline in paternal labor force participation implies that, at least for some fathers, child support orders play the role of income taxes, with the substitution effect dominating the income effect. Our findings are broadly consistent with other studies on the relationship between the relative value of labor market participation and disability/retirement program take-up in the U.S., Canada, and Europe.[32] Thus, our estimates point to an unintended consequence of child support mandates on public budgets: although they may shift the burden of single-mother household support from welfare programs to non-custodial fathers, they also may pass part of this cost on to other government programs including disability insurance and early retirement.

[32]See, e.g., Black *et al.* (2002); Autor and Duggan (2003); Gruber (2000); Gruber and Wise (2004, 2009); Bratsberg *et al.* (2010); Bingley *et al.* (2011).

6.4 Additional Results

Effects of Child Support Mandates on Parental Separation Rates While we have thus far provided evidence that child support obligations have important consequences for the behavior of parents who have already separated, as previewed in Section 2, it is plausible that orders can affect the likelihood of separation or an out-of-wedlock/cohabitation birth in the first place. If this is the case, then studying the behavior of already separated parents may be subject to sample selection bias as child support orders may affect the composition of parents who appear in the analysis sample.

We examine the relationship between the likelihood of separation and the annual child support order that each father would face based on his income and number of children in each year in Table 9. In these analyses, we consider all fathers who were either married to or cohabiting with their oldest children's mothers at the time of childbirth (or in 1998 for oldest children born before), or who had a first child between 1999 and 2008 while not cohabiting with their child's mother. We do *not* limit to parents who have separated as we do in our main analysis above.[33] We only keep father-year observations until the year of separation (if it occurs). Our outcome of interest is an indicator for parents separating, divorcing, or having an out-of-wedlock/cohabitation birth. We regress this outcome on the child support obligation that a father would face in that year (calculated based on his income and number of children), with a full set of fixed effects and interactions for the number of children, year, and different functions of the father's income. In column 5, when we include indicators for 20,000DKK bins in the father's income, for computational feasibility, we collapse the data into cells according to the interactions these father income bins, years 1999-2010, and the number of children. The regression in column 5 is weighted by the number of observations in each cell and has standard errors clustered on the cell level.

The results in Table 9 show no consistent evidence that child support obligations are correlated with the likelihood of parental separation. While there are some significant effects in specifications using lower-order polynomial functions in father's income, they have opposite signs. Moreover, in our preferred specification that includes indicators for 20,000DKK bins, we find no statistically significant relationship. We thus conclude that in our data, the effects of child support obligations on parental separation are either very small or zero. Parents do not seem to make their relationship

[33] We do, however, make the same sample restrictions on income and the number of children as before: we keep father-year observations with nominal incomes between 175,000 and 505,000DKK and with either one or two children aged less than 18.

and fertility decisions in anticipation of expected child support orders. As such, there is little concern about sample selection bias due to changes in the composition of the sample of separated parents.

Simpler "Double-Difference" Models Our main specification is a type of "triple-difference" model that exploits variation across paternal incomes, number of children, and separation years. We test the sensitivity of this specification by considering one- and two-child families separately in analyses that only exploit variation in child support guidelines by year of separation and the father's income. These regressions still include the controls in vector X_{it} described above, as well as fixed effects for the year of separation and $20,000$DKK bins in father's income.[34] Appendix Tables 13 and 14 present the results from these simpler "double-difference" type specifications. While we lose some power and variation in these analyses, the effects are broadly consistent with the main results reported above. Additionally, these results suggest that the effects of child support orders on parental outcomes are similar across one- and two-child families.

7 Conclusion

As growing numbers of children in the United States and many Western European countries have parents who are divorced or separated, understanding the causal effects of government interventions into their families is important. Since unmarried and divorced mothers have historically retained physical custody of their children and had full parental rights, most of these government interventions are centered around encouraging father involvement in terms of financial support. These policies share the underlying assumption that father involvement is essential to child and family well-being. Additionally, they seek to reduce public spending by shifting the burden of support of single-mother households from government programs to the children's fathers.

However, the implications of such policies for both family welfare and public budgets depend crucially on their causal impacts on parental behavior. This type of research has thus far been infeasible on a large scale in the United States primarily due to data constraints, and the Danish context provides a unique opportunity to study these issues. We leverage Danish administrative data together with non-linearities in child support guidelines that assign non-custodial parents different obligations according to their incomes, numbers of children, and separation years to study

[34] We also control for children aging out of child support by turning 18 by including fixed effects for the number of children still under age 18 in each year post-separation (not including any new children born post-separation), as in our main regression equation.

the causal effects of child support mandates on parental outcomes. We estimate that among parents with a formal agreement, a 1,000DKK increase in a father's average annual child support obligation is associated with about a 573DKK increase in the average annual child support payment. These results imply that child support orders are moderately effective at increasing fathers' financial investments in their children, and are consistent with some imperfect compliance and substitution between mandated and voluntary payments.

We also show that higher orders reduce the likelihood that fathers live with their children in at least one year post-separation, providing some evidence of substitution between monetary and non-pecuniary paternal investments. Additionally, we find that child support mandates increase post-separation fertility for both parents. While both parents are more likely to have additional children while married to or cohabiting with new partners, mothers are also more likely to have children outside these unions. The fertility effects for mothers are consistent with a positive income-fertility relationship, while the fertility effects for fathers are consistent with increased demand for new offspring as a result of reduced contact with existing children. Finally, we find evidence that among higher-income fathers for whom child support obligations represent taxes on earnings, higher orders are associated with reductions in labor force participation and transitions into disability insurance and early retirement programs.

On the whole, the findings in this paper point to important parental behavioral responses to the main forms of government interventions meant to address the needs of children growing up in so-called "broken homes". By placing mandates on non-custodial parents to make financial transfers to their children, these policies can disincentivize other forms of non-pecuniary involvement. Moreover, these obligations generate shocks to parental income and time allocation, and can thus impact their subsequent family formation decisions and the division of resources across children. As such, the net impacts on child investment levels and overall family welfare are complicated and ambiguous. Our results cannot speak to these implications, although future research might shed light on these issues by exploring the effects of child support mandates on children's cognitive and health outcomes.

The net effects on public spending are also potentially unclear. For example, the fact that some fathers respond to obligations by exiting the labor force and taking up disability insurance or early retirement benefits reveals a possible increase in public sector costs. In 2008, public expenditure on disability pensions amounted to about 16.5 billion DKK ($3.1 billion) in Denmark.[35] Given that there were about 240,000 recipients in that year, this translates to approximately 69,000DKK

[35]See OECD.Stat for more details: http://stats.oecd.org/Index.aspx?DataSetCode=SOCX_AGG.

($13,000) per recipient.[36] Our estimated positive effect on the take-up of disability insurance alone can thus be valued at approximately 21 million DKK (nearly $4 million).[37] Of course these increases in public spending costs have to be weighed against any possible savings, such as those due to potential reductions in maternal welfare benefit take-up, which we do not observe. Nevertheless, our findings point to the possible unintended consequences of child support mandates on public budgets.

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[36] In 2008, the Danish age 18-64 population was 3,418,273 according to Statistics Denmark, and approximately 7 percent of them were receiving disability income (Bingley *et al.*, 2011). This amounts to $0.07 * 3,418,273 = 239,279$ recipients.

[37] This value is calculated as follows: We estimate a 0.00126 increase in the likelihood of disability insurance take-up, which translates to $0.00126 * 240,000 = 302$ additional recipients. This means that costs are increased by $302 * 69,000$DKK$= 20,838,000$DKK.

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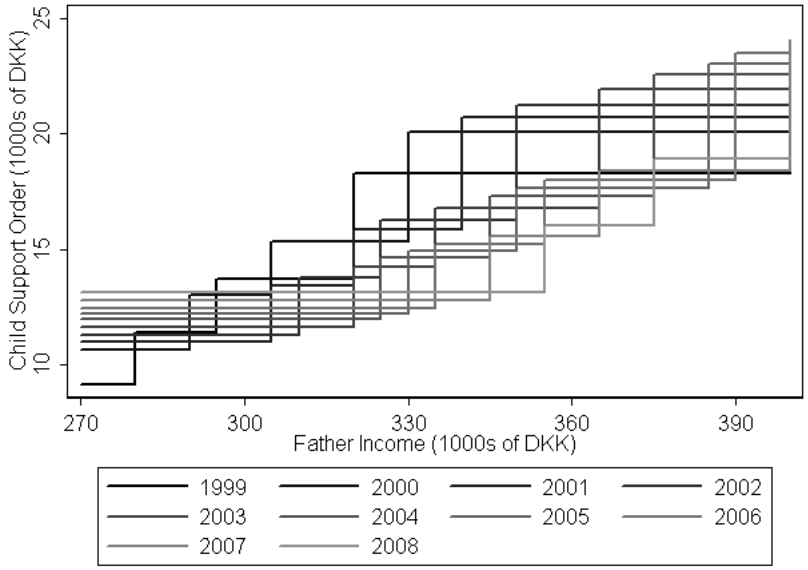
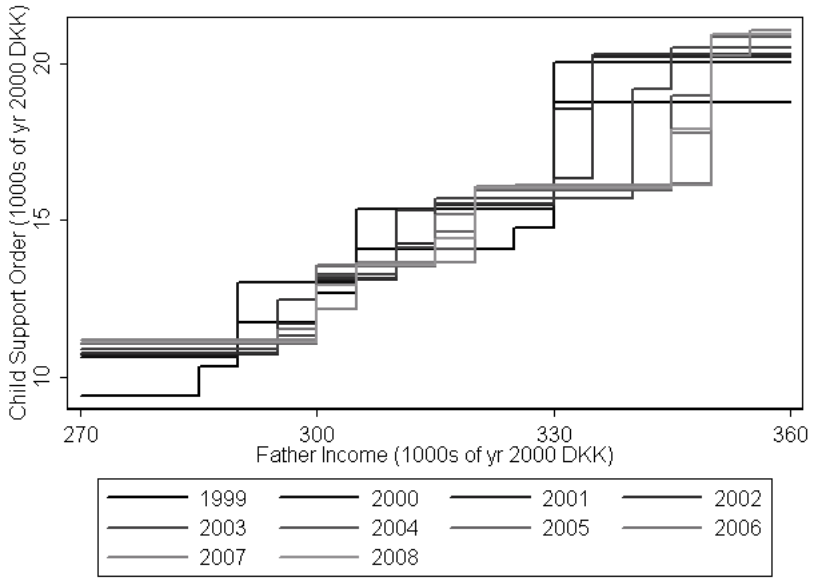
Figure 1: Government-Mandated Child Support Orders, 1 Child Families, Nominal DKK



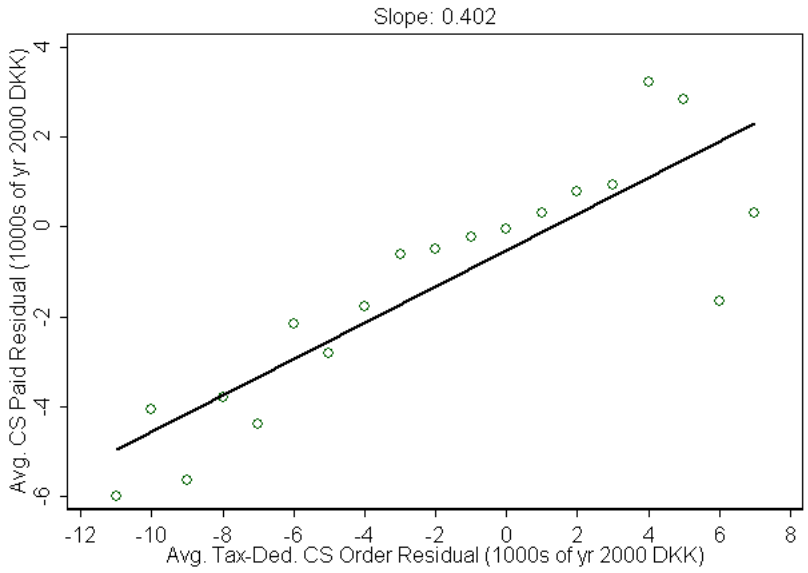
Notes: This figure shows the relationship between a non-custodial father's income and the required amount of child support by year for families with one child. Units are 1000s of nominal DKK.

Figure 2: Government-Mandated Child Support Orders, 1 Child Families, Year 2000 DKK



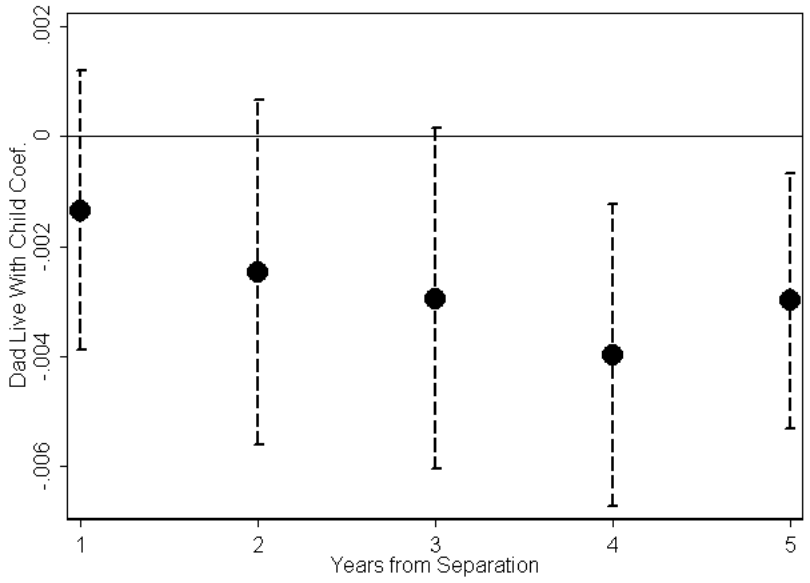
Notes: This figure shows the relationship between a non-custodial father's income and the required amount of child support by year for families with one child. Units are 1000s of real year 2000 DKK.

Figure 3: Relationship between Average Child Support Orders and Actual Child Support Payments Over Separation Years, Residuals, Year 2000 DKK



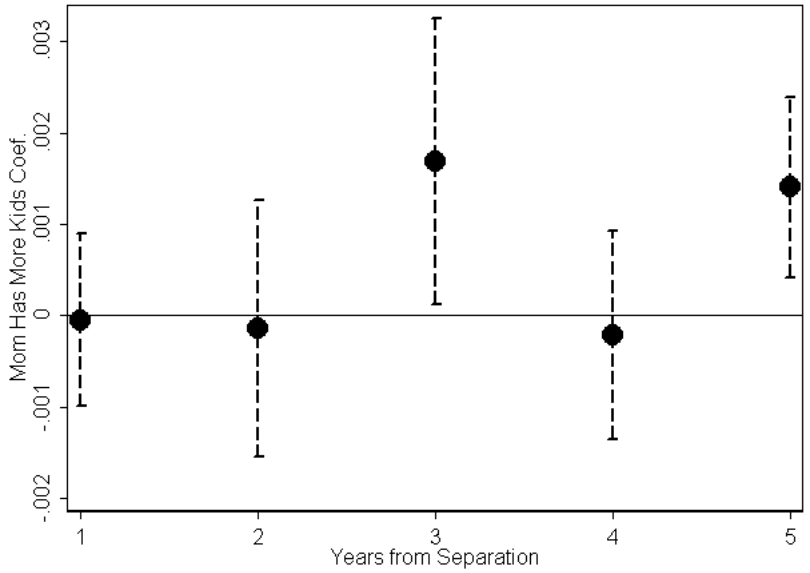
Notes: Residuals are from two specifications that regress the father's average child support order and actual average child support payment (both net of the unobserved non-tax-deductible "extra amount") on a full set of fixed effects and interactions for number of children, year, and 20,000 DKK income bins. This figure shows the relationship between these residuals. Units are 1000s of real year 2000 DKK.

Figure 4: The Effects of Child Support Orders on Paternal Physical Custody: By Year After Separation



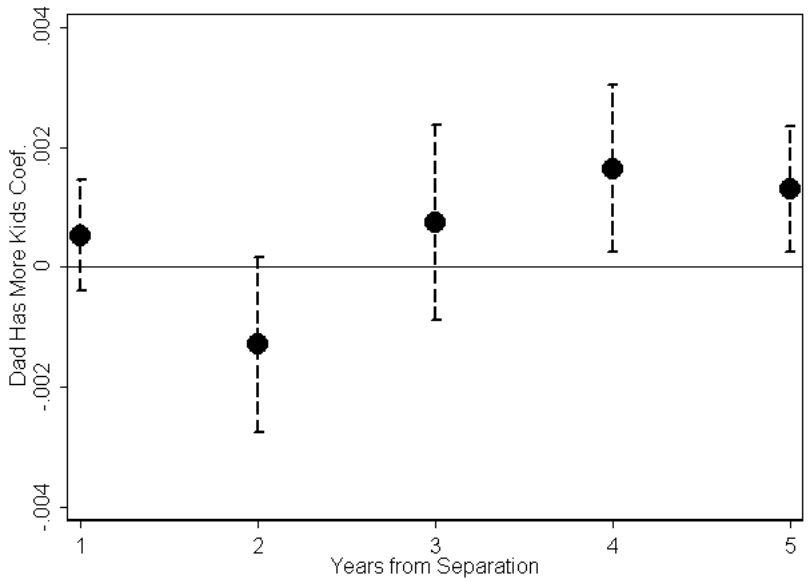
Notes: This figure presents the coefficients and 95% confidence intervals from five separate regressions. In particular, for years $x \in [1, 5]$—the first five years of separation displayed on the x-axis—each regression has an indicator for the father living with his oldest child in year $x + 1$ post-separation as the dependent variable and the average annual obligation over the preceding post-separation years (0 to x) as the explanatory variable. See notes under Table 1 for more information on the sample. All regressions include fixed effects for 20,000 DKK bins in father's income, number of children, year of separation, and their double interactions. All regressions include controls (measured in the year of separation) for the father's age and age squared, dummies for the father's education (less than high school, high school, vocational/short-term higher ed, college/university, and missing), an indicator for the father being from Western Europe, mother's age and age squared, dummies for the mother's education (less than high school, high school, vocational/short-term higher ed, college/university, and missing), an indicator for the mother being from Western Europe, mother's total income in year 2000 DKK, oldest child's age and age squared, youngest child's age and age squared, and indicators for original parental relationship status (married, cohabiting, never-married/non-cohabiting). Additionally, the regressions include indicators for the number of children still under age 18 in each year post-separation that the parents had (not including any new children born post-separation). Standard errors robust to heteroskedasticity.

Figure 5: The Effects of Child Support Orders on Mothers' Subsequent Fertility: By Year After Separation



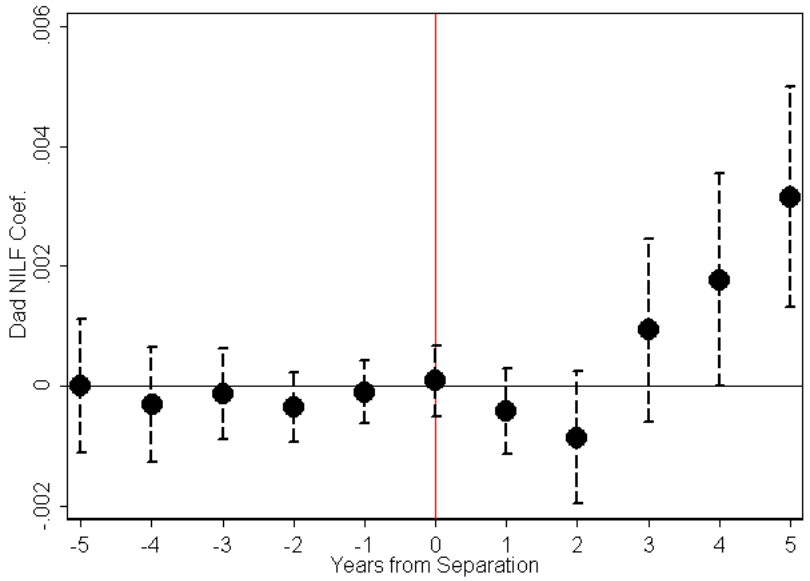
Notes: This figure presents the coefficients and 95% confidence intervals from five separate regressions. In particular, for years $x \in [1, 5]$—the first five years of separation displayed on the x-axis—each regression has an indicator for the mother having more children in year $x + 1$ post-separation as the dependent variable and the average annual obligation over the preceding post-separation years (0 to x) as the explanatory variable. See notes under Table 1 for more information on the sample, and notes under Figure 4 for more information on the estimation and controls.

Figure 6: The Effects of Child Support Orders on Fathers' Subsequent Fertility: By Year After Separation



Notes: This figure presents the coefficients and 95% confidence intervals from five separate regressions. In particular, for years $x \in [1, 5]$—the first five years of separation displayed on the x-axis—each regression has an indicator for the father having more children in year $x+1$ post-separation as the dependent variable and the average annual obligation over the preceding post-separation years (0 to x) as the explanatory variable. See notes under Table 1 for more information on the sample, and notes under Figure 4 for more information on the estimation and controls.

Figure 7: The Effects of Child Support Orders on Fathers Being Not in the Labor Force (NILF): By Year Before and After Separation



Notes: This figure presents the coefficients and 95% confidence intervals from 11 separate regressions. In particular, for years $x \in [1, 5]$—the first five years of separation displayed on the x-axis—each regression has an indicator for the father being not in the labor force (NILF) in year $x + 1$ post-separation as the dependent variable and the average annual obligation over the preceding post-separation years (0 to x) as the explanatory variable. For years $x \in [-5, 0]$—the five years *before* separation and the year of separation—each regression has an indicator for the father being not in the labor force (NILF) in year x pre-separation as the dependent variable and the obligation in the year of separation as the explanatory variable. See notes under Table 1 for more information on the sample, and notes under Figure 4 for more information on the estimation and controls.

Table 1: Summary Statistics

	(1) All Sep.	(2) Prev. Mar.	(3) Prev. Coh.	(4) Never Mar/Coh
Average child support paid after sep.	9.211 (8.509)	10.19 (9.529)	9.025 (7.711)	5.735 (5.136)
Average child support order after sep.	16.83 (7.688)	17.54 (8.467)	17.22 (7.255)	12.42 (2.790)
Average tax-ded. child support order after sep.	15.18 (7.126)	15.86 (7.847)	15.48 (6.715)	11.15 (2.788)
1st child's age at sep.	6.922 (5.586)	9.647 (5.421)	5.682 (4.335)	0 (0)
Dad age at sep.	36.33 (7.581)	39.69 (7.060)	34.34 (6.532)	29.50 (5.972)
Dad inc. at sep.	286.3 (71.92)	298.6 (72.88)	279.7 (68.73)	258.6 (68.45)
Dad ed: uni/college	0.133 (0.339)	0.161 (0.368)	0.111 (0.314)	0.0939 (0.292)
Dad ed: short high-ed/vocational	0.551 (0.497)	0.565 (0.496)	0.554 (0.497)	0.476 (0.499)
Dad ed: high school	0.0345 (0.183)	0.0355 (0.185)	0.0303 (0.171)	0.0463 (0.210)
Dad from W. Europe	0.971 (0.169)	0.960 (0.197)	0.987 (0.114)	0.955 (0.206)
Mom age at sep.	34.14 (7.111)	37.17 (6.335)	32.40 (6.497)	27.78 (5.934)
Mom inc. at sep.	205.6 (73.19)	224.7 (73.07)	196.2 (68.48)	161.2 (63.97)
Mom ed: uni/college	0.197 (0.398)	0.231 (0.422)	0.176 (0.381)	0.133 (0.339)
Mom ed: short high-ed/vocational	0.432 (0.495)	0.481 (0.500)	0.416 (0.493)	0.287 (0.452)
Mom ed: high school	0.0528 (0.224)	0.0454 (0.208)	0.0547 (0.227)	0.0769 (0.266)
Mom from W. Europe	0.967 (0.178)	0.950 (0.218)	0.989 (0.102)	0.959 (0.197)
Obs.	73,325	34,663	30,481	8,181

Notes: All income variables are in year 2000 real units of 1,000 DKK. The sample is limited to fathers of children born in 1985-2010, who appear in the register data in every year over 1998-2010, and who were either married to, cohabiting with, or never-married/non-cohabiting with their oldest child's mother at the time of childbirth for children born in 1998 or later or in 1998 for children born before. For parents who were never-married/non-cohabiting, the year of separation refers to the year of their oldest child's birth. The sample is further limited to fathers who were either never-married/non-cohabiting and had a child between 1998 and 2008 or who separated or divorced from their oldest child's mother between 1999 and 2008, who had nominal incomes between 175,000 and 505,000 kr. in the year of separation (100,000 DKK surrounding the range of the first three cutoffs), and who had either one or two children aged less than 18 at the time of separation. The average child support order in years after separation is calculated using the father's income in the year of separation, the number of chidren under 18 in each year post-separation (i.e., accounting for children who age out when they 18), and the formula in each year.

Table 2: Correlation between Average Child Support Order and Parental Characteristics

	(1) F.Age	(2) M.Age	(3) F.Ed:Uni	(4) F.Ed:Voc	(5) F.Ed:HS	(6) M.Ed:Uni	(7) M.Ed:Voc	(8) M.Ed:HS	(9) M.Inc.
Average child	0.0123	-0.0130	0.00204	-0.00246	0.0000646	0.00214	-0.000157	0.000350	0.394
support order after sep.	[0.0214]	[0.0190]	[0.00149]	[0.00178]	[0.000678]	[0.00160]	[0.00178]	[0.000678]	[0.284]
Mean, dept. var.	36.33	34.14	0.133	0.551	0.0345	0.197	0.432	0.0528	205.6
Obs.	73325	73272	73325	73325	73325	73325	73325	73325	70639

Notes: "F." refers to fathers' characteristics, while "M." refers to mothers' characteristics. See notes under Table 1 for more information on the sample. All regressions include a full set of fixed effects and interactions for number of children, year, and 20,000 DKK income bins. Additionally, the regressions include indicators for the number of children still under age 18 in each year post-separation that the parents had (not including any new children born post-separation). Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Table 3: Effects of Average Child Support Orders on Fathers' Child Support Payments and Contacts with Children

	(1) Average CS	(2) Zero CS Always	(3) Zero CS Ever	(4) Ever live w/child
Average child support order after sep.	0.427*** [0.0317]	-0.00135 [0.00154]	-0.0112*** [0.00123]	-0.00494*** [0.00171]
Mean, dept. var.	9.252	0.187	0.737	0.278
Obs.	70639	70639	70639	70639

Notes: The outcomes are defined as follows: 1) "Average CS" refers to the average annual child support paid by the father in the years post-separation; 2) "Zero CS Always" refers to an indicator for zero child support paid by the father in all years post-separation; 3) "Zero CS Ever" refers to an indicator for zero child support paid by the father in at least one year post-separation; 4) "Ever live w/child" refers to an indicator for the father living with the child at least one year post-separation. All income variables are in year 2000 real units of 1,000 DKK. See notes under Table 1 for more information on the sample. All regressions include fixed effects for 20,000 DKK bins in father's income, number of children, year of separation, and their double interactions. All regressions include controls (measured in the year of separation) for the father's age and age squared, dummies for the father's education (less than high school, high school, vocational/short-term higher ed, college/university, and missing), an indicator for the father being from Western Europe, mother's age and age squared, dummies for the mother's education (less than high school, high school, vocational/short-term higher ed, college/university, and missing), an indicator for the mother being from Western Europe, mother's total income in year 2000 DKK, oldest child's age and age squared, youngest child's age and age squared, and indicators for original parental relationship status (married, cohabiting, never-married/non-cohabiting). Additionally, the regressions include indicators for the number of children still under age 18 in each year post-separation that the parents had (not including any new children born post-separation). Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Table 4: Effects of Average Child Support Orders on Mothers' Post-Separation Fertility Outcomes

	Mother Has More Kids After Sep.			
	(1) Overall	(2) Mar.	(3) Coh.	(4) Not Mar./Coh.
Average child support order after sep.	0.00505*** [0.000844]	0.00318*** [0.000593]	0.00123** [0.000625]	0.000699** [0.000314]
Mean, dept. var.	0.185	0.0657	0.0921	0.0287
Obs.	68941	68941	68941	68941

Notes: The outcomes are defined as follows: 1) "Overall" refers to an indicator for the mother having any children post-separation (regardless of relationship status); 2) "Mar." refers to an indicator for the mother having more children post-separation while married to a new partner; 3) "Coh." refers to an indicator for the mother having more children post-separation while cohabiting with a new partner; 4) "Not Mar./Coh." refers to an indicator for the mother having more children post-separation while neither married or cohabiting. All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample, specifications, and controls. Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Table 5: Effects of Average Child Support Orders on Fathers' Post-Separation Fertility Outcomes

	Father Has More Kids After Sep.				
	(1) Overall	(2) Mar.	(3) Coh.	(4) Not Mar./Coh.	(5) Not living w/ older child
Average child support order after sep.	0.00582*** [0.00102]	0.00273*** [0.000753]	0.00279*** [0.000709]	0.000234 [0.000384]	0.00640*** [0.000914]
Mean, dept. var.	0.186	0.0804	0.0830	0.0238	0.148
Obs.	70639	70639	70639	70639	70639

Notes: The outcomes are defined as follows: 1) "Overall" refers to an indicator for the father having any children post-separation (regardless of relationship status); 2) "Mar." refers to an indicator for the father having more children post-separation while married to a new partner; 3) "Coh." refers to an indicator for the father having more children post-separation while cohabiting with a new partner; 4) "Not Mar./Coh." refers to an indicator for the father having more children post-separation while neither married or cohabiting; 5) "Not living w/ older child" refers to an indicator for the father having more children post-separation while not living with his oldest child. All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample, specifications, and controls. Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Table 6: Effects of Average Child Support Orders on Fathers' Post-Separation Labor Market Outcomes

	(1) Any Wage	(2) Log Wage	(3) Emp.	(4) Self-Emp.	(5) NILF	(6) Dis.	(7) Welf.	(8) Ret.
Average child support order after sep.	-0.00139*	-0.00106	-0.000639	-0.000335	0.00176***	0.00103***	-0.000116	0.00102***
	[0.000827]	[0.00390]	[0.000996]	[0.000842]	[0.000458]	[0.000298]	[0.000263]	[0.000256]
Mean, dept. var.	0.915	12.26	0.832	0.0611	0.0418	0.0113	0.0249	0.00364
Obs.	70626	69184	70639	70639	70639	70639	70639	70639

Notes: The outcomes are defined as follows: 1) "Any Wage" refers to the proportion of years the father has any wage income post-separation, 2) "Log Wage" refers to the log of the father's average annual wage income in the years post-separation, 3) "Emp." refers to the proportion of years the father is employed in the private or public sector (not self-employed) post-separation, 4) "Self-Emp." refers to the proportion of years the father is self-employed post-separation, 5) "NILF" refers to the proportion of years the father is not in the labor force post-separation, 6) "Dis." refers to the proportion of years the father is not in the labor force due to disability leave post-separation, 7) "Welf." refers to the proportion of years the father is not in the labor force and receiving welfare benefits, and 8) "Ret." refers to the proportion of years the father is not in the labor force due to retirement (including early retirement) post-separation. All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample, specifications, and controls. Standard errors robust to heteroskedasticity.

Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Table 7: Effects of Average Child Support Orders on Mothers' Post-Separation Labor Market Outcomes

	(1) Any Wage	(2) Log Wage	(3) Emp.	(4) Self-Emp.	(5) NILF
Average child support order after sep.	0.000723 [0.000860]	0.00734* [0.00387]	0.00102 [0.000998]	0.000335 [0.000498]	0.000561 [0.000699]
Mean, dept. var.	0.847	11.82	0.753	0.0237	0.0691
Obs.	68869	65525	68941	68941	68941

Notes: The outcomes are defined as follows: 1) "Any Wage" refers to the proportion of years the mother has any wage income post-separation, 2) "Log Wage" refers to the log of the mother's average annual wage income in the years post-separation, 3) "Emp." refers to the proportion of years the mother is employed in the private or public sector (not self-employed) post-separation, 4) "Self-Emp." refers to the proportion of years the mother is self-employed post-separation, and 5) "NILF" refers to the proportion of years the mother is not in the labor force post-separation. All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample, specifications, and controls. Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Table 8: Effects of Average Child Support Orders on Fathers' Post-Separation Labor Market Outcomes: Heterogeneity by Income Relative to the First Guideline Threshold

	(1) Any Wage	(2) Log Wage	(3) Emp.	(4) Self-Emp.	(5) NILF	(6) Dis.	(7) Welf.	(8) Ret.
Average child	0.00258**	0.0143***	0.00388***	-0.00187*	-0.00138**	-0.000901**	-0.000111	-0.000221
support order after sep.	[0.00104]	[0.00461]	[0.00127]	[0.00104]	[0.000602]	[0.000398]	[0.000355]	[0.000310]
Average Order *	-0.00282***	-0.0111***	-0.00322***	0.00108**	0.00223***	0.00137***	-0.0000128	0.000884***
Above Threshold 1	[0.000474]	[0.00214]	[0.000577]	[0.000447]	[0.000311]	[0.000229]	[0.000167]	[0.000146]
Above Threshold 1	0.0433***	0.207***	0.0516***	-0.0139*	-0.0322***	-0.0201***	0.00223	-0.0143***
	[0.00877]	[0.0401]	[0.0108]	[0.00844]	[0.00554]	[0.00400]	[0.00297]	[0.00261]
Mean, dept. var.	0.915	12.26	0.832	0.0611	0.0418	0.0113	0.0249	0.00364
Obs.	70626	69184	70639	70639	70639	70639	70639	70639

Notes: This table presents results from regressions that include an interaction with an indicator for the father's separation year nominal income being above the first threshold in the child support guidelines. The outcomes are defined as follows: 1) "Any Wage" refers to the proportion of years the father has any wage income post-separation, 2) "Log Wage" refers to the log of the father's average annual wage income in the years post-separation, 3) "Emp." refers to the proportion of years the father is employed in the private or public sector (not self-employed) post-separation, 4) "Self-Emp." refers to the proportion of years the father is self-employed post-separation, 5) "NILF" refers to the proportion of years the father is not in the labor force post-separation, 6) "Dis." refers to the proportion of years the father is not in the labor force due to disability leave post-separation, 7) "Welf." refers to the proportion of years the father is not in the labor force and receiving welfare benefits, and 8) "Ret." refers to the proportion of years the father is not in the labor force due to retirement (including early retirement) post-separation. All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample, specifications, and controls. Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

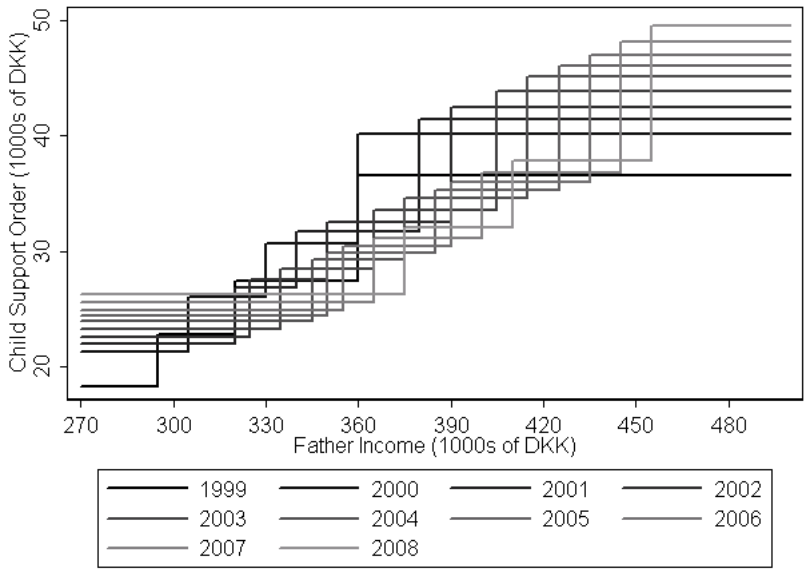
Table 9: Effects of Child Support Orders on the Likelihood of Parental Separation

	Dep. Var.: Parents Separated or Had Out-of-Wedlock/Cohabitation Birth				
	(1) Poly 1	(2) Poly 2	(3) Poly 3	(4) Poly 4	(5) 20K Bins
Child Support Order	0.000214*** [0.0000318]	0.000161*** [0.0000399]	-0.000130** [0.0000523]	-0.0000551 [0.0000628]	-0.000100 [0.000341]
Dad income	-0.0000505*** [0.00000615]	-0.000118*** [0.0000436]	-0.000510** [0.000237]	0.000331 [0.00114]	
Dad inc. squared		0.000000104 [6.41e-08]	0.00000139* [0.000000726]	-0.00000282 [0.00000531]	
Dad inc. cubed			-1.29e-09* [7.19e-10]	7.65e-09 [1.07e-08]	
Dad inc. quartic				-6.88e-12 [7.90e-12]	
Mean, dept. var.	0.0297	0.0297	0.0297	0.0297	0.0206
Obs. (father-years)	2451720	2451720	2451720	2451720	2451720
Number cells					330

Notes: In columns 1-4, units of analysis are father-year observations. In column 5, the units of analysis are cells according to the interactions of 20,000 DKK father income bins, year, and number of children. The regression in column 5 is weighted by the number of father-year observations in each cell. The sample is a panel of fathers of children born in 1985-2010, who appear in the register data in every year over 1998-2010, and who were either married to, cohabiting with, or never-married/non-cohabiting with their oldest child's mother at the time of childbirth for children born in 1998 or later or in 1998 for children born before. Only father-year observations until the year of separation (if it occurs) are kept. The sample is further limited to father-year observations with nominal incomes between 175,000 and 505,000 DKK. (100,000 DKK surrounding the range of the first three cutoffs), and who have either one or two children aged less than 18. In columns 1-4 (column 5), the outcome of interest is an indicator for (fraction of) the parents either separating, divorcing, or have an out-of-wedlock/cohabitation child. All income variables are in year 2000 real units of 1,000 DKK. In columns 1-4, standard errors are robust to heteroskedasticity; in column 5, robust standard errors are clustered on the cell level.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

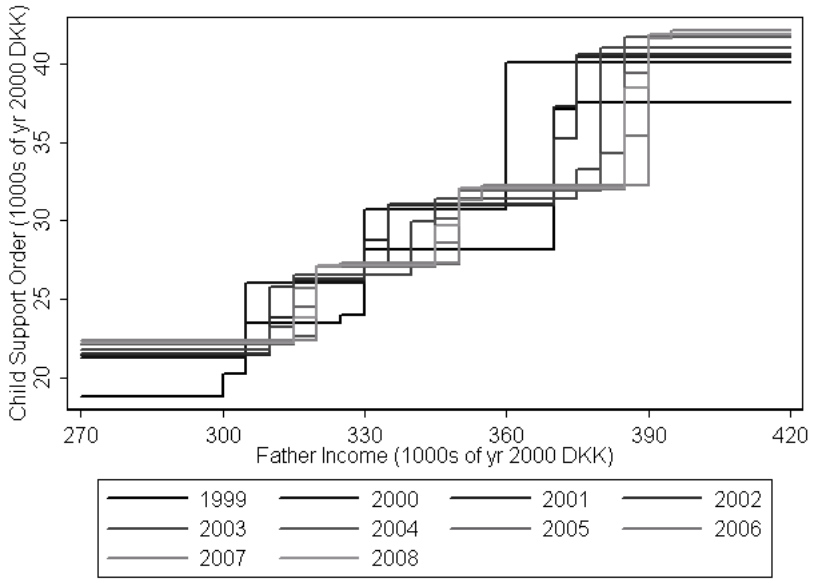
A Appendix Figures and Tables

Appendix Figure 1: Government-Mandated Child Support Orders, 2 Child Families, Nominal DKK



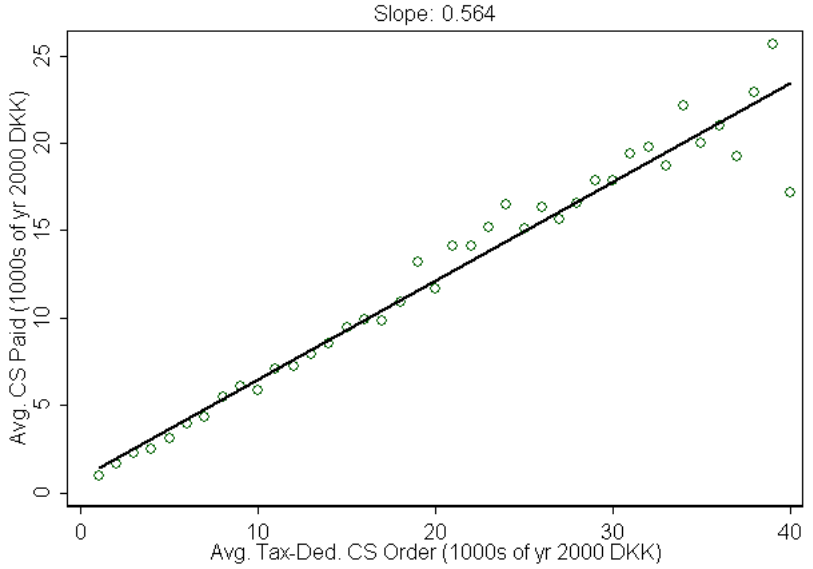
Notes: This figure shows the relationship between a non-custodial father's income and the required amount of child support by year for families with two children. Units are 1000s of nominal DKK.

Appendix Figure 2: Government-Mandated Child Support Orders, 2 Child Families, Year 2000 DKK



Notes: This figure shows the relationship between a non-custodial father's income and the required amount of child support by year for families with two children. Units are 1000s of real year 2000 DKK.

Appendix Figure 3: Relationship between Average Child Support Orders and Actual Child Support Payments Over Separation Years, Year 2000 DKK



Notes: This figure shows the relationship between a non-custodial father's average child support order and his actual average child support payment (both net of the unobserved non-tax-deductible "extra amount") over the years of separation. Units are 1000s of real year 2000 DKK.

Appendix Table 1: Child Support Payment Variables, More Details

	(1) All Sep.	(2) Prev. Mar.	(3) Prev. Coh.	(4) Never Mar/Coh
CS Paid as Pct. of Order	0.613	0.656	0.587	0.528
Zero CS Paid	0.193	0.190	0.176	0.272
CS Paid as Pct. of Order, no 0s	0.760	0.810	0.713	0.726
0 < CS Paid < Order	0.647	0.617	0.692	0.608
CS Paid >= Order	0.159	0.192	0.133	0.120
Obs.	73,325	34,663	30,481	8,181

Notes: This table reports the fraction of all individuals in each column that are in each of the categories denoted on the left-hand side. See notes under Table 1 for more information on the sample.

Appendix Table 2: Fraction Fathers with Zero Child Support Paid Post-Separation, By Fathers' Characteristics

All	0.193
Dad Income Below Med.	0.201
Dad Income Above Med.	0.185
Dad Ed Less than Uni.	0.188
Dad Ed Uni. or More	0.232
Dad Age 35 or Less	0.164
Dad Age 36 or More	0.221

Notes: This table reports the fraction of fathers described in the left column who paid zero child support in all the years post-separation. Median real income among fathers in our sample is 277,602 in year 2000 DKK. See notes under Table 1 for more information on the sample.

Appendix Table 3: Effect of Average Child Support Orders on Average Child Support Paid in the Years After Separation, Different Polynomial Specifications

	Dep. Var.: Average Child Support Paid in Years After Sep.				
	(1) Poly 1	(2) Poly 2	(3) Poly 3	(4) Poly 4	(5) 20K Bins
Average child support order after sep.	0.262*** [0.0154]	0.365*** [0.0253]	0.364*** [0.0260]	0.400*** [0.0304]	0.427*** [0.0317]
Dad inc. at sep.	0.0149*** [0.00158]	0.00550 [0.00956]	-0.0163 [0.0530]	0.372 [0.254]	
Dad inc. squared		0.0000111 [0.0000160]	0.0000774 [0.000173]	-0.00181 [0.00125]	
Dad inc. cubed			-6.39e-08 [0.000000181]	0.00000388 [0.00000264]	
Dad inc. quartic				-2.98e-09 [2.03e-09]	
Mean, dept. var.	9.252	9.252	9.252	9.252	9.252
Obs.	70639	70639	70639	70639	70639
R-squared	0.314	0.315	0.315	0.315	0.317

Notes: All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample and controls. The following functions of the father's real income in the year of separation are included: column 1 — linear polynomial, column 2 — quadratic polynomial, column 3 — cubic polynomial, column 4 — quartic polynomial, column 5 — indicators for 20,000 DKK bins. All regressions include the controls listed in the notes under Table 3 as well as a full set of fixed effects and interactions for number of children, year of separation, and the interactions between them and the father's income function. Additionally, the regressions include indicators for the number of children still under age 18 in each year post-separation that the parents had (not including any new children born post-separation). Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Appendix Table 4: Effect of Average Child Support Orders on the Incidence of Fathers Ever Living with Their Children After Separation, Different Polynomial Specifications

	Dep. Var.: Father Ever Lives w/ Child After Sep.				
	(1) Poly 1	(2) Poly 2	(3) Poly 3	(4) Poly 4	(5) 20K Bins
Average child support order after sep.	-0.000987 [0.000731]	-0.00477*** [0.00129]	-0.00403*** [0.00136]	-0.00565*** [0.00167]	-0.00494*** [0.00171]
Dad inc. at sep.	-0.000151* [0.0000823]	-0.000298 [0.000559]	-0.00151 [0.00310]	-0.0127 [0.0149]	
Dad inc. squared		0.000000373 [0.000000872]	0.00000427 [0.00000979]	0.0000594 [0.0000712]	
Dad inc. cubed			-4.07e-09 [9.91e-09]	-0.000000120 [0.000000147]	
Dad inc. quartic				8.86e-11 [1.10e-10]	
Mean, dept. var.	0.278	0.278	0.278	0.278	0.278
Obs.	70639	70639	70639	70639	70639
R-squared	0.0759	0.0762	0.0765	0.0767	0.0783

Notes: All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample and controls. The following functions of the father's real income in the year of separation are included: column 1 — linear polynomial, column 2 — quadratic polynomial, column 3 — cubic polynomial, column 4 — quartic polynomial, column 5 — indicators for 20,000 DKK bins. All regressions include the controls listed in the notes under Table 3 as well as a full set of fixed effects and interactions for number of children, year of separation, and the interactions between them and the father's income function. Additionally, the regressions include indicators for the number of children still under age 18 in each year post-separation that the parents had (not including any new children born post-separation). Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Appendix Table 5: Effect of Average Child Support Orders on Average Child Support Paid in the Years After Separation, Different Bin Specifications

	Dep. Var.: Average Child Support Paid in Years After Sep.				
	(1) 50K Bins	(2) 25K Bins	(3) 20K Bins	(4) 15K Bins	(5) 10K Bins
Average child support order after sep.	0.405*** [0.0268]	0.428*** [0.0309]	0.427*** [0.0317]	0.436*** [0.0324]	0.450*** [0.0334]
Mean, dept. var.	9.252	9.252	9.252	9.252	9.252
Obs.	70639	70639	70639	70639	70639
R-squared	0.315	0.317	0.317	0.318	0.320

Notes: All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample and controls. The following functions of the father's real income in the year of separation are included: column 1 — indicators for 50,000 DKK bins, column 2 — indicators for 25,000 DKK bins, column 3 — indicators for 20,000 DKK bins, column 4 — indicators for 15,000 DKK bins, column 5 — indicators for 10,000 DKK bins. All regressions include the controls listed in the notes under Table 3 as well as a full set of fixed effects and interactions for number of children, year of separation, and the interactions between them and the father's income function. Additionally, the regressions include indicators for the number of children still under age 18 in each year post-separation that the parents had (not including any new children born post-separation). Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Appendix Table 6: Effect of Average Child Support Orders on the Incidence of Fathers Ever Living with Their Children After Separation, Different Bin Specifications

	Dep. Var.: Father Ever Lives w/ Child After Sep.				
	(1) 50K Bins	(2) 25K Bins	(3) 20K Bins	(4) 15K Bins	(5) 10K Bins
Average child support order after sep.	-0.00364*** [0.00130]	-0.00485*** [0.00164]	-0.00494*** [0.00171]	-0.00631*** [0.00178]	-0.00531*** [0.00183]
Mean, dept. var.	0.278	0.278	0.278	0.278	0.278
Obs.	70639	70639	70639	70639	70639
R-squared	0.0770	0.0779	0.0783	0.0789	0.0805

Notes: All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample and controls. The following functions of the father's real income in the year of separation are included: column 1 — indicators for 50,000 DKK bins, column 2 — indicators for 25,000 DKK bins, column 3 — indicators for 20,000 DKK bins, column 4 — indicators for 15,000 DKK bins, column 5 — indicators for 10,000 DKK bins. All regressions include the controls listed in the notes under Table 3 as well as a full set of fixed effects and interactions for number of children, year of separation, and the interactions between them and the father's income function. Additionally, the regressions include indicators for the number of children still under age 18 in each year post-separation that the parents had (not including any new children born post-separation). Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Appendix Table 7: Effect of Average Child Support Orders on Average Child Support Paid in the Years After Separation, Different Windows

	Dep. Var.: Average Child Support Paid in Years After Sep.				
	(1) 20K	(2) 40K	(3) 60K	(4) 80K	(5) 100K
Average child support order after sep.	0.498*** [0.0430]	0.461*** [0.0374]	0.429*** [0.0346]	0.433*** [0.0330]	0.427*** [0.0317]
Mean, dept. var.	9.369	9.357	9.320	9.302	9.252
Obs.	45585	54002	60634	66002	70639
R-squared	0.307	0.313	0.314	0.316	0.317

Notes: All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample, specifications, and controls. Samples of analysis are chosen based on the following income windows surrounding the first three thresholds: column 1 — 20,000 DKK, column 2 — 40,000 DKK, column 3 — 60,000 DKK, column 4 — 80,000 DKK column 5 — 100,000 DKK. Standard errors robust to heteroskedasticity. Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Appendix Table 8: Effect of Average Child Support Orders on the Incidence of Fathers Ever Living with Their Children After Separation, Different Windows

	Dep. Var.: Father Ever Lives w/ Child After Sep.				
	(1) 20K	(2) 40K	(3) 60K	(4) 80K	(5) 100K
Average child support order after sep.	-0.00396 [0.00267]	-0.00317 [0.00229]	-0.00288 [0.00204]	-0.00418** [0.00187]	-0.00494*** [0.00171]
Mean, dept. var.	0.277	0.278	0.278	0.278	0.278
Obs.	45585	54002	60634	66002	70639
R-squared	0.0765	0.0773	0.0781	0.0789	0.0783

Notes: All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample, specifications, and controls. Samples of analysis are chosen based on the following income windows surrounding the first three thresholds: column 1 — 20,000 DKK, column 2 — 40,000 DKK, column 3 — 60,000 DKK, column 4 — 80,000 DKK column 5 — 100,000 DKK. Standard errors robust to heteroskedasticity. Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Appendix Table 9: Effect of Average Child Support Orders on the Likelihood of Mothers Having Children After Separation, Different Polynomial Specifications

	Dep. Var.: Mother Has More Kids in Years After Sep.				
	(1) Poly 1	(2) Poly 2	(3) Poly 3	(4) Poly 4	(5) 20K Bins
Average child support order after sep.	0.000799 [0.000543]	0.00287*** [0.000787]	0.00293*** [0.000812]	0.00505*** [0.000857]	0.00505*** [0.000844]
Dad inc. at sep.	-0.0000799 [0.0000702]	-0.000521 [0.000482]	-0.00166 [0.00267]	-0.0178 [0.0130]	
Dad inc. squared		0.000000554 [0.000000734]	0.00000411 [0.00000834]	0.0000832 [0.0000615]	
Dad inc. cubed			-3.53e-09 [8.37e-09]	-0.000000170 [0.000000126]	
Dad inc. quartic				1.27e-10 [9.37e-11]	
Mean, dept. var.	0.185	0.185	0.185	0.185	0.185
Obs.	68941	68941	68941	68941	68941
R-squared	0.213	0.213	0.213	0.213	0.215

Notes: All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample and controls. The following functions of the father's real income in the year of separation are included: column 1 — linear polynomial, column 2 — quadratic polynomial, column 3 — cubic polynomial, column 4 — quartic polynomial, column 5 — indicators for 20,000 DKK bins. All regressions include the controls listed in the notes under Table 3 as well as a full set of fixed effects and interactions for number of children, year of separation, and the interactions between them and the father's income function. Additionally, the regressions include indicators for the number of children still under age 18 in each year post-separation that the parents had (not including any new children born post-separation). Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Appendix Table 10: Effect of Average Child Support Orders on the Likelihood of Fathers Having Children After Separation, Different Polynomial Specifications

	Dep. Var.: Father Has More Kids in Years After Sep.				
	(1) Poly 1	(2) Poly 2	(3) Poly 3	(4) Poly 4	(5) 20K Bins
Average child support order after sep.	0.000386 [0.000577]	0.00272*** [0.000912]	0.00243*** [0.000934]	0.00569*** [0.00101]	0.00582*** [0.00102]
Dad inc. at sep.	0.000181** [0.0000763]	0.000202 [0.000520]	-0.00431 [0.00288]	0.00282 [0.0139]	
Dad inc. squared		-0.000000174 [0.000000801]	0.0000143 [0.00000904]	-0.0000194 [0.0000662]	
Dad inc. cubed			-1.47e-08 [9.11e-09]	5.32e-08 [0.000000136]	
Dad inc. quartic				-5.00e-11 [1.01e-10]	
Mean, dept. var.	0.186	0.186	0.186	0.186	0.186
Obs.	70639	70639	70639	70639	70639
R-squared	0.140	0.140	0.140	0.141	0.143

Notes: All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample and controls. The following functions of the father's real income in the year of separation are included: column 1 — linear polynomial, column 2 — quadratic polynomial, column 3 — cubic polynomial, column 4 — quartic polynomial, column 5 — indicators for 20,000 DKK bins. All regressions include the controls listed in the notes under Table 3 as well as a full set of fixed effects and interactions for number of children, year of separation, and the interactions between them and the father's income function. Additionally, the regressions include indicators for the number of children still under age 18 in each year post-separation that the parents had (not including any new children born post-separation). Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Appendix Table 11: Effect of Average Child Support Orders on the Fraction of Years Fathers are Not in the Labor Force After Separation, Different Polynomial Specifications

	Dep. Var.: Proportion of Time NILF in Years After Sep.				
	(1) Poly 1	(2) Poly 2	(3) Poly 3	(4) Poly 4	(5) 20K Bins
Average child support order after sep.	0.00626*** [0.000241]	0.000439 [0.000359]	-0.000513 [0.000383]	0.00204*** [0.000477]	0.00176*** [0.000458]
Dad inc. at sep.	-0.000406*** [0.0000250]	-0.00143*** [0.000171]	-0.00415*** [0.000928]	-0.00684 [0.00450]	
Dad inc. squared		0.00000192*** [0.000000254]	0.0000106*** [0.00000280]	0.0000249 [0.0000208]	
Dad inc. cubed			-8.68e-09*** [2.72e-09]	-4.15e-08 [4.15e-08]	
Dad inc. quartic				2.65e-11 [3.02e-11]	
Mean, dept. var.	0.0418	0.0418	0.0418	0.0418	0.0418
Obs.	70639	70639	70639	70639	70639
R-squared	0.0941	0.102	0.107	0.109	0.109

Notes: All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample and controls. The following functions of the father's real income in the year of separation are included: column 1 — linear polynomial, column 2 — quadratic polynomial, column 3 — cubic polynomial, column 4 — quartic polynomial, column 5 — indicators for 20,000 DKK bins. All regressions include the controls listed in the notes under Table 3 as well as a full set of fixed effects and interactions for number of children, year of separation, and the interactions between them and the father's income function. Additionally, the regressions include indicators for the number of children still under age 18 in each year post-separation that the parents had (not including any new children born post-separation). Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Appendix Table 12: Effects of Expected Savings in Child Support Obligations from Having an Income Below the 1st Threshold on Fathers' Post-Separation Labor Market Outcomes

	(1) Any Wage	(2) Log Wage	(3) Emp.	(4) Self-Emp.	(5) NILF	(6) Dis.	(7) Welf.	(8) Ret.
Value of moving	-0.00763**	-0.00621	-0.00533	-0.00113	0.0101***	0.00531***	-0.000235	0.00556***
below thres. 1 as pct of income	[0.00377]	[0.0185]	[0.00454]	[0.00391]	[0.00200]	[0.00131]	[0.00114]	[0.00106]
Mean, dept. var.	0.915	12.26	0.832	0.0611	0.0418	0.0113	0.0249	0.00364
Obs.	70626	69184	70639	70639	70639	70639	70639	70639

Notes: This table presents results from regressions where the key explanatory variable is the average annual real savings in child support obligations, as a percentage of the father's separation year real income, that would accrue if the father had an income below the 1st guideline threshold. This variable is expressed in percentage point units. The outcomes are defined as follows: 1) "Any Wage" refers to the proportion of years the father has any wage income post-separation, 2) "Log Wage" refers to the log of the father's average annual wage income in the years post-separation, 3) "Emp." refers to the proportion of years the father is employed in the private or public sector (not self-employed) post-separation, 4) "Self-Emp." refers to the proportion of years the father is self-employed post-separation, 5) "NILF" refers to the proportion of years the father is not in the labor force post-separation, 6) "Dis." refers to the proportion of years the father is not in the labor force due to disability leave post-separation, 7) "Welf." refers to the proportion of years the father is not in the labor force and receiving welfare benefits, and 8) "Ret." refers to the proportion of years the father is not in the labor force due to retirement (including early retirement) post-separation. All income variables are in year 2000 real units of 1,000 DKK. See notes under Tables 1 and 3 for more information on the sample, specifications, and controls. Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Appendix Table 13: Effects of Average Child Support Orders, 1-Child Families

	(1) Avg. CS Paid	(2) F. Live w/Child	(3) F. More Kids	(4) M. More Kids	(5) F. NILF
Average child support order after sep.	0.333*** [0.0368]	-0.00219 [0.00240]	0.00900*** [0.00144]	0.0130*** [0.00120]	0.00232*** [0.000766]
Mean, dept. var.	6.313	0.253	0.209	0.221	0.0470
Obs.	39021	39021	39021	37466	39021

Notes: "F." refers to fathers' outcomes, while "M." refers to mothers' outcomes. See notes under Table 1 on the sample. Here, the sample is further limited to parents who had one child at the time of separation. All income variables are in year 2000 real units of 1,000 DKK. All regressions include fixed effects for 20,000 DKK bins in father's income and the year of separation. All regressions include controls (measured in the year of separation) for the father's age and age squared, dummies for the father's education (less than high school, high school, vocational/short-term higher ed, college/university, and missing), an indicator for the father being from Western Europe, mother's age and age squared, dummies for the mother's education (less than high school, high school, vocational/short-term higher ed, college/university, and missing), an indicator for the mother being from Western Europe, mother's total income in year 2000 DKK, the child's age and age squared, and indicators for original parental relationship status (married, cohabiting, never-married/non-cohabiting). Additionally, the regressions include indicators for the number of children still under age 18 in each year post-separation that the parents had (not including any new children born post-separation). Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

Appendix Table 14: Effects of Average Child Support Orders, 2-Child Families

	(1) Avg. CS Paid	(2) F. Live w/Child	(3) F. More Kids	(4) M. More Kids	(5) F. NILF
Average child support order after sep.	0.261*** [0.0443]	-0.00347* [0.00207]	0.00335*** [0.00129]	0.00356*** [0.00107]	-0.000107 [0.000470]
Mean, dept. var.	12.88	0.309	0.157	0.142	0.0354
Obs.	31618	31618	31618	31475	31618

Notes: "F." refers to fathers' outcomes, while "M." refers to mothers' outcomes. See notes under Table 1 on the sample. Here, the sample is further limited to parents who had two children at the time of separation. All income variables are in year 2000 real units of 1,000 DKK. All regressions include fixed effects for 20,000 DKK bins in father's income and the year of separation. All regressions include controls (measured in the year of separation) for the father's age and age squared, dummies for the father's education (less than high school, high school, vocational/short-term higher ed, college/university, and missing), an indicator for the father being from Western Europe, mother's age and age squared, dummies for the mother's education (less than high school, high school, vocational/short-term higher ed, college/university, and missing), an indicator for the mother being from Western Europe, mother's total income in year 2000 DKK, the oldest child's age and age squared, the youngest child's age and age squared, and indicators for original parental relationship status (married, cohabiting, never-married/non-cohabiting). Additionally, the regressions include indicators for the number of children still under age 18 in each year post-separation that the parents had (not including any new children born post-separation). Standard errors robust to heteroskedasticity.
Significance levels: * p<0.1 ** p<0.05 *** p<0.01

B Incorporating Future Out-of-Union Fertility into the Model

In this extension of the model described in Section 2, we discuss the theoretical implications of distinguishing between future fertility within and outside unions. Specifically, suppose now that utility from child quality is comprised of three components: Q^0 (current child quality), Q^u (child quality from a subsequent child born within a union with a new partner—i.e., marriage or cohabitation), and Q^{ou} (child quality from a subsequent child born outside a union with a new partner). For each parent $i \in \{m, f\}$, denote the number of subsequent children born within a union by n_i^u, and the number of subsequent children born outside a union by n_i^{ou}, where n_i^u and n_i^{ou} can take on integer values $\{0, 1, 2, \ldots\}$.

As before, we assume that child quality is a function of two types of investments: financial, F, and time, K. Denote the financial and time investments in the current child by F^0 and K^0, respectively. For mothers' subsequent children born within unions, financial and time investments are F_m^u and K_m^u, respectively; for mothers' subsequent children born outside unions, financial and time investments are F_m^{ou} and K_m^{ou}, respectively. Similarly, for fathers' subsequent children born within unions, financial and time investments are F_f^u and K_f^u, respectively; for fathers' subsequent children born outside unions, financial and time investments are F_f^{ou} and K_f^{ou}, respectively.

Additionally, for subsequent children born outside unions, we assume that the parents make their decisions based on their expectations of the transfers they will have to give and receive: let $E_m(s)$ and $E_m(t)$ denote the transfers that the mothers expect to receive, and $E_f(s)$ and $E_f(t)$ denote the transfers that the fathers expect to give. We assume that the expectations are non-decreasing functions of the current transfers: $\forall i \in \{m, f\}$, $E_i'(s) \geq 0$ and $E_i'(t) \geq 0$.

Parental utility, $\forall i \in \{m, f\}$, is now represented by the following function:

$$U\Big(Q^0, Q_i^u, Q_i^{ou}, n_i^u, n_i^{ou}, C_i, L_i\Big)$$

$$= \beta_i U_c\Big(Q^0(F^0, K^0),\ \ n_i^u * Q^u(F_i^u, K_i^u),\ \ n_i^{ou} * Q^{ou}(F_i^{ou}, K_i^{ou})\Big) + (1 - \beta_i) U_a\Big(C_i, L_i\Big)$$

The mother chooses the optimal current and subsequent child investments, the numbers of subsequent children she will have in and outside unions, and her own adult consumption and leisure by solving the following maximization problem:

$$\max_{F^0, K^0, n_m^u, n_m^{ou}, F_m^u, K_m^u, F_m^{ou}, K_m^{ou}, C_m, L_m}$$

$$\beta_m U_c\Big(Q^0(F^0,K^0),\ \ n_m^u * Q^u(F_m^u,K_m^u),\ \ n_m^{ou} * Q^{ou}(F_m^{ou},K_m^{ou})\Big) + (1-\beta_m)U_a\Big(C_m, L_m\Big)$$

$$\text{s.t.} \quad F^0 + n_m^u \lambda_m^F F_m^u + n_m^{ou} F_m^{ou} + C_m$$

$$= w_m\Big(T - L_m - K^0 + t - n_m^u \lambda_m^K K_m^u - n_m^{ou} K_m^{ou} + n_m^{ou} E_m(t)\Big) + s + n_m^{ou} E_m(s)$$

The father then maximizes his indirect utility function, choosing his optimal financial and time transfers for the current child, the number of subsequent children he will have in and outside unions, his subsequent child investments for children born within unions, his adult private consumption, and his time spent in leisure. For subsequent children born outside unions, he makes his decisions based on his expectations of response functions from future partners, which we assume to be the same as the current maternal response functions. As before, we assume that for the current child, the father is subject to a child support mandate, R, which depends on his earned income and his time transfer. The father thus solves the following problem:

$$\max_{s,t,n_f^u,n_f^{ou},L_f,F^u,K^u}$$

$$\beta_f U_c\Big(Q^0(F^0(s,t)^*,K^0(s,t)^*),\ \ n_f^u{*}Q^u(F_f^u,K_f^u),\ \ n_f^{ou}{*}Q^{ou}\big(F^0(E_f(s),E_f(t))^*,K^0(E_f(s),E_f(t))^*\big)\Big)$$

$$+(1-\beta_f)U_a\Big(w_f(T - L_f - t - n_f^u\lambda_f^K K_f^u - n_f^{ou}E_f(t)) - s - n_f^u\lambda_f^F F_f^u - n_f^{ou}E_f(s),\ \ L_f\Big)$$

$$\text{s.t.} \quad s \geq R(w_f H_f, t)$$

This expanded framework highlights how increasing the child support obligation from R_1 to R_2 has distinct implications for subsequent fertility within and outside unions for each parent. In particular, for fathers, the increase in the obligation raises the expected cost of having more children outside unions, and thus makes subsequent paternal fertility within unions less costly relative to fertility outside unions. In contrast, mothers have a greater incentive for childbearing outside unions because the receipt of higher payments for existing children increases their expectations of child support transfers associated with subsequent offspring from new partners.