

Child Protection and Child Outcomes: Measuring the Effects of Foster Care

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ABSTRACT

The child welfare system investigates over 2 million children each year for parental abuse or neglect, yet little is known about the effects of removing children from home and placing them in foster care. Long-term outcomes are rarely observed, and children placed in foster care likely differ from those not placed, making comparisons difficult. This paper uses the removal tendency of investigators as an instrumental variable to identify causal effects of foster care placement on a range of outcomes for school-age children and youth. A rotational assignment process effectively randomizes families to these investigators. The results suggest that children assigned to investigators with higher removal rates are more likely to be placed in foster care themselves, and they have higher delinquency rates, teen birth rates, and lower earnings. Large marginal treatment effect estimates suggest caution in the interpretation, but the results suggest that children on the margin of placement tend to have better outcomes when they remain at home, especially for older children.

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Introduction

The child welfare system aims to protect children thought to be abused or neglected by their parents. Over 2 million children are investigated for child abuse and neglect each year in the United States, and roughly half are found to have been abused (U.S. Department of Health and Human Services, 2004). Approximately 10 percent of these abused children will be placed in protective custody known as foster care.

Foster care is meant to be a temporary arrangement, though children stay in care for an average of 2 years, and there are currently over 500,000 children in care (U.S. Department of Health and Human Services, 2005). Roughly 60 percent of foster children return home; 15 percent are adopted; and the remainder “age out” of foster care (Fred C. Wulczyn, Kristen Brunner Hislop, and Robert M. Goerge, 2000). Three-quarters of these children live with substitute families, one-third of which are headed by relatives of the children. These families are paid a monthly subsidy of approximately \$400 per month per child (Child Welfare League of America, 1999), and states spend over \$20 billion each year to administer these child protective services (Roseana Bess, et al. 2002).

Further, foster care policy directly targets children who appear to be at high risk of poor life outcomes. Abused children are three times more likely to die in childhood (Eugene E. Sabotta and Robert L. Davis, 1992), with 1,400 child deaths each year directly attributed to child abuse (U.S. Department of Health and Human Services, 2004). Those placed in foster care are far more likely than are other children to commit crimes, drop out of school, join welfare, experience substance abuse problems, or enter the homeless population (June M. Clausen, John Landsverk, William Ganger, David Chadwick, and Alan Litrownik, 1998; Mark E. Courtney and Irving Piliavin, 1998; US

Department of Health and Human Services, 1999; Amy Dworsky and Mark E. Courtney, 2000; Bo Vinnerljung, Knut Sundell, Cecilia Andree Lofholm, and Eva Humlesjo, 2006). In particular, nearly 20 percent of young prison inmates¹ and 28 percent of homeless individuals spent some time in foster care as a youth (Martha Burt et al., 1999). Mark E. Courtney, Sherri Terao, and Noel Bost (2004) surveyed children who will turn 18 in foster care and found that *two-thirds* of the boys and *half* of the girls had a history of delinquency. The group was three times more likely to have mental health needs and four times more likely to have been treated for a sexually transmitted disease compared to the national average.

Despite the large number of children at high risk of poor life outcomes served by child protective services, it is unclear whether removing children from home and placing them in foster care is beneficial or harmful for child development, especially for children at the margin of placement (Goerge, Wulczyn, and David Fanshel, 1994; Thomas P. McDonald, Reva I. Allen, Alex Westerfelt, and Irving Piliavin, 1996; National Research Council, 1998; Courtney, 2000; Richard J. Gelles, 2000; Melissa Jonson-Reid and Richard P. Barth, 2000).² Child protection agencies trade off two competing goods: family preservation and child protection (Anthony N. Maluccio, Edith Pine, and Inger P. Davis, 1994; Barth, 1999). Although an abusive family environment is undoubtedly harmful to child development, removing a child from home may be traumatic as well.

¹ The Survey of Inmates in Adult State and Federal Correctional Facilities (1997) reports that nearly 20 percent of inmates under the age of 30, and 25 percent of these inmates with prior convictions, reported spending time in foster care as a youth.

² Few studies compare children investigated for abuse. See Desmond K. Runyan and Carolyn L. Gould (1985), Elizabeth Elmer (1986), Michael S. Wald, J.M. Carlsmith, and P.H. Leiderman (1998), and Bilha Davidson-Arad, Dorit Englechin-Segal, and Yochanan Wozner (2003) for four small scale studies. Jonson-Reid and Barth (2000a, 200b) studied 160,000 children in California using administrative data and found lower delinquency on average for children who remained at home, especially those who received in-home services.

For example, placement instability in foster care has been highlighted as a potentially serious problem for child development.³ The average foster child is moved from one home to another at least once, with a quarter experiencing three or more moves.

There are two main limitations to estimating the effects of foster care placements on child outcomes. First, there is a lack of long-term outcome data. Children investigated for abuse or neglect are not tracked over time in a systematic way. Second, endogeneity and selection bias problems can contaminate comparisons: worse outcomes for foster children compared to other children in the same area could be due to abusive family backgrounds, as opposed to any effect of foster care placement (Benjamin Kerman, Judith Wildfire, and Barth, 2002). Meanwhile, those children who are removed are likely those who would benefit most from placement, and a comparison of average outcomes may overstate the benefit of removal for marginal cases.

This paper uses a measure of the removal tendency of child protection investigators as an instrumental variable to identify causal effects of foster care placement on child outcomes for school-age children and youth. Cases are distributed to investigators on a rotational basis within geographic field teams to smooth the caseload, which effectively randomizes families to investigators. The instrumental variables estimates focus on variation in foster care placement among marginal cases—those cases where investigators may disagree about the recommendation of removal. These are the cases most likely to be affected by policy changes that alter the threshold for placement.

³ There is a large empirical literature on placement stability, as it is one observable characteristic in administrative data. See Alan J. Litronwnik, and John A. Landsverk (2000), Rae Newton, and Dana K. Smith, Elizabeth Stormshak (2000), Patricia Chamberlain, and Rachel Bridges Whaley (2001), Sigrid James, John A. Landsverk, and Donald J. Slymen (2004), and Andrew Zinn, Jan DeCoursey, Robert M. Goerge, and Mark E. Courtney (2006).

Using a unique dataset that links children in Illinois with a wide range of government programs, it is possible to compare children placed in foster care with other children who were investigated for abuse or neglect in terms of long-term outcomes, including juvenile delinquency, teen motherhood, employment, and earnings. The results, which apply in particular to children receiving welfare benefits and between the ages of 5 and 15 at the time of the initial investigation, point to better outcomes when children on the margin of placement remain at home. While the large size of the estimated effects and their lack of precision suggest caution in the interpretation, the results suggest that large benefits from foster care placement in terms of these outcomes appear unlikely for children at the margin of foster care.

The paper is organized as follows. Section I presents the empirical framework, which highlights the possibility of heterogeneous treatment effects across children. It also discusses the policy parameters estimated with the instrumental variables strategy. Section II presents background information on the investigator assignment process in Illinois. Section III describes the data and reports summary statistics. Section IV describes the results, including an investigation of how the effects vary over different types of children. Section V concludes.

I. Empirical Framework: Heterogeneous Treatment Effects

The decision to remove a child from home is a difficult one, and child welfare services have historically struggled with the sometimes-conflicting goals of family preservation versus child protection. This is evident from the changing emphasis on child protection and family preservation over the recent decades, as foster care populations

grew from 100,000 to 600,000 in the 1960s, dropped to 200,000 by the end of the 1970s, and rose to over 500,000 by the end of the 1980s. Recently, family preservation initiatives are increasingly common (McDonald et al., 1996). Although an abusive home environment undoubtedly harms child development, removing children from home and placing them in a potentially unstable foster family relationship may be harmful as well.

