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Income and Child Maltreatment: Evidence from the Earned Income Tax Credit

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ABSTRACT

This study uses an instrumental variables strategy to estimate the effect of income on both CPS involvement and a range of parenting behaviors that proxy for child maltreatment risk in the areas of physical abuse, physical neglect, lack of supervision, and emotional abuse. Following the strategy used by Dahl and Lochner (2012), we take advantage of differences between states and over time in the generosity of the total state and federal Earned Income Tax Credit to identify exogenous variation in family income. Our individual-level data are drawn from the Fragile Families and Child Wellbeing Study, a longitudinal birth-cohort of relatively disadvantaged urban children who have been followed from birth to age nine. Results suggest that an exogenous increase in income is associated with relatively large reductions in the probability of both CPS involvement and risk for physical child neglect; we find less consistent evidence with regard to the other maltreatment risk proxies. These findings suggest that there is a causal link between income and CPS involvement, which most likely reflects a causal link between income and physical neglect—the most common form of maltreatment and the form of maltreatment most strongly correlated with poverty. Given that child neglect and CPS involvement impose tremendous economic costs to both victims and society as a whole, this research suggests that economic support policies may be an efficient prevention strategy for physical neglect, and also that child welfare interventions may be well served by addressing families' economic issues.

Introduction

Child maltreatment is a costly public health problem. Recent estimates suggest that the average lifetime cost of child maltreatment ranges from approximately $210,000 to $1,200,000 (in 2010 dollars) for incidents of nonfatal and fatal child maltreatment, respectively (Fang, Brown, Florence & Mercy, 2012). Annual estimates of the cost of new incidents of child maltreatment approach $1.25 billion, with alternative specifications reaching as high as $5.5 billion (Fang et al., 2012). With such high costs at stake, there is a striking dearth of evidence on the causes of child maltreatment. The vast body of research on child maltreatment etiology involves correlational study designs and/or statistical techniques that elude identification of causal risk factors. In this research, we focus on one of the most common correlates of child maltreatment—family income—and address the question of whether it has a causal relationship with various indicators of child maltreatment.

A decades-long literature offers evidence of an inverse association between family income and child maltreatment (Berger, 2004; Gelles, 1992; Jones & McCurdy, 1992; Sedlak & Broadhurst, 1996; Sedlak et al., 2010); and of a positive association between poverty status or welfare receipt and child maltreatment (Coulton, Crampton, Irwin, Spilsbury & Korbin, 2007; Coulton, Korbin, Su & Chow, 1995; Drake and Pandey, 1996; Paxson and Waldfogel, 2002; Slack, Holl, Lee, McDaniel, Altenbernd & Stevens, 2003). However, evidence of a causal relationship between income/poverty and child maltreatment is almost nonexistent. Randomized controlled trials of either income-reducing or income-enhancing interventions have rarely involved child maltreatment outcome measures (excepting Cancian, Yang & Slack, 2013 and

Fein & Lee, 2003), and few studies have been conducted that apply rigorous techniques for isolating income's exogenous impact on child maltreatment.

This study applies an instrumental variables strategy to estimate income's causal effect on child maltreatment using longitudinal panel data from the Fragile Families and Child Wellbeing Study (Reichman, Teitler, Garfinkel, & McLanahan, 2001), a nationally representative study of infants from large urban areas, who have been followed from birth through age nine. The main hypothesis tested is that higher family income is associated with lower probabilities of child maltreatment, measured in various forms. A second hypothesis is that higher family income is more closely associated with child neglect than with other forms of child maltreatment, given that past research has consistently demonstrated a stronger association between income and child neglect versus child physical or sexual abuse (Sedlak & Broadhurst, 1996; Sedlak et al., 2010). State variation, across states and over time, in Earned Income Tax Credits (EITC) is used to instrument family income.

Background

The Earned Income Tax Credit (EITC) is a refundable federal tax credit designed to supplement the earnings and net income of low-wage workers. The amount of the tax credit varies significantly as a function of marital status and number of children, ranging in 2012 from a maximum credit of just under $500 for a childless single adult to a maximum credit of nearly $6,000 for a family with three or more children (Center on Budget and Policy Priorities [CBPP], February 1, 2013). This amount can be supplemented in 24 states with state EITCs, which vary significantly as a proportion of the federal EITC.

The EITC Program has been touted as a highly successful component of the contemporary U.S. safety net in that it incentivizes work, given its gradual phase-in/phase-out structure. It also lifts significant numbers of people above the poverty level, second only to Social Security in the extent of this

achievement (Bitler, Hoynes, & Kuka, 2013; Short, 2012). It has been shown to encourage welfare exits, particularly during periods of economic growth (CBPP, 2013). Bitler et al. (2013) assess how receipt of and expenditures on EITC benefits track with state-level economic trends. They find that higher state unemployment rates are associated with greater EITC participation and expenditures for married couples (but not for single individuals). Given its pervasive use among low-income wage earners, and its strong anti-poverty and work incentive effects, it is logical to hypothesize that EITC participation may impact a range of child and family well-being outcomes.

In fact, past research has accumulated evidence of EITC's (somewhat mixed) effects on well-being. Taking advantage of a spike in EITC benefit levels in the mid-1990s, Dahl and Lochner (2012) found that a $1,000 increase in family income was associated with increases in math and reading scores among children in the National Longitudinal Survey of Youth. Strully, Rehkopf & Xuan (2013) looked at enactments of state EITCs and found a positive association with birth weights of newborns. Similarly, Hoynes, Miller & Simon (2012) found that reforms in the federal EITC program are linked to increases in birth weights. Using a difference-in-difference approach with National Survey of Families and Households data, Boyd-Swan, Herbst, Ifcher & Zarghamee (2013) found that the federal EITC expansion in 1990 was associated with decreases in maternal depression symptomatology. Evans & Garthwaite (2011) found that the 1993 EITC expansions were associated with improvements in self-reported maternal health and with select biomarkers of general health status, however Schmeizer (2007) found that state and federal variations in EITC benefits were linked to increases in Body Mass Index (BMI) for men and even more so for women. Larrimore (2011) did not find evidence to link exogenous shifts in the generosity of state and federal EITC benefits with self-reported health or functional limitations. With respect to health risk behaviors, Cowan and Tefft (2012) found EITC benefits to be associated with a decline in smoking among unmarried women with less than a college degree. Using the NLSY, Averett and Wang (2012) found a similar decline in smoking for white, less educated women with two or more children.

Indicators of child and family socio-economic wellbeing have been assessed in relation to EITC benefits, as well. Berger, Collins, Lee & Smeeding (2013) exploit variation in state EITC amounts and in UI benefits over time are used to estimate the effect of each of these programs on the probability of exit from homeownership, foreclosure, and eviction. More generous state benefits reduce each of these outcomes. Michelmore (2013) also looked at state variation in EITC benefits over time to assess whether this program operates as a form of "financial aid" for families with children of college age. She found that increases in EITC benefits show a modest impact on the likelihood of attending college, and of completing a bachelor's degree. In contrast, little evidence exists to suggest that EITC affects decisions to marry or to stay married (Dickert-Conlin, 2002; 1999)

To date, there have been no rigorous studies of the causal role of income on child maltreatment, with one notable exception. Cancian, Yang, and Slack (2013) utilized a randomized control trial on full child support pass through dollars for welfare recipients to show that exogenous increases in the amount of child support received led to reduced risk of being reported to and investigated by CPS. We hypothesize that higher state EITC benefits reduce child maltreatment based on the fact that the EITC has been shown to be particularly effective in reducing poverty levels for less educated single mothers (Meyer & Rosenbaum, 2001; Neumark & Washer, 2000; Strully et al., 2013). This family structure (i.e., low-income single mothers, typically with a high school degree or less) constitutes the vast majority of the families who come to the attention of child protective systems (CPS). Income and indicators of poverty are among the strongest and most consistent correlates of child maltreatment (McDaniel and Slack, 2005; Courtney, Dworsky, Piliavin & Zinn, 2005; Slack, Lee & Berger, 2007; Slack, Holl, McDaniel, Lee & Bolger, 2004; Sedlak & Broadhurst, 1996; Sedlak et al., 2010), such that increases in income levels (or reductions in poverty) are associated with decreases in child maltreatment risk. We further hypothesize that income will be more strongly associated with child neglect than other forms of child maltreatment, based on past research that identifies neglect as the type of maltreatment most closely associated with poverty (Fein & Lee, 2003; Sedlak & Broadhurst, 1996; Sedlak et al., 2010). At the same time, however, there is a strong work incentive built into the EITC program structure, characterized by a phase-

in, plateau, and phase-out benefit sequence. In general, past research has generated evidence that programs designed to encourage work are much more likely to positively influence child and family well-being than programs which mandate work in the absence of financial supports (Currie & Cole, 1993; Strully et al., 2013). At the same time, however, evidence on associations of maternal employment with child maltreatment have been quite mixed with some studies suggesting that maternal employment is associated with reduced maltreatment risk (Jones & McCurdy, 1002; Courtney et al., 2010; Slack et al., 2003) and others suggesting that increased maternal employment, particularly among disadvantaged women, is associated with increased maltreatment risk (Paxson & Waldfogel, 2002). Thus, the role of increased employment and work hours associated with the EITC vis-à-vis associations between EITC induced income increases and child maltreatment are unclear a priori. On balance, however, we expect that the protective effect of increased income is likely to outweigh an adverse effect of increased work.

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Data

Data are drawn from the Fragile Families and Child Well-Being (FFCW) study, a longitudinal birth cohort study that began in 1999 and comprises a nationally representative sample of non-marital urban births and a purposive sample of marital urban births. Parents of the child were interviewed at the time of birth, and again when the child is 1, 3, 5, and 9 years of age. The initial sample included 4,898 children.

We use observations from the 3, 5, and 9 year interviews of this study for a possible sample of 14,694 person-waves. Our analysis sample drops observations (person-waves) which were not interviewed at that wave (N=2,809), which lacked earnings information for the present wave (N=869) or prior wave (N=1,252), or were missing information on CPS involvement (N=1,073) or the maltreatment proxy variables (N=1,307). This resulted in 7,378 observations of 3,119 individuals.

Measures

Child Maltreatment

We measure child maltreatment in terms of involvement with Child Protective Services (CPS), as well as with a set of measures of substandard parenting behaviors intended to proxy for maltreatment (Berger 2007), which we refer to as behaviorally approximated measures of child maltreatment risk. CPS involvement is measured by parent report. In the age 5 and 9 interviews of the FFCW, mothers were asked whether they had any contact with child protective services since birth (for age 5) or the prior wave (for age 9). Mothers who answered in the affirmative were asked to provide the date of their most recent CPS contact. From the date information, CPS involvement is attributed to the wave which immediately succeeded the contact date. Consequently, we are likely underestimating the prevalence of CPS involvement at wave 3, given we only know the date of most recent contact at waves 4 and 5. Because CPS is unlikely to contact a family regarding a "screened-out" child maltreatment report, this measure likely identifies families that were the subject of a CPS investigation or assessment. We refer to families responding affirmatively to this item as being CPS-involved.

Behaviorally approximated child maltreatment risk items were drawn from various sections of the mother interview, which included subsets of the Parent-Child Conflict Tactic Scales ([CTS] Straus et al, 2007) which were completed by the mother. Specifically, FFCW included in the parent interviews only the portion of items from the CTS for which affirmative responses from the parent would not trigger the mandated reporter requirements for instances of suspected maltreatment. Thus, we were limited to those items which, while not meeting mandatory reporting threshold for suspected abuse or neglect, are most indicative of maltreatment risk behaviors. Behaviorally approximated child maltreatment risk items were

categorized by type, using generic standards for maltreatment typology. Four types of maltreatment were approximated: exposure/supervision neglect, physical neglect, physical abuse and emotional abuse. For all measures, the following conditions were applied: (1) for the indicator to be calculated, no more than 1 of the items could be missing; and (2) individual items that were not initially dichotomous were made dichotomous by creating a cutoff point at the 90^{th} percentile, or the lowest value greater than zero if less than 10 percent of observations were indicated.

Exposure or supervision neglect occurs when a parent, by action or inaction, places a child in a situation or environment wherein there is a foreseeable risk of harm to the child. The measures used in this study identify four such situations (1) child is left without an adult present; (2) child witnessing or in an environment with severe parental substance abuse; (3) child witnessing domestic violence; or (4) criminal activity in the environment of the child. Exposure/supervision neglect is measured by a dichotomous indicator, equal to 1 if any of the individual items are indicated. Physical neglect occurs when a parent is unable or unwilling to provide adequate food, shelter, medical care, or other necessary material needs for a child. We assess five such indicators: (1) inability to obtain needed medical care for focal child; (2) inability to provide food for focal child; (3) lack of shelter, by way of homelessness or doubling up; (4) inadequate shelter, by way of high internal disarray or safety problems; and (5) inadequate clothing and hygiene of focal child. The physical neglect measure is equal to 1 if 2 or more items are indicated, 0 otherwise. Physical abuse is operationalized using two items from the physical assault CTS subscale, pertaining to the focal child: hitting of child with an object on multiple occasions, and shaking of child any time in the past 12 months. The physical abuse indicator is equal to 1 if either item is indicated, 0 otherwise. Finally, emotional abuse is

operationalized with 3 items from the psychological aggression subscale of the CTS. The emotional abuse indicator is equal to 1 if any of the following occurred over the past 12 months, pertaining to the focal child: swearing at child on multiple occasions, insulting child or calling child names, or threatening to kick child out of the home.

Whereas CPS reports are a commonly used proxy for child maltreatment, they are likely to underestimate maltreatment, given that a substantial portion of maltreatment is never reported to CPS (National Incidence Studies, 2009). In contrast, our behaviorally approximated measures are likely to overestimate maltreatment, given our use of a broad set of parenting behaviors that, for the most part, would not themselves meet legal thresholds for maltreatment. To the extent that there is such systematic reporting bias in both types of measures, our results should be biased toward zero. Nonetheless, we argue that a comparison of the estimates for each type of maltreatment measure will provide insight into the likely bounds of the magnitude of the influence of income on child maltreatment. Moreover, it may be the case that the probability of being reported to CPS reflects different characteristics and circumstances than the probability that parents exhibit behaviors that place children at risk of maltreatment. For instance, income could affect the probability of coming to the attention of CPS (e.g. by reducing contact with social service agencies, whose employees are mandated reporters), without reducing the probability that a parent will perpetrate maltreatment. Hence, the use of additional maltreatment measures can also provide some evidence as it pertains to the mechanisms through which income might affect CPS involvement.

Income and potential EITC benefit

The primary predictor for this study is post-tax and transfer family income, which we construct in two ways. First we estimate pre-tax income as the sum of all reported earned and

unearned income for the mother (and the father if married to the mother). This includes wages in addition to cash income from social assistance programs (TANF, SNAP, SSI, and unemployment compensation) and child support payments received by the mother. We refer to this measure as our naïve income measure. However, because this measure fails to account for potential resource sharing by nonparent spouses or cohabiting partners of the mother, we also use a second income measure which was constructed, with some imputed data, by the FFCW study team to measure of gross household income. We refer to this measure, which we believe more fully captures actual family income, as our enhanced income measure. This is our preferred measure.

In our construction of both the net income measures and the EITC amount, we again follow closely the strategy delineated by Dahl and Lochner (2012). To construct post-tax and transfer income measures, we used TAXSIM (National Bureau of Economic Research, 2012) to estimate tax liability based on the first (naïve) income measure. The estimated tax liability—which can be a positive or negative amount, as it takes into account all refund credits for which the respondent would be eligible—is then deducted from each income measure to approximate post tax and transfer income. The conservative estimate of income, as a sum of parts, can be broken down into earned and unearned income, which makes it appropriate for calculating tax liabilities. However, the second income measure does not differentiate earned and unearned income, and thus the estimated liabilities based on the conservative income estimate were used for both measures. Our EITC measure, which serves as the exogenous source of variation in income (instrument) in our instrumental variables models for each income measure is the combined state and federal EITC amount for which each respondent would be eligible, given their reported income, number of dependents, and state of residence. This assumes full take-up of the EITC, though prior estimates have suggested that take-up rate for the EITC among eligible

families is approximately 80-87% (IRS, 2002; Schulz, 1994). Income and EITC variables are converted to 2009 dollar amounts and modeled in log form.

Covariates

We control for a number of static and time-variant characteristics. Static characteristics, all measured at the baseline interview, include: state of residence, prenatal substance abuse, number of dependents, education, and race. Time variant characteristics include wave of observation, family structure (married or cohabiting with a biological or social father, or single), mother's age, number of adults in the household, and age of youngest child.

Estimation Strategy

We use person-wave observations of the FFCW sample in combination with data on yearly maximum benefits for state and federal Earned Income Tax Credits (EITCs) to model the effect of income on child maltreatment outcomes. Our estimation strategy consists of two parts: (1) standard ordinary least squares (OLS) regressions (linear probability models) with a set of controls, to estimate the effect of income directly; and (2) instrumental variables regression models, where individual-level EITC benefit is used as an instrument for income. Both sets of models are estimated using both pooled cross-sectional models and individual fixed-effects models.

First, we estimate both pooled cross-sectional OLS models and OLS models with individual fixed-effects models to assess the association between net income and our maltreatment measures. The pooled OLS model, with standard errors clustered at the person level, is of the basic form:

$$\Pr(Y_{i,w}) = \alpha + \delta_1 \ln(NET_{i,w}) + \beta_1 X_{i,w} + \varepsilon \qquad (1)$$

where the outcome is whether a given maltreatment outcome *Y* occurred for person *i* at wave *w*; *NET* is net income; and *X* is a vector of observed characteristics. We the estimate the association between a change in net income and a change in maltreatment, using individual fixed effects with robust standard errors:

$$\Delta \Pr(Y_i) = \alpha + \delta_2 \Delta \ln(NET_{i,}) + \beta_2 \Delta X_i + \varepsilon_i \qquad (2)$$

If EITC amount is a valid instrument for net income, then equations (1) and (2) can be estimated by two-stage least squares. The appropriateness of an instrumental variables approach relies on three assumptions: (1) the EITC is predictive of variation in net income; (2) the EITC only affects maltreatment through its effect on income; and (3) the EITC is uncorrelated with the disturbance or error term. The first assumption is easily tested using underidentification and weak identification tests, which demonstrate the EITC is a strong instrument. The second assumption is justified because the primary purpose of the EITC is to encourage work through wage supplements and it provides no (direct) non-monetary benefits, thus making it improbable that it would belong in the structural equation. The third assumption, however, is more difficult to prove. It is highly possible that states with more generous EITCs differ from states with smaller or no EITCs on characteristics associated with maltreatment rates. Similarly, changes over time in EITC benefits may co-occur with changes in unobserved local conditions, such as changes in other aspects of the social safety net, which may affect the likelihood of maltreatment. We address this potential problem through the inclusion of both state and wave dummies. However, after accounting for possible confounding effects of time and location on maltreatment, variation in EITC amount is still partly a function of two family characteristics: pretax income and number of dependents, both of which are likely to be associated unobserved family characteristics.

To address the fore-mentioned concerns, we follow the strategy used by Dahl and Lochner (2012) in their study of the effects of income on children's cognitive outcomes: first, we hold constant the number of dependents as equal to the baseline value, both in our modeling strategy and in our calculation of tax liabilities; and second, we include an instrument control function. This control function consists of a lagged indicator of pretax income and its fifth order polynomial, as well as a lagged indicator zero pretax income. This accounts for the variation in EITC benefit that stems from the level of or changes in family income, thus leaving only the variation attributable to changes in benefit levels on the state or local level. By addressing the issues of time, location, family size, and income level, we argue that the third assumption for a valid instrument is met.

We then estimate the pooled and fixed effects models using EITC amount to instrument net income. The first stage model, in OLS form, is:

$$Ln(NET_{i,w}) = \alpha + \theta_1 \ln(EITC_{i,w}) + \beta_3 X_{i,w} + \sum \varphi_1 (ZERO_{i,w-1} + INC_{i,w-1} + INC_{i,w-1}^2 \dots + INC_{i,w-1}^5) + \varepsilon$$

Where θ_1 is the estimated first stage coefficient for the effect of logged EITC on logged net income, and φ_1 is the control function for the instrument, consisting of a zero lagged income indicator, and lagged pretax income and its 5th order polynomial. The second stage equation is then:

$$\Pr(Y_i) = \alpha + \hat{\delta}_3 ln(NET_{i,w}) + \beta_4 X_{i,w} + \sum \varphi_2 (ZERO_{i,w-1} + INC_{i,w-1} + INC_{i,w-1}^2 \dots + INC_{i,w-1}^5) + \varepsilon$$

The coefficient $\hat{\delta}_3$ is an estimate of the effect of exogenous differences in net income on the probability of experiencing a given maltreatment outcome.

Results

Descriptive statistics are presented in Table 1 for the full sample, as well as for families that were and were not involved with CPS during the observation period. As we would expect, CPS-involved families had considerably higher rates of each of the behaviorally approximated maltreatment measures. Consistent with existing evidence, non-CPS-involved families had considerably higher incomes than CPS-involved families. The former were also subject to higher potential EITC benefits. Moreover, they were generally more advantaged than CPS-involved families in that mothers had greater levels of educational attainment, fewer biological children, were more likely to be married to the biological father and less likely to be living with or married to a social father.

Table 2 shows results from standard OLS (linear probability) regressions and OLS regression with individual-specific fixed effects. For each income measure, we present results from three models. In the first model, we regressed CPS-involvement on current net income without any controls. In the second model, we included the full set of covariates. In the final model, we added a measure of lagged pre-tax income. In the uncontrolled OLS models (Model 1), we find an inverse association of income with CPS involvement. However, this association is no longer significant with the addition of the covariates, and remains non-significant with the addition of the lagged income measure. Likewise, the fixed-effects estimations show no significant association of income with CPS involvement.

The results from our IV models are presented in Table 3. The top panel presents the standard IV estimates, the bottom panel shows the IV estimates with individual-specific fixed

effects. For each income measure, the estimate presented in the first column is the second-stage estimate of the association (instrumented) income with CPS involvement. The second column shows the first-stage estimate for the association of potential EITC benefit with current net income. We estimated three models in each case. The first included the full set of covariates as well as state and year fixed effects. The second added lagged pre-tax income, and the final model also included the control function. In all cases, the instruments performed exceptionally well, passing both weak instrument and under-identification tests, and having F-statistics of well above 10 (the conventional test for a valid instrument). The potential EITC benefit was highly predictive of income. Considering our preferred model, which includes the control function (Model 3), in our standard IV estimations, for example, we see that a 1 percent larger potential EITC benefit is roughly associated with 8 percent greater income for the naïve income measure and with 3 percent greater income for the enhanced income measure (our preferred specification).

Turning to the second-stage results, we see that for the standard IV estimations, the association of income with CPS-involvement is negative in all cases, but nonsignificant in Models 1 and 2, and only marginally significant in Model 3. Given that it is common for IV models to produce large standard errors for the second stage estimates, we interpret these findings as suggestive of an inverse causal link between income and CPS-involvement. In terms of effect size, these results suggest that a 1 percent increase in income is roughly associated with a 2.3 (for naïve income) to 5.0 percentage point decrease (for enhance income) in the likelihood of CPS involvement. These are relatively large effects given that CPS-involvement was reported for about 6 percent of the sample.

The bottom panel of Table 3 presents the IV results when individual-specific fixed effects are included. Again the first stage estimates are large and the instruments appear to be strong and valid. Strikingly, we also see that for each model, the second stage estimate is negative, significant, and relatively large in size. Because these models are estimated only using within-family (child) variation, this suggests that an exogenously triggered conditional increase in income is strongly associated with a within-family reduction in the probability of CPS involvement. That is, these results suggest that the within-family effect of an exogenous change in income is considerably larger and more precisely estimated than the between family effect. This gives us further confidence that there is likely to be a causal link between income and CPS involvement.

Results for the behaviorally approximated maltreatment measures are presented in Table 4. We show results for each specification of the full model (Model 3) for both income measures. For comparison purposes, we also display (again) the Model 3 results for CPS involvement for each specification. The OLS results for physical and emotional abuse suggest that income is positively associated with each and, in the naïve income model, this results in a positive association between income and any maltreatment. This result is counter-intuitive and does not lend itself to easy interpretation. We plan to investigate it further in future versions of the paper. Each of the three neglect measures is negatively associated with maltreatment and each is significant in the enhanced income models, whereas only physical neglect is significant in the naïve income model. There is only one significant association in the standard fixed-effects model; for naïve income, we again find a counter-intuitive positive association of income with any maltreatment. We find no significant effects in the standard IV models. For the IV fixed-effects models, however, we find a marginally significant inverse association between income

and physical neglect. These results suggest that a 1 percent exogenous increase in income is associated with a 1.7 (naïve income) to 3.3 (enhanced income) percentage point decrease in physical neglect. This is a relatively small effect given that the overall rate for behaviorally approximated physical neglect in the sample was 25 percent.

Conclusion

This paper presents preliminary analyses intended to test whether there is a causal link between income and child maltreatment by using exogenous variation in income as a result of EITC benefit generosity. We emphasize that this exogenous variation is driven by a work-conditioned benefit and that our results reflect the local average treatment effect of income on maltreatment for only those who respond to this benefit. Thus, they cannot be applied to the full population of those at risk for maltreatment. Our IV results (with and without fixed effects) are suggestive of a causal link between income and CPS involvement such that an exogenous work-conditioned increase in income is associated with a decreased probability of experiencing a CPS investigation. Our results for behaviorally approximated measures of maltreatment are somewhat inconsistent. However, in the IV fixed effects models, we do find evidence of a causal link between income and physical neglect. This makes sense given that physical neglect is most closely and, perhaps, even mechanically tied to income given that it reflects a failure to provide for a child's material needs. On the whole, then, our findings suggest that there may be a causal link between income and CPS involvement, which most likely reflects a causal link between income and physical neglect—the most common form of maltreatment and the form of maltreatment most strongly correlated with poverty. Given that child neglect and CPS involvement impose tremendous economic costs to both victims and society as a whole, this research suggests that economic support policies may be an efficient prevention strategy for

physical neglect, and also that child welfare interventions may be well served by addressing families' economic issues. However, additional rigorous research is crucial to achieve a more complete understanding of whether these links are truly causal and, thereby, the extent to which economic support policies have the potential to reduce child neglect and associated CPS involvement.

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Table 1. Descriptive Statistics

	Full Sample	No CPS Reports	CPS Report	
Behaviorally approximated maltreatment measures				
Physical Neglect	0.25	0.24	0.44	**
Exposure/Supervision Neglect	0.15	0.14	0.28	***
Physical Abuse	0.21	0.20	0.28	**
Emotional Abuse	0.29	0.28	0.48	***
Any Maltreatment	0.43	0.42	0.60	***
Income and potential EITC benefit				
LN naïve income	3.07	3.08	2.88	*
	(1.59)	(1.60)	(1.32)	
LN enhanced income	3.34	3.35	3.07	***
	(1.26)	(1.27)	(1.01)	
LN potential EITC benefit (instrument)	-2.47	-2.50	-1.93	**
	(3.78)	(3.78)	(3.68)	
Time constant covariates				
Prenatal substance use	0.12	0.12	0.20	***
White	0.23	0.23	0.22	
Black	0.50	0.50	0.53	
Hispanic	0.23	0.23	0.21	
Other race	0.03	0.03	0.03	
Less than HS education	0.32	0.32	0.32	
More than HS education	0.12	0.12	0.03	***
Number of biological children (age 1)	2.10	2.07	2.48	***
	(1.28)	(1.27)	(1.42)	
California	0.10	0.10	0.05	***
Texas	0.14	0.14	0.19	**
Maryland	0.08	0.08	0.06	
Michigan	0.08	0.08	0.10	
New Jersey	0.06	0.06	0.06	
Pennsylvania	0.10	0.10	0.10	
Virginia	0.10	0.10	0.11	
Indiana	0.08	0.08	0.09	
Wisconsin	0.08	0.08	0.07	
New York	0.05	0.05	0.06	
Massachusetts	0.02	0.02	0.02	
Tennessee	0.02	0.02	0.02	
Illinois	0.03	0.03	0.02	
Florida	0.02	0.02	0.03	
Ohio	0.03	0.03	0.03	
Time varying covariates				
Age of youngest child	2.26	2.26	2.33	

	(1.67)	(1.66)	(1.81)	
Number of adults in the home	1.99	2.00	1.86	**
	(0.86)	(0.86)	(0.89)	
Age	30.86	30.90	30.27	*
	(6.50)	(6.54)	(5.74)	
Married biological-father family	0.31	0.32	0.14	***
Cohabiting biological-father family	0.14	0.14	0.09	**
Married social-father family	0.05	0.04	0.07	*
Cohabiting social -father family	0.11	0.10	0.18	***
Single-mother family	0.40	0.39	0.52	***
LN pretax naïve income	2.79	2.80	2.73	
	(2.00)	(2.02)	(1.44)	
No naïve income	0.03	0.03	0.01	+
LN pretax enhanced income	3.22	3.25	2.84	***
	(1.34)	(1.34)	(1.41)	
No enhanced income-	0.01	0.00	0.01	
Wave 3	0.32	0.34	0.13	***
Wave 4	0.35	0.34	0.51	***
Wave 5	0.32	0.32	0.36	+
Observations	7378	6942	436	

Note: Proportion or mean (and standard deviation) presented. +p<.10, *p<.05, **p<.01, ***p<.001.

Table 2. Linear probability and fixed effects estimates for CPS involvement

	Naïve Income			Enhance Income		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Linear probability estimation						
Current net income	-0.004**	0.000	-0.000	-0.010***	-0.002	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Lagged pretax income			0.002+			-0.004
			(0.001)			(0.003)
Fixed effects estimation						
Current net income	-0.001	-0.003	-0.002	0.001	0.000	-0.000
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Lagged pretax income			0.001			-0.004
			(0.001)			(0.004)

Notes: N=7378. Standard errors for the LP estimates are clustered by person. Robust standard errors are used for the fixed effects estimates. Model 1 contains no covariates, Model 2 controls for demographics, Model 3 adds lagged income.

+ p< .1 * p< .05 ** p<.01 *** p < .001

Table 3. IV estimates for CPS involvement

	Naïve Income		Enhanced Income	
	Effect of current income	First stage coefficient for EITC	Effect of current income	First stage coefficient for EITC
Panel A: Standard IV estimates				
1. Demographic Controls	-.022	.059***	-.081	.016**
	(.015)	(.007)	(.061)	(.005)
2. Add pretax lagged income	-.021	.062***	-.058	.025***
	(.015)	(.007)	(.038)	(.005)
3. Add control function	-.023+	.075***	-.050+	.034***
	(.013)	(.007)	(.028)	(.005)
Panel B: IV fixed-effects estimates				
1. Demographic Controls	-.036*	.082***	-.072*	.040***
	(.017)	(.010)	(.036)	(.006)
2. Add pretax lagged income	-.038*	.076***	-.075*	.039***
	(.019)	(.009)	(.037)	(.006)
3. Add control function	-.037*	.076***	-.074*	.039***
	(.019)	(.009)	(.037)	(.006)

Notes: N=7378. Standard errors for the LP estimates are clustered by person. Robust standard errors are used for the fixed effects estimates.

+ p< .1 * p< .05 ** p<.01 *** p < .001

Table 4. Behaviorally approximated maltreatment estimates

	Physical Abuse	Emotional Abuse	Exposure/ Supervision Neglect	Physical Neglect (self-report only)	Physical Neglect (SR w/o electric)	Any maltreatment	CPS
Panel A: Naïve income							
OLS	.005+	.010***	-.001	-.002	-.002*	.008*	-.000
	(.003)	(.003)	(.003)	(.001)	(.001)	(.004)	(.002)
FE	.005	.006	.003	.000	-.001	.016**	-.002
	(.004)	(.004)	(.004)	(.002)	(.002)	(.005)	(.003)
IV	.014	.023	.016	.013	-.005	.020	-.023+
	(.019)	(.021)	(.017)	(.010)	(.008)	(.024)	(.013)
IVFE	-.022	-.014	-.005	.012	-.017+	-.035	-.037*
	(.026)	(.027)	(.023)	(.014)	(.010)	(.031)	(.017)
Panel B: Enhanced income							
OLS	.006+	.001	-.007+	-.009***	-.005**	-.001	-.001
	(.003)	(.004)	(.004)	(.002)	(.002)	(.005)	(.002)
FE	.006	-.003	-.003	-.002	-.003	.004	-.000
	(.005)	(.005)	(.005)	(.003)	(.003)	(.007)	(.003)
IV	.026	.025	.023	.020	-.014	.021	-.050+
	(.043)	(.046)	(.039)	(.022)	(.017)	(.054)	(.028)
IVFE	-.050	-.021	-.003	.027	-.033+	-.064	-.074*
	(.050)	(.051)	(.044)	(.027)	(.020)	(.060)	(.035)

Notes: N=7378. All estimates based on Model 3 (the full model). Standard errors for the LP estimates are clustered by person. Robust standard errors are used for the fixed effects estimates.

+ p< .1 * p< .05 ** p<.01 *** p < .001

Appendix A. Maximum Federal and State EITC Benefits by Year

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Maximum Federal EITC Benefit												
1 child	$2,271	$2,312	$2,353	$2,428	$2,506	$2,547	$2,604	$2,662	$2,747	$2,853	$2,917	$3,043
2 children	$3,756	$3,816	$3,888	$4,008	$4,140	$4,204	$4,300	$4,400	$4,536	$4,716	$4,824	$5,028
3 children	$3,756	$3,816	$3,888	$4,008	$4,140	$4,204	$4,300	$4,400	$4,536	$4,716	$4,824	$5,657
State EITC as a percentage of Federal Amount												
CA	-	-	-	-	-	-	-	-	-	-	-	-
TX	-	-	-	-	-	-	-	-	-	-	-	-
MD	10%	10%	15%	16%	16%	18%	20%	20%	20%	20%	25%	25%
MI	-	-	-	-	-	-	-	-	-	-	10%	20%
NJ	-	-	10%	15%	18%	20%	20%	20%	20%	20%	23%	25%
PA	-	-	-	-	-	-	-	-	-	-	-	-
VA	-	-	-	-	-	-	-	-	20%	20%	20%	20%
IN	-	-	-	-	-	6%	6%	6%	6%	6%	6%	9%
NY	20%	20%	23%	25%	28%	30%	30%	30%	30%	30%	30%	30%
MA	10%	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%	15%
TN	-	-	-	-	-	-	-	-	-	-	-	-
IL	-	-	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
FL	-	-	-	-	-	-	-	-	-	-	-	-
OH	-	-	-	-	-	-	-	-	-	-	-	-
WI - 1 child	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
WI - 2 children	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%
WI - 3 children	43%	43%	43%	43%	43%	43%	43%	43%	43%	43%	43%	43%

Appendix B. Maltreatment Scale Items

Scale	Concept	Item	Scoring
Physical Neglect	Child food insecurity	Unable to make sure child got food needed	Ever in past 12 months
	Medical Neglect	Could not get child to doctor/hospital when needed	Ever in past 12 months
	Inadequate housing	Electricity/heat shut off for non-payment	Ever in past 12 months
	Inadequate housing	Observed housing interior issues (9 items)	Observed 3+ issues (90th percentile)
	Inadequate housing	Observed housing safety issue (11 items)	Observed any issues
	Inadequate housing	Experiencing homelessness	Currently or in past 12 months
	Inadequate housing	Doubling up for financial reasons	Currently or in past 12 months
	Child hygiene	Series of 9 items related to child's appearance/clothing	Observed any issues
Supervision / Exposure Neglect	Domestic violence	Physical fight w/ bio dad or current partner in the presence of child	Ever in past 12 months
	Substance abuse	Too high/drunk to care for child	Ever in past 12 months
	Substance abuse	Use of any hard drug (heroin, cocaine, amphetamines, etc.)	Ever in past 12 months
	Substance abuse	Use of non-prescribed drug several days per week or more	Currently
	Criminality	Earned income from illegal activity, such as drug sales or prostitution	Ever in past 12 months
	Supervision	Left child alone when child should not be left alone	Ever in past 12 months
Physical Abuse	Shaking	Shook child in past 12 months	Ever in past 12 months
	Inappropriate discipline	Hit child with an object	3+ times in past 12 months (90th percentile)
Emotional Abuse	Verbal abuse	Called child stupid/dumb, other names	Ever in past 12 months
	Threats	Threatened to kick child out of home	Ever in past 12 months
	Verbal abuse	Swore at child	3+ times in past 12 months (90th percentile)