The empirical framework considers how the benefit or harm of the decision to remove a child from home can vary across children. Consider a random coefficient model in the spirit of Anders Bjorklund and Robert Moffitt (1987) and James J. Heckman and Edward Vytlacil (2005) for an outcome, Y , such as earnings, observable case characteristics X , an indicator for removal from home R , for child i :

$$(1) Y_i = X_i\beta + \alpha_i R_i + \varepsilon_i$$

α_i will be positive for children where the placement is associated with higher earnings, but may be negative for children where the disruption of placement is associated with lower earnings.

Re-writing (1) to reflect the standard single coefficient model reveals two error terms:

$$(2) Y_i = X_i\beta + \bar{\alpha}R_i + R_i(\alpha_i - \bar{\alpha}) + \varepsilon_i$$

There are two main sources of econometric problems when estimating equation (2). First, R may be correlated with ε . For example, an omitted variable such as poor family environment may lead to an increased likelihood of removal and a decreased earnings capacity. Second, R will be correlated with α_i if agents select treatment based on expected gains—a correlated random coefficient model. Note that for foster care

placement, the treatment is not chosen by the child, but by the child protection system.

Although the placement decision may not be based on the returns to earnings, α_i , if earnings were indicative of child well being in general, then such a correlation may exist.⁴

The estimation will use an instrument, Z , which holds the potential to overcome the endogeneity problems and allow the estimate of marginal treatment effects as Z varies (Heckman and Vytlačil, 2005). In particular, the instrument describes the propensity for the investigator assigned to the family to have children placed in foster care.⁵ Consider two types of investigators, tough and lenient. The difference in outcomes across these investigators could be used to measure local average treatment effects: the effects for children induced into foster care on the basis of the investigator assignment (Joshua D. Angrist and Guido W. Imbens, 1994). Letting $Z = 1$ if the family is assigned to a tough investigator, and $Z = 0$ if assigned to a lenient one, the estimand is:

$$(3) \alpha^{LATE} = [E(Y | Z = 1) - E(Y) | Z = 0)] / [P(R = 1 | Z = 1) - P(R = 1 | Z = 0)],$$

which can be estimated with sample means.

The conditions necessary to interpret the result as a local average treatment effect are:

Condition 1. (Existence): Z is a random variable such that:

(i) $P(z) = E(R|Z = z)$ is a nontrivial function of z .

(ii) Z is independent of the error term in the outcome equation.

⁴ α may also be correlated with ε , for example if those who benefit most from placement have the highest earnings capacity. This may also affect the interpretation of the parameters estimated.

⁵ This approach is similar to that of Jeffrey R. Kling (2006), who studied the effect of prison sentences on employment and earnings. In that study, the tendencies of randomly assigned judges to impose different prison sentences is used as an instrumental variable. In an analogy to criminal proceedings, investigators studied here are similar to detectives who are the key witnesses in each case.

The first (testable) assumption is that the instrument is associated with foster care placement. The second is an exclusion restriction that Z is not in the outcome equation.⁶ In the correlated random coefficient model, the local average treatment effect will incorporate the additional gains associated with selection. This affects the interpretation of the parameter, though the effects are policy relevant: namely, should we encourage the system to act more like strict investigators and push for more child protection, or should we emulate the more lenient investigators and emphasize family preservation?

Condition 2. (Monotonicity). Any child removed by a lenient investigator would also be removed by a strict one, and a child not removed by a strict case manager would not be removed by a lenient one.

This condition rules out the case where assignment to a case manager described as “lenient” would result in an increased likelihood of placement. To consider the effect of a violation of this assumption, it is necessary to describe the instrument itself.

Consider a simple placement decision model where investigators observe cases along a distribution of abuse levels, θ , as in Figure 1. The two types of investigators are defined by the threshold of abuse required to recommend placement. Each type observes the same abuse levels, as would be true if cases were randomized to investigators, so they can be described by the fraction of children recommended for placement, Z .

The investigator who puts relatively more emphasis on child protection will recommend removal if $\theta > \theta^1$, whereas the investigator who places more emphasis on family preservation will recommend removal for children with $\theta > \theta^2$. For high levels of abuse ($\theta > \theta^2$), both types of investigators would recommend removal, and the effect

⁶ This assumption may be relaxed to a mean independence.

of removal on child outcomes cannot be identified. Similarly, in low levels of abuse ($\theta < \theta^1$), both investigator types would recommend leaving the child at home, and the potential harm to these types of children would also not be identified. Instead, the comparison of outcomes across the investigator types would focus on variation in placement among marginal cases ($\theta^1 < \theta < \theta^2$). In a policy context, these cases are of interest, as extreme abuse cases are unlikely to be affected in any policy change. In a welfare analysis of child protection as a whole, however, it would be necessary to consider the benefits to children who are removed at higher abuse levels as well.

This can be summarized by a latent index model for child i :

$$(4) R_i^* = -Z_i\gamma + \theta_i$$

$$(5) R_i = 1 \text{ if } R_i^* > 0$$

Z_i can be thought to characterize the threshold the investigator assigned to child i must observe before she decides to recommend foster care placement and γ represents the influence that such a recommendation will actually result in a placement. A child with abuse level θ will be placed in care if that level is greater than the investigator's threshold for removal multiplied by the effectiveness of that recommendation.

The conditions for identification are:

$$(6) E(Z\theta) = 0; E(Z\varepsilon) = 0; E(Z(\alpha - \bar{\alpha})) = 0; \gamma \neq 0$$

That is, Z is (mean) independent of θ_i in the selection equation, the error term in equation (1), and the idiosyncratic gains to foster care placement. If investigators are randomized to families, the exclusion restriction would appear to be an accurate description of the role of case managers in the outcome equations. The last condition states that Z must be associated with foster care placement.

The monotonicity assumption is imbedded in the common coefficient γ . This is less straightforward compared to a treatment and control environment, where, for example, the control group may be denied the treatment (Imbens and Angrist, 1994). Instead, the model here relies more heavily on the varying ethos in child welfare between family preservation and child protection, coupled with the reliance on practice wisdom, so that investigators are given latitude to reach a removal recommendation (Scotty J. Cash, 2001).

Angrist, Imbens, and Donald B. Rubin (1996) described the tradeoff involved when the monotonicity assumption is only approximated. First, the bias will decrease with the strength of the relationship between the instrument and foster care placement. Second, in their language, if the effect of foster care placement for “defiers” (for example, those individuals induced to receive the treatment when assigned to the *lenient* investigator) is the same for the “compliers” (those induced to receive the treatment because they are assigned to the strict investigator), then the bias disappears. This may be unlikely when the investigator types are much different from one another, where defiers may represent exceptional cases. In the case of a continuous instrument, however, this would appear to be less of a problem when considering small differences in investigators: that is, measuring marginal treatment effects.

A marginal treatment effect is the limit of the LATE parameter as the difference in the probability of treatment given the instrument goes to zero. In Figure 1, this would mean comparing outcomes for children across case managers whose thresholds are close together. Letting $P(z)$ equal the $P(R = 1|Z = z)$, the marginal treatment effect is simply the derivative:

$$(7) \alpha^{\text{MTE}} = \partial E(Y) / \partial P(z)$$

In this setting, the MTE estimates may be of interest in themselves, as they describe whether outcomes improve or become worse as different types of children are induced into foster care based on different values of a particularly policy-relevant instrument: assignment to different types of investigators.⁷

II. Background: Foster Care Placement in Illinois

Reports of abuse or neglect are typically made by physicians, school principals, police, and family members. In Illinois, all reports are made through a statewide hotline that connects to the State Central Register (Illinois Department of Children and Family Services (DCFS), 2003). This allows an intake worker to determine if there were any pending or previous investigations that can aid in the investigation and determine the need for emergency services. The case is then referred to a field team that is closest to the child's residence. A typical team covers one county in Illinois and consists of eight investigators at any given time. These investigators are called "case managers", and they collect the facts to determine whether a child has been abused or neglected.

There are three decisions made by the investigator that can affect foster care placement. First, the investigator may remove the child from home on an emergency basis. Second, the investigator may decide that the case does not have merit. Third, the case manager collects the evidence of the case, and presents this evidence along with a

⁷ Heckman and Vytlačil (2005) discuss the consequences of a lack of independence between the instrument and the idiosyncratic gains to treatment in an environment of heterogeneous treatment effects. The resulting estimate would include selection bias induced by the placement of children who are most likely to benefit, which may be policy relevant.

recommendation to a judge in each county's Child Protection Division of the Juvenile Court. Most foster care placements are made through the court system.

At this point it may be useful to discuss why case managers might arrive at different recommendations. If the removal decision were always clear, there should be no variation across case managers with randomly assigned families. There is a literature on case manager variation in recommendations, which provides some support for the identification strategy employed here. In particular, case managers are thought to rely more heavily on "practice wisdom" than administrative rules when making placement referrals (Cash, 2001).⁸ In addition, the standard for foster care placement does vary over time and with the amount of resources available to child protective services, such as federal funding and monthly subsidies paid to foster parents (Julian Simon, 1975; Claudia Campbell and Susan Whitelaw Downs, 1987; Patricia Chamberlain, Sandra Moreland, and Kathleen Reid 1992; Hegar and Scannapieco, 1995; Joseph J. Doyle Jr. and H. Elizabeth Peters, 2007). It appears that the threshold for placement is not constant across time or across investigators.

Rotational Assignment of Case Managers

In general, families are assigned to case managers on a rotational basis in an effort to smooth the caseload. The assignment process is referred to as "the rotation", and it appears to be self-enforced: case managers note that they abide by it to avoid managing too many cases.⁹

⁸ For example, P.J. Nasuti and Peter J. Pecora (1993) found that case managers using the Utah Risk Assessment Scales reviewing fictional cases had inter-rater reliability ranging from 57 percent to 81 percent. Peter Rossi, John Schuermant, and Stephen Budde (1996) found similar differences in case manager assessments of fictional cases.

⁹ Conversations with case managers.

One limitation in using the case manager assignment as a randomization device is that exceptions are made, and the main analysis will focus on cases that are most likely to enter the rotational assignment process. First, if a family is investigated more than once, an effort is made to re-assign the same case manager to investigate the most recent allegation. The exogenous variation in case manager assignment stems from the initial investigation. To rely only on this type of variation, the case manager assigned to the family's first investigation will be considered.¹⁰

Second, some field teams assign case managers to particular neighborhoods. For example, one team divides its county into east and west, with half of the case managers assigned to each sub-team. If particular types of case managers are assigned to neighborhoods more likely to have child abuse or neglect, then a comparison across case managers would capture differences in these neighborhoods as well. The analysis here will focus on sub-teams defined as the interaction between the child's ZIP code of residence and the field team assigned.

Third, if the family speaks only Spanish, an effort is made to assign a Spanish-speaking case manager. Like the neighborhood consideration, if some case managers specialize in Spanish-speaking cases, then differences across case managers would incorporate differences in Spanish-speaking versus English-speaking cases as well. For this reason, the sub-teams will be defined separately for Hispanic cases.

Last, cases involving sexual abuse and drug-exposed children are assigned to case managers specially trained to investigate these cases, given the greater need for training and closer cooperation with police. These allegations, which make up 13 percent of all

¹⁰ Some cases report the initial reporter as the Department of Children and Family Services, the agency that runs the Division of Child Protection. These referrals are likely the result of previous cases, so they are not treated as the first investigation for the family.

first investigations, will not be considered as they are less likely to enter the rotational assignment.

In essence, the results will consider the effect of assignment to different types of case managers, categorized by their rate of foster care placement, on long-term child outcomes. One question that arises is whether these investigators affect families in ways other than through foster care placement. These investigators do not supervise the case once a child enters foster care. Foster care stays are overseen by a separate division within IL DCFS that works with private child welfare agencies to recruit and supervise foster families. One potential area where they may have an impact is the recruitment of relatives to care for foster children, as the investigators often interview family members. An IL DCFS rule requires a relative to be sought first, however, regardless of the case manager assigned to investigate the case. An examination of any relationship between the investigator type and observable case characteristics, including placement type, will be explored in detail below. It appears that the role of the investigator is concentrated on determining whether a child has been abused or neglected: evidence that will be used to make the foster care placement decision. As a result, the differences in outcomes across investigators should largely stem from differences in the likelihood of foster care placement.¹¹

III. Data and Descriptive Statistics

A unique dataset that combines a wide array of administrative agencies in Illinois is used to carry out the analysis. These data are collected by the Chapin Hall Center for

¹¹ Family preservation services, such as counseling and vouchers for maid services, are increasingly common in the late 1990s. These programs are generally administered by separate case managers, as the investigators are focused on child protection investigations.

Children, a research institute located at the University of Chicago, and linked using personal identifiers together to create the Illinois Integrated Database (Goerge, John Van Voorhis, and Bong Joo Lee, 1994).

The core of the data comes from the Illinois Department of Children and Family Services. The Child Abuse and Neglect Tracking System (CANTS) provides details of the investigation, including the initial reporter of abuse, the allegations, the field team assigned to the case, and the case manager assigned to investigate. CANTS data include the child's age, sex, race, and address. The alleged perpetrators are also included in the tracking system. To consider the effect of removal from home, the analysis focuses on the 81 percent of cases where the alleged perpetrator is a natural parent, step parent, or co-habiting adult.

Meanwhile, the Child and Youth Centered Information System tracks children in foster care, and the two systems have been linked to determine whether the child was ever removed from home. The two information systems reflect the fact that once a child is placed in foster care a separate agency supervises the case.

In terms of longer-term outcomes, the prevalence of delinquency found in previous work suggests that this is an important one to consider. For children in Cook County, which includes the city of Chicago, the investigation data are linked with the Delinquency File of the Juvenile Court of Cook County. These data track children who enter the juvenile courts, and all entries between July 1, 1990 and December 31, 2000 are available. An appearance before the juvenile court system usually entails three juvenile arrests (or an arrest for a serious charge). This implies that a court appearance identifies

a child who has had a number of episodes with police and serves as a measure of delinquency.

Second, the database includes Medicaid Paid Claims data. These data contain payment records for medical services funded by the Illinois Department of Public Aid from January 1, 1990 through June 30, 2001. The variables include demographic measures used in the linkage and service dates, along with diagnosis and procedure codes. Births to girls nineteen years old and younger have been identified using these diagnosis and procedure codes.

The Medicaid data do appear informative of health care use. For example, all foster children are supposed to have a medical checkup within 90 days of entering foster care, and entry into foster care is associated with a forty-percentage point increase in the likelihood of a medical checkup within one year of the abuse report. This also suggests an immediate benefit of foster care entry in terms of preventative health care.¹²

Third, the Illinois Department of Employment Security's unemployment insurance program provides employment and earnings data for 2002 and the first two quarters of 2003. According to the Department, businesses that employ one or more individuals within any 20-week period in a calendar year are required to report employee wages on a quarterly basis.¹³ The state estimates that approximately 95 percent of all paid jobs in Illinois are contained in this database. In addition to the missing data, for a small segment of the population it is difficult to unduplicate individuals or link them

¹² This result is the 2SLS estimate of the effect of foster care entry on medical checkups similar to those presented below for longer-term outcomes. The estimated coefficient on foster care placement is 0.41 and a standard error of 0.09. The mean rate of wellness visits within one year of the abuse report for all Medicaid-enrolled children is 64 percent.

¹³ Some nonprofits and local government entities are exempt.

across quarters because of the relatively few linkage variables: only name and social security number. Robert Kornfeld and Howard Bloom (1999) found similar results using UI wage report and self-report data, though earnings of individuals with a prior arrest record were somewhat different. Employment measures were similar, however. Given that former foster children are overrepresented in prison surveys, such a concern should be kept in mind. Differences in employment appear to be less sensitive to the measurement problems, however.

Sample Construction

The outcome data are considered more reliable beginning in 1990, so all first investigations of parental abuse or neglect from between July 1, 1990 and June 30, 2001 are considered. The foster care placement measure is observable through June 30, 2003. Each outcome covers slightly different time periods, and the data appendix reports the time period for each data source. As noted in Section II, sexual abuse cases (which represent 8 percent of cases) and drug exposure cases (representing another 5 percent of cases) are excluded because these children are less likely to enter the rotational assignment.¹⁴

There are two main restrictions of the data. First, every foster child is statutorily eligible for Medicaid. Once in Medicaid, the personal identifiers available to match children with outcomes improve, including social security number. It may be possible, then, to find foster children more likely to be matched to the employment data, say, simply due to the greater availability of the identifiers. To compare children with the same identifiers and prevent this type of bias, the analysis here will focus on all children

¹⁴ Results were similar when sexual abuse cases were included. Drug exposure largely relates to infants, who are excluded from the outcome comparisons due to age restrictions described below.

receiving Medicaid prior to the abuse/neglect report. This represents 42 percent of all first-time abuse reports. Although this restriction will affect the interpretation of the results, it considers an important group, especially for foster care. Of the children placed in foster care in Illinois, 82 percent had received Medicaid prior to the abuse report.¹⁵

The second major restriction is on the age of children to ensure that children are old enough at the end of the sample period to be at risk for the outcomes considered here (a young child cannot have a teen birth, for example). All children who are at least 15 at the end of the sample period for the delinquency and teen motherhood samples, and at least 18 for the employment sample, will be considered. All children who were investigated when they were 16 or older in the delinquency and teen motherhood samples, and all children who were first investigated when they were 17 or older in the employment sample, were excluded, which results in an uncensored foster care placement measure.¹⁶ The analysis will focus, then, on school-age children roughly between the ages of 5 and 15 at the time of the abuse investigation. The results here should therefore be regarded as the effects of foster care placement for older children.

The delinquency outcome necessarily relates to children in Cook County, while the teen motherhood outcome relates to girls. Another 1 percent of the observations had missing child characteristics or had too few case manager investigations to calculate the instrument defined below. Finally, in a few cases the child was delinquent prior to the

¹⁵ This is especially important for the teen motherhood and employment outcomes, which require a social security number for the match. Interestingly, the instrumental variables point estimates for the delinquency results are similar when non-Medicaid children are included in the analysis, as the instrumental variable is unrelated to Medicaid receipt.

¹⁶ Placement is often quite different for children older than 15, who often enter an Independent Living program.

abuse report, and these cases are excluded from the delinquency analysis.¹⁷ These restrictions result in 15,039 children in the delinquency sample, 20,091 girls in the teen motherhood sample, and 30,415 children in the employment sample.

Further, for the few cases where the delinquency or teen birth occurred between the time of the investigation and the placement, the wait for removal may have contributed to the outcome. It is important not to associate these delinquencies or births with foster care placement. In the outcome comparisons, the indicator for removal is set to zero for these cases.

Summary Statistics

To better understand the types of allegations, reporters, and other child characteristics, Table 1 reports summary statistics for the delinquency sample—those children considered for juvenile delinquency using data from Cook County. The most common reporter of abuse is the family itself (29 percent). These reports can stem from domestic violence reports or from a concerned grandparent, for example. School personnel (13 percent), police (13 percent), and physicians (12 percent), are known as mandated reporters—they are required by law to report suspected abuse or neglect.

The average age of all first-investigated children in Illinois is 6.5, with half of the children under the age of 5, yet the children considered here are 11 years old on average. This is due to the restriction that these children are at least 15 years old in 2000.

In terms of race and ethnicity, 76 percent of the sample is African American and 12 percent is Hispanic, compared to 26 percent and 20 percent, respectively, for school-

¹⁷ 670 prior delinquency cases are excluded. Employment is not subject to this concern given the restriction that investigated children be at least 18 in 2002. The teen motherhood outcome should be regarded not as a pregnancy outcome but rather the decision to bear a child prior to the age of 18 (abortions are not available in Medicaid). Point estimates were virtually identical when 597 cases where the woman gave birth less than nine months after the initial abuse report were excluded.

aged children in Cook County as a whole in 2000. Meanwhile, 47 percent of the investigated children are boys.

Another characteristic observed is the allegation. Roughly half of the allegations are for abuse, and the other half for neglect. The most common report of neglect is a lack of supervision. This occurs when a child is found unsupervised or when a parent abandons a child, which may partly be due to child behavior problems. 15 percent of the allegations are due to environmental neglect, when the child's living conditions are hazardous. Physical abuse is the primary allegation 17 percent of the time, and is usually described as bruises, cuts, or broken bones. Meanwhile, nearly one-quarter of the allegations are "substantial risk of harm", which describes children deemed to be in imminent danger. Together, the characteristics in Table 1 describe the types of cases seen by child protective services and will be used as controls in the analysis below, including indicators for each year of age at the time of the investigation.

The teen motherhood and employment samples are statewide, with 47 percent of the children coming from Cook County. Reports are less likely to come from family members (22 percent vs. 29 percent in Cook County), children are less likely to be African American (49 percent vs. 76 percent), and more likely to be white (42 percent vs. 11 percent). Meanwhile, the allegation is more likely to be substantial risk of harm (32 percent vs. 24 percent) and less likely to be lack of supervision (30 percent vs. 37 percent). Full summary statistics for the teen motherhood and employment samples are located in the appendix.

Compared to the statewide foster care population, the observable characteristics for all investigated children are similar to the employment sample, with the biggest

difference being the average age (5.9 vs. 12.4). There were more physician reports among the population of first-investigated children (17 percent vs. 10 percent), reflecting physician interventions for infants, and fewer school reports (9 percent vs. 14 percent). The population is more likely to be white (48 percent vs. 42 percent) and less likely to be African American (41 percent vs. 49 percent), largely due to the restriction that the children previously received Medicaid. In terms of allegations, physical abuse reports were less common among the full population (12 percent vs. 20 percent), with much of the difference coming from the 8 percent sexual abuse and 5 percent drug-exposed children who were excluded because they were less likely to enter the rotational assignment as described in Section II. Rates of the other major allegation categories were similar in the full population. Last, the full population included 43 percent from Cook County versus 47 percent in the employment sample.

To place the results in context with foster care in the U.S., note that the average length of stay in the U.S. is 2 years compared to an average length of stay of 4 years in Illinois.¹⁸ In addition, the average age of foster children currently in care is 10 years old, with 30 percent under the age of 5 (US Department of Health and Human Services, 2004). Illinois also relies more heavily on kinship foster care, with half of all initial placements going to a relative, compared to 23 percent for all foster children currently in family foster care. Last, the sample studied here is disproportionately African American compared to the US foster care population (49 percent vs. 35 percent), with similar rates of whites, and fewer Hispanics (7 percent vs. 17 percent). One advantage of considering Illinois is that it includes a large city as well as smaller cities to compare the results.

¹⁸ Under court order to reduce lengths of stay, efforts were made to reduce this time in foster care beginning in 1997.

In summary, the results here consider a large urban state and school-aged children who were receiving public aid prior to the investigation. These restrictions should be kept in mind when interpreting the results.

IV. Estimation

A. Investigator Assignment

Given the rotational assignment process within geographic teams, the instrument will be calculated for each case manager-team group, where the team is defined by the case team x ZIP code x Hispanic x report year cells. The main analysis is done at the child level, so the instrument is defined for each child i assigned to case manager c in investigation sub-team j as:

$$(8) Z_{icj} = d_{icj} \cdot (1/(n_c - n_{cj})) \cdot \sum_{k=-j} n_{ck} (\bar{R}^{ck} - \bar{R}^k)$$

where d_{icj} is an indicator that the case manager c and sub-team j correspond to the ones assigned to child i . n_c is the total number of children investigated by case manager c , n_{cj} is the number of children investigated by case manager c in investigation team j , \bar{R}^{ck} is the fraction of children investigated by case manager c in sub-team k that are eventually removed from home, and \bar{R}^k is the fraction of investigated children in sub-team k that are eventually removed from home.

The case manager removal differential is analogous to a case manager fixed effect in a model predicting removal with sub-team fixed effects: the propensity of a case manager's investigation to result in foster care placement relative to the types of cases seen by this case manager's sub-teams. It is calculated for all sub-teams other than the

family's sub-team, so that each family's removal decisions do not enter into their calculation. It is not conditional on child characteristics to allow a direct examination of whether the rotational assignment of cases results in case manager placement tendencies that are unrelated to the characteristics of a given child's case. In contrast, a model with controls may mask the possibility that case managers are assigned to particular types of cases.

Heckman (1981) and William H. Greene (2001) discuss the ability of small sample sizes per group to allow for meaningful estimates of fixed effects with a rule of thumb of eight observations per group. The calculation is restricted to case managers with at least 10 investigations. In the delinquency sample there are 409 case managers considered, with an average of 38 investigations per case manager used in constructing the measure.¹⁹ In the teen motherhood and employment samples, the figures are 705 and 28, and 815 and 37.²⁰

The measure is constructed on sub-team cells where there is more than one case manager. Children investigated in a sub-team cell with only one case manager will still have a non-missing instrument, however, as it is calculated for all other sub-team cells. There are 1,465 sub-teams used in the calculation in the delinquency sample with an average of seven observations per cell, 1,961 in the teen motherhood sample and 3,824 in the employment sample, both with an average of five children per cell. The calculation is weighted by the number of children in the sub-team to extract the signal from cells with

¹⁹ The total number of observations used in the calculation differs slightly from the analysis sample, as sub-teams with only one case manager are excluded from the calculation. These cases are still assigned a case manager removal differential, however, as this measure is for all cells other than for a given family. The calculation in the delinquency sample also included the 670 prior delinquency cases excluded in the main results.

²⁰ Note that if the number of investigators grows with the sample size, these fixed effects would suffer as weak instruments (Jinyong Hahn and Jerry A. Hausman, 2003; James Stock, James Wright, and Motohiro Yogo, 2002). The strength of the instrument is considered below.

the least noise. Further, the results were similar when the report-year interactions were not used in the cell construction to increase the number of children per cell.

The instrument is calculated for the case manager originally assigned to the case. The foster care placement indicator is equal to 1 if the child is ever removed from home, and this may occur during a subsequent investigation with a different case manager. Case managing is well known to be a difficult occupation, with 20 percent of case managers who began in 1990 no longer working 5 years later; for 1991 case manager entrants, 37 percent were no longer working 5 years later. These two cohorts of case managers had median tenures of 10 years and 8 years, respectively. As a result, the relationship between the assigned case manager and ultimate foster care placement is unlikely to be one-to-one, and the strength of this first-stage relationship will be described below.

The resulting instruments reveal some variation in placement rates across case managers. The instrument has a mean of zero and a standard deviation of 9 percent in the delinquency sample, 10 percent in the teen motherhood sample, and 7 percent in the employment sample.

The rules and regulations described in Section II imply that families are effectively randomized to investigators within the rotational assignment pool. If this were the case, then child characteristics should be similar across investigators and therefore not predict the case manager's removal differential. To test this hypothesis, the instrument can be regressed on the child characteristics. For child i investigated during month m of year t , the following model is estimated using ordinary least squares:

$$(9) Z_{icj} = \pi_0 + \pi_1 X_{icj} + \delta_{t(i)} + \eta_{m(i)} + \mu_{icj}$$

where X is a vector of child characteristics, and δ and η represent vectors of indicators for the year and month of child i 's investigation. The standard errors are clustered at the case manager level to reflect the dependence across cases assigned to the same investigator.

Table 2 reports the results for the delinquency sample. The observable child characteristics do not appear related to the case manager's removal differential. For example, children with a report from the police are found to have only a 0.3 percentage point decrease in the case manager removal differential compared to school reports, despite the fact that police reports are associated with an increased likelihood of placement. Another example: African American children are more likely to be placed compared to white children, yet case managers assigned to African American families have a 0.1 percentage point lower removal differential compared to white cases.

One summary of the relationship between the child characteristics and the case manager removal rate is an F-test for joint significance. For the models predicting the removal differential, a lack of joint significance for these characteristics is not rejected: in the delinquency sample the F-statistic is 0.84 with a p-value of 0.75; in the teen motherhood sample, 1.07 and 0.34; and in the employment sample, the F-statistic is 0.96 with a p-value of 0.54, as shown in Table 3.²¹

Another test to see whether case managers with high removal frequencies are assigned tougher cases is to examine the length of stay once in foster care. More abusive families can be expected to result in longer stays away from them. If strict case managers are assigned to these families, then length of stay should be correlated with the removal

²¹ An F-test for the child characteristics only (excluding the year and month indicators) results in F-statistics (p-value) of 0.83 (0.71), 1.15 (0.28), and 0.93 (0.57) for the delinquency, teen motherhood, and employment samples.

differential. In these samples, children typically stay in care for 4 years for the state-wide samples and 5 years for the Cook County sample. A higher case manager removal differential is not related to the length of stay, however.²²

To further explore the type of care received, the placement type can be compared as well. Although case managers do not supervise foster children once placed in care, case managers do investigate the family and may be aware of a relative willing to provide foster care, as described in Section II. Nevertheless, an initial placement with relatives is not related to the case manager removal differential. Of the children placed in foster care, roughly half are initially placed with relatives, but a ten percentage point increase in the case manager removal differential is associated with only a 0.2 percentage point increase in relative placement for the delinquency and teen motherhood samples, and a 0.2 percentage point decrease in the employment sample. This is not surprising given the administrative rule that relatives are sought first for any child placed in foster care. Still, the lack of a relationship between the investigator and the placement type is suggestive that the investigator has little impact on the type of care received once in foster care.

Finally, if case managers with higher removal frequencies place particular types of children who just so happen to be more frequently observed, this would be a violation of the monotonicity condition. If this were the case, then observable characteristics, such as allegations or reporters, may be more prevalent for case managers with higher removal differentials, *conditional on foster care placement*. When the case manager removal differential is regressed on child characteristics for children placed in foster care,

²² A ten percentage point increase in the case manager removal differential is associated with a 0.1 year reduction in care in the delinquency sample, a 0.02 year reduction in the teen motherhood sample, and a 0.01 year reduction in the employment sample, none of which is statistically significant. Results are reported in a supplementary appendix available from the author.

however, child characteristics are again unrelated to the case manager removal differential in each of the three samples.²³

B. Case Manager Assignment and Foster Care Placement

Children assigned to case managers with high removal differentials may be more likely to be placed in foster care as well. To test this first-stage relationship, the estimating equation for child i assigned to an investigator c in sub-team j during month m in year t is:

$$(10) R_{icj} = \phi_0 + \phi_1 Z_{icj} + \phi_2 X_{icj} + \delta_{t(i)} + \eta_{m(i)} + \omega_{icj}$$

This equation is estimated using a probit model, with standard errors clustered at the case manager level, though results are nearly identical with a linear probability model.

Table 4 reports the results for the delinquency sample and shows that the case manager removal differential is positively associated with foster care placement. The estimated marginal effect of 0.3 implies that an increase in the removal differential from one standard deviation below the mean to one standard deviation above—representing an approximately 20 percentage point increase—would be associated with a 6 percentage point increase in the likelihood of removal, or 22 percent of the mean removal rate.

The probability of removal does not increase one-for-one with the case manager removal rate. This is likely due to a type of measurement error that attenuates the effect toward zero. First, the case manager of the initial investigation is used to characterize the case manager type, though this may not represent the case manager in subsequent investigations given the investigator turnover described above. Second, the case manager

²³ The F-statistic of joint significance is 0.85, 1.05, and 1.05 for the delinquency, teen motherhood, and employment samples, with p-values of 0.75, 0.39, and 0.39. Results are reported in the supplementary appendix.

is the lead investigator in the case, whereas a judge has the final say on foster care stays. Nevertheless, the removal rate is associated with placements, with a Chi-squared statistic of 28, well above the rule of thumb of 10 for weak instruments (James Stock, James Wright, and Motohiro Yogo, 2002).

The addition of controls to the model does not change the estimates very much, as expected given that the control variables appear unrelated to the case manager removal differential. In contrast, these variables are associated with foster care placement. For example, police and physician reports are strongly associated with increases in the likelihood of foster care placement compared to school reports, and African American children are also more likely to be placed. Physical abuse and other abuse (which represents the most serious allegations, such as burns) are less likely to be placed. This may be due to the more automatic reports of such injuries despite a lack of abuse. Also, “lack of supervision”, which often implies a missing mother and may describe problem behavior on the part of the child as well, is more likely to result in a placement compared to environmental neglect, which represents hazardous living conditions that may be more easily remedied. Similar results are seen in the teen motherhood and employment samples that are statewide, though smaller differences in the allegation types are found. Meanwhile, Cook County cases are more likely to result in placement (with a coefficient of 0.06 and 0.08 in the two statewide samples, and a standard error of 0.01 in each).²⁴

Table 5 reports the first-stage results for all three samples. The placement rate is lower outside of Cook County, with the statewide placement rate in the employment sample of 23 percent. The marginal effect of the removal differential on placement ranges from 0.2 to 0.33. Chi-squared statistics of the significance of the instrument in

²⁴ Full results for each of the samples are available in the supplementary appendix.

predicting placement range from 28 to 55 in the models with controls. For all three samples, then, it appears that the removal differential does have some explanatory power and does not suffer as a weak instrument.

To explore the source of this first-stage relationship across case managers, Figure 2 presents local linear regressions of an indicator for foster care placement on the case manager removal differential for each of the three samples. Each point represents the local linear regression estimate evaluated at a percentile of the case manager removal differential, and the estimates use a bandwidth of 0.05.²⁵

The figures show how much variation in placement can be attributed to the instrument. The top line reports the results for the delinquency sample, and an increase from the tenth percentile to the ninetieth percentile in the removal differential (from -0.10 to 0.11) is associated with an increase in the placement rate from 0.25 to 0.31. This implies a first-stage slope estimate of 0.29. The middle line is for the employment sample, and the rise in placement is evident for case manager removal differentials that are greater than zero when the placement rate increases from 21.6 percent to 29 percent. The bottom line is for the teen motherhood sample, and the increase in placement is seen in the interquartile range of the instrument where the placement rate increases from 18 percent to 23 percent.

The first-stage results graphed in Figure 2 show a fairly monotonic increase in foster care placement with the case manager removal differential, especially within the interquartile range of the instrument. This provides modest support for the monotonicity

²⁵ When the percentiles were calculated, case manager removal differentials of zero occupied three percentiles in the juvenile delinquency sample, four percentiles in the teen motherhood sample, and three percentiles in the employment sample, resulting in 98, 97, and 98 estimates for the three samples. The shape of the first-stage relationship is similar for a wide range of bandwidths from 0.01 to 0.1, though a bandwidth of 0.1 reveals larger fluctuations.

condition, though that assumption applies to each individual rather than the averages reported in Figure 2.

Case Manager Characteristics

Some information is known about the case manager as well, including sex, race, experience, educational attainment (master's degree), and Spanish-speaking ability. The most stable relationship in these data is that male case managers are slightly less likely to be associated with foster care placement. These case manager characteristics are much less predictive compared to the case manager removal differential, however. It appears that differences in removal rates are more idiosyncratic than systematic when it comes to case manager characteristics.

C. Foster Care Placement and Child Outcomes

The empirical models will consider outcomes, Y , for child i assigned to case manager c in sub-team j during month m in year t of the form:

$$(11) Y_{icj} = \alpha_0 + \alpha_1 R_{icj} + \alpha_2 X_{icj} + \delta_{t(i)} + \eta_{m(i)} + v_{icj}$$

where the case manager removal differential, Z_{icj} , will be used as an instrument for the indicator for removal, R_{icj} . The outcomes will be estimated separately given the different samples used. In particular, the delinquency and teen motherhood outcomes are binary and will be estimated using probit and IV probit maximum likelihood models, while the employment and earnings outcomes will be estimated using OLS and 2SLS.

Juvenile Delinquency

Juvenile delinquency is a common occurrence for this group. Of the 15,039 children considered here, 17 percent are found to come before the Juvenile Court of Cook

County. Table 6 reports the results, where the probit models reveal little difference between those placed in foster care and those not placed in care.

Delinquency differences are found to be greater when estimated with an IV probit model, with a marginal effect estimate of 0.26 and a standard error of 0.14 in a model with no controls. When controls are included, the marginal effect estimate increases to 0.35 with a standard error of 0.14, largely due to the control for the sex of the child. The controls also reveal that boys, older children at the time of the initial investigation, and children investigated in the early 1990s, were more prone to delinquency.

These IV point estimates are quite large. If 10 percent of these marginal cases were placed in foster care, then a thirty percentage point difference would imply that foster children have a delinquency rate three times that of children who were not placed in foster care.²⁶

The larger IV results suggest that the estimated causal effects of foster care on delinquency are worse than the conditional means comparison would imply, although differences between the IV and non-IV results are not statistically significant. A key difference between the two sets of results is that the IV calculation estimates the effects for marginal cases—those induced into foster care due to the case manager assignment. The usual omitted variables bias in the means comparison—that foster children come from worse families and would have worse outcomes regardless of placement—may be outweighed by a selection bias: children with higher expected benefits from foster care placement, such as severely abused children, are more likely to be placed. As a result,

²⁶ The calculation uses the weighted average: $0.9 \cdot 0.14 + 0.1 \cdot (0.14 + 0.30) = 0.17$: the mean delinquency rate for the sample.

the means comparison may understate any negative effect from placement for marginal cases.

In any event, the large coefficients and standard errors suggest some caution in the interpretation. The results do suggest that large benefits to foster care placement are unlikely for children on the margin, at least in terms of juvenile delinquency.

Teen Motherhood

For girls, teen pregnancy is often cited as a correlate to other problems such as poverty, less educational attainment, and welfare dependency. As with delinquency, teen motherhood is common, with 35 percent of the sample having a teen birth.

Table 7 reports the results, and children who entered foster care are found to have a nine to ten percentage point higher teen birth rate. The control variables reveal that older children at the time of the investigation, African American children, and children investigated in the early 1990s had higher teen birth rates. Meanwhile, children investigated in Cook County had slightly lower teen birth rates.

When the case manager removal differential is used as an instrument for removal in an IV Probit model, girls who were removed from home are found to have even higher teen birth rates, similar to the delinquency results. The estimated marginal effect is 0.17 and a standard error of 0.16. With the inclusion of controls, especially age controls, the estimate increases to 0.29, with a standard error of 0.17—a difference that is marginally statistically significant at the 10 percent level. The estimates are again large (representing a teen birth rate of foster children twice that for those who remained at home), with large standard errors as well.

Employment and Earnings

Employment and earnings are also of interest as a measure of stability and long-term success for these children. The data are available on a quarterly basis, and the employment measure is the fraction of quarters that the individual was employed in 2002. The earnings measure is the average quarterly earnings, including those who had zero earnings. The age restriction results in investigated children who were between the ages of 18 and 28 in 2002. Given the large dropout rate in this group—over 60 percent for Chicago schools—most of the investigated children should be in the labor force by the age of 18. Nevertheless, this group has low employment and earnings levels, with the average individual found employed 32 percent of the time earning \$1,044 in an average quarter (including zero earnings).

Table 8 reports the results for employment and earnings. The OLS results suggest almost no difference between investigated children who were placed in foster care compared to those who remained at home. Employment differences are also small across children described by the control variables, with younger children at the time of the investigation, boys, African Americans, and residents of Cook County slightly less likely to be found working. Similar results are found for quarterly earnings, with the exception of slightly higher wages in Cook County.

When foster care placement is instrumented, however, the children who were removed are associated with an 11 percentage point reduction in the fraction of quarters worked, and \$850 fewer earnings. When controls are introduced, these estimates increase to -0.15 and -\$1296, largely due to the controls for year of investigation and age at investigation. This reflects the relative imprecision of the estimates, with standard errors of 0.11 and \$626, respectively. Only the earnings outcome is statistically

significant at the 5 percent level. These results are consistent with the delinquency and teen motherhood results that children on the margin of placement appear to have better longer-term outcomes when they remain at home.

Marginal Treatment Effects

One way to explore the source of the IV results is by estimating marginal treatment effects, as described in Section I. Given the lack of precision in the main results, however, these results should be regarded with some caution.

As the propensity to be placed in foster care increases with the case manager placement differential, the delinquency and teen motherhood rates also rise and the employment measures tend to fall (figures are provided in the appendix). The first derivative of each of these relationships with respect to the probability of placement represents the marginal treatment effect function. The shape of this function compares the treatment effects as they vary across children who are removed at different rates depending on the investigator who was assigned to the case. For example, among low removal rate investigators, the marginal child will likely have worse unobserved abuse levels before being placed in foster care by such “lenient” investigators compared to children on the margin among high removal rate investigators.

To calculate the MTE function, the predicted probability of placement was estimated using a probit model. The case manager removal differential was the only explanatory variable in the model to capture the variation in placement solely due to the instrument. The relationship between each of the outcome variables and the predicted probability of placement was then estimated using a local quadratic estimator and a

bandwidth of 0.037.²⁷ The estimates of the first derivative of this relationship were evaluated at each percentile of the predicted probability of placement and reported in Figures 3A-3D.²⁸

The first feature is that the predicted probabilities range from 0.16 to 0.45 in the delinquency sample, and 0.1 to 0.35 in the teen motherhood and employment samples. With the lack of full support for the probability of placement on the unit interval, especially at the extremes, estimating parameters such as the average treatment effect will not be possible. Rather, the marginal treatment effects are considered to trace out how outcomes vary across children who are induced into foster care as the probability of treatment varies with the instrument. These parameters are necessarily dependent on the instrument considered, though an advantage of the instrument considered here is that it exploits variation that is naturally within the bounds of likely policy changes.

The relationship between delinquency and the probability of placement induced by case manager assignment is fairly linear. Figure 3A shows that this results in an MTE function that is roughly flat at 0.27, with a decline in the top quartile of the predicted propensity of removal. This decline at the upper levels of this propensity suggests that children on the margin of placement among the highest removal rate case managers

²⁷ The local quadratic estimator was chosen as the first derivative of the relationship is sought and local quadratic estimators are thought to have better properties (J. Fan and I. Gijbels, 2000). In practical terms, the results are nearly identical when a local linear regression was estimated instead. The pilot bandwidth was chosen by minimizing the sum of squared errors between the local quadratic estimator and a fourth-degree polynomial model. For the delinquency, teen motherhood, and employment and earnings samples, the resulting pilot bandwidths were 0.070, 0.037, 0.047, and 0.075. Larger bandwidths lead to more linear relationships (and flatter MTE estimates). To explore variations from linearity, the minimum bandwidth from these models was chosen: 0.037. Results are robust to bandwidths down to 0.020, with larger fluctuations in the MTE function at $h = 0.010$.

²⁸ The local quadratic estimates are reported in the appendix figures, while the derivative is reported in Figure 3. The derivative comes directly from the local quadratic coefficients. In practice, considering the ratio of discrete differences between percentiles in the outcome and the predicted probability of placement yielded the same results. 5 to 95 percent percent confidence intervals were calculated using a bootstrap procedure clustered at the case manager level. The propensity score was re-estimated in each of the 250 re-samplings to capture the variation in the point estimates caused by estimating this variable.

(children who are likely to have *less* severe unobserved abuse levels) appear to avoid the negative effects of foster care placement. Note that these abuse level comparisons do not include the most severe abuse levels when all case managers would agree to the placement referral.

The results for teen motherhood show more curvature in the relationship between the outcome and the predicted placement variation. This results in a downward-sloping MTE function, as shown in Figure 3B. This again suggests that among children on the margin, foster care placement tends to have a smaller negative effect for those with higher removal rates. While it appears that there are heterogeneous effects across the instrument values, the standard errors are too wide to statistically reject a slope of zero.

The employment measures are more mixed. The earnings MTE fluctuates around -\$1000 with a downward slope in the interquartile range of predicted placement and an increase in the top quartile. The employment MTE shows a downward slope throughout, with point estimates below zero only in the top half of the predicted removal propensities, suggesting that worse employment differences are found for children on the margin of placement among high removal rate case managers.

These MTE results suggest that the delinquency result is fairly robust over different margins of foster care placement; that the negative teen motherhood results are found largely among children assigned to low removal rate case managers—children who likely have relatively greater abuse levels; meanwhile, the negative employment results are found for those assigned to the high removal rate case managers—a margin focused on those with relatively lower abuse levels. Again, all of these comparisons are among

children on the margin of placement, albeit along different margins as defined by the instrument.

Differences across Child Types

The marginal treatment effect results suggest that there may be heterogeneous effects of foster care placement across different types of children. To investigate this further, Table 9 reports the results of the IV estimation broken into subgroups defined by key childhood characteristics. As in the MTE comparison, these results aim to describe the types of children that drive the main results.

The table reports the Chi-squared statistics in the delinquency and teen motherhood samples, and the F-statistics in the employment samples, which test whether the relationship between the instrument and foster care placement is different from zero. These tend to be greater than 20 even in the smaller samples.

The first comparison is between abuse and neglect allegations, and the results are mixed. The placement rate is found to be higher in neglect cases, and the jump in delinquency is most noticeable in the neglect cases, as well. Meanwhile the jump in teen motherhood is found in abuse cases, and the sign flips to negative for neglect cases (again with large and standard errors). The first-stage relationship is not as strong in the neglect sample for the teen motherhood outcome, however, with a Chi-squared statistic of 12. The employment results are similar across allegation types, though lower quarterly earnings among foster care entrants appear more concentrated in the abuse cases.

One important caveat when interpreting the main results is that these children are between 5 and 15 years old when they are investigated to allow for an examination of longer-term outcomes, but half of children investigated are under the age of 5. One way

to begin to investigate the role of age is to consider children who were investigated when they were under the age of 10 with those who are 10 years old and older. The removal rates are higher for the younger children, as this is an indicator for ever having been removed as a child, and they were at risk of removal for longer periods of time. The bulk of the data reside in the above-10 category, and the results are similar to the main results for this group.²⁹ The point estimates are smaller for the under-10 group in terms of delinquency; a negative sign is found for the teen motherhood sample (which also had a weaker first stage with a Chi-squared statistic of 8.5); and a somewhat smaller effect is found for quarterly earnings. Meanwhile, the point estimate for the fraction of quarters employed suggests that the under-10 children have worse outcomes relative to the older group.

For race, the bulk of the data are among non-whites and the results are similar when whites are excluded from the estimation. The point estimate of the effect of placement on delinquency is greater for girls. Delinquency is much less common among girls as a group, and the interaction between the juvenile delinquency and foster care systems may lead to relatively larger increase for girls than for boys. The employment effects are similar across boys and girls, though the fraction of quarters worked point estimate suggests a larger drop for boys.

Across areas, the more urban Cook County has larger increases in teen motherhood and larger declines in employment outcomes compared to the rest of the state.

²⁹ Children older than 10 years old are available for more years. For example, a 5-year-old is only available from 1990 to be at least fifteen in fiscal year 2000.

A final subgroup comparison breaks the sample into two groups based on the propensity of placement estimated using the child characteristics in Table 1, along with three-digit ZIP code indicators to capture neighborhood characteristics.³⁰ Note that this analysis differs from the MTE results which considered children with similar observable characteristics among those at the margin of placement, while this exercise compares the effects of placement across children who have different observable characteristics. The estimated propensities range from 2 percent to 63 percent in the delinquency sample, 1 percent to 57 percent in the teen motherhood sample, and 2-63 percent in the employment sample.

For delinquency and teen motherhood, the negative effects of placement are concentrated among those who are less likely to be placed. This is consistent with larger IV results representing worse results for children at the margin compared to the average foster child. As with the previous results, however, the estimates are imprecisely estimated. The employment results are again mixed, with the negative effects of placement on the fraction of quarters working found solely for those with a larger propensity to be placed in foster care, though the point estimates for earnings are larger for those with lower propensities to be placed in care. Similar results are found when broken into quartiles as well.³¹

³⁰ A propensity score matching exercise was also conducted which largely mimicked the OLS results. In particular, the probability of foster care placement was estimated using the full controls in Table 1 along with three-digit ZIP code indicators. The data were then broken into deciles based upon these predicted probabilities. The delinquency comparisons show small differences across the two groups, with a tendency to have slightly lower delinquency for foster children at lower probability of removal deciles. Teen motherhood comparisons are similar to the OLS results of ten percentage point higher teen birth rates for foster children, beginning with the third decile. Smaller differences are found for the lowest two deciles, though the observable characteristics are not balanced for these deciles. The employment differences are small across the deciles. Wages are slightly lower for foster children similar to the OLS results, though larger reductions are found in the third and ninth deciles. Full results are in the supplementary appendix.

³¹ Available in the supplementary appendix.

Specification Checks

Table 10 reports the results of some specification checks. The first set of checks uses 2SLS, as opposed to the maximum likelihood IV probit in the main results. The point estimates are slightly smaller, as well as the standard errors. That said, the results are roughly similar to those presented earlier with large IV estimates. For delinquency the point estimate is 0.28; for teen motherhood the estimate is 0.27. The employment results are replicated from Table 8 for comparison.

Panel B introduces ZIP code fixed effects to control for the type of neighborhood that may influence the outcomes. The estimates are similar, as expected, given that the instrument is calculated within ZIP code areas.

To compare the results presented here with the larger literature on the local average treatment effect with a binary instrument, an indicator that the case manager removal differential is greater than zero was used instead of the level. It may be that a coarse measure of removal tendencies may more accurately categorize those case managers with a high versus a low threshold for recommending foster care placement. The results show similar, though somewhat larger, point estimates in Table 10.³²

The results were also robust to alternative specifications for the instrument, including the use of a prior removal rate that described the frequency of foster care placements for case managers calculated on all investigations prior a given family's case. Last, the results were robust to IV probit estimation that used a two-step method: residuals were obtained from a first-stage linear regression of placement on the instrument and controls, and a polynomial in these residuals was added to a probit model

³² When the delinquency and teen motherhood LATE models were estimated with 2SLS, the coefficients were 0.27 (se = 0.11) and 0.37 (se = 0.20), respectively.

of the outcome on a foster care placement indicator and controls. When a quartic in the first-stage residual was included, for example, the marginal effect of removal on delinquency was 0.340 (se = 0.172), and for teen motherhood the effect was 0.343 (se = 0.181).³³

Limitations

One of the main limitations of the above approaches is that the outcome data are available only for children who remain in Illinois. For example, if families who are investigated leave the state, they will not be removed, and they will not be found in the outcome data. This may partly explain the increases in juvenile delinquency and teen motherhood found, though this explanation would generally not be consistent with the decline in employment. Further, when the analysis is restricted to children who were found in the public aid data through age 10, similar point estimates are found (though the standard errors increase with the smaller sample sizes).

Another limitation is that the empirical strategy does not lend itself to an analysis of the effect of length of stay in foster care on outcomes. Rather, the difference across placement status is considered. When models are considered for children who were either not removed or were in foster care for more than 1 year, the results are similar. This is partly due to the fact that most children are in care for more than a year in these datasets that focus on older children.

A third limitation is that the benefit of foster care placement in terms of child safety is only addressed through its impact on the outcomes studied here. Using the

³³ Another set of tests used the instrument fully interacted with the child characteristics in the first stage instead of just the level. The resulting F-statistic was lower, however, as variation in these interactions may require too much from the data. The 2SLS estimates are similar, however, with slightly lower point estimates.

Medicaid data, reports of broken bones are found to increase with placement, though such a result could reflect more cautious foster parents or case workers being more likely to take the child to the hospital. Although the outcomes studied here represent a wider range of outcomes than previously studied, there are likely unobserved benefits and costs to be considered in future research.

V. Conclusions

With the child welfare system affecting so many children who appear to be at high risk of poor life outcomes, it would be useful to know whether abused children benefit from being removed from their families. The analysis here uses the effective randomization of abuse investigators, who differ somewhat in their tendency to have children placed in foster care, to estimate causal effects of placement on longer-term outcomes. Children assigned to investigators with higher removal rates are more likely to be placed in foster care themselves, and they are found to have higher delinquency rates, along with some evidence of higher teen birth rates and lower earnings.

The point estimates are large and relatively imprecisely estimated, with only the delinquency and earnings results statistically significantly different from zero and none statistically different from the conditional mean comparison, which suggests some caution in the interpretation. Nevertheless, the estimates suggest that large gains from foster care placement are unlikely for this group of children at the margin of placement, at least for the outcomes studied here.

When interpreting the results three main caveats should be kept in mind. First, the sample consists of school-age welfare recipients investigated in Illinois. In addition,

the negative effects in terms of delinquency and teen motherhood are found in the 10-15 age group where most of the data reside. Future work will consider younger children as they become at risk for these adolescent and young-adult outcomes. In addition, Illinois is a large urban state where placement of children with family members is more popular than the nation as a whole.

Second, the results consider a group on the margin of placement. While this speaks directly to the policy question of whether we should place greater emphasis on family preservation or child protection, it does not attempt to measure the benefit of placement for children in such danger that all investigators would agree the child should be placed.

Last, the outcomes studied here may relate to child wellbeing as an adolescent, though they may not reflect the potential prevention of serious child abuse in extreme cases. To the extent that the children on the margin of placement are less likely to suffer from the most serious abuse, this may be less of a concern. Still, child welfare agencies may be willing to trade off higher delinquency, teen motherhood, and unemployment rates for slightly lower levels of serious abuse.

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Data Appendix

Source	Time Frame	Key Variables	Age Restriction
Child Abuse and Neglect Tracking System, Illinois Department of Children and Family Services	July 1 1990- June 30, 2001	Investigation Data	Infant – Age 16 at time of the report
Child and Youth Centered Information System, Illinois Department of Children and Family Services	July 1 1990- June 30, 2003	Removal	Infant – Age 16 at time of the report
Online Data Entry and Display System, Illinois Department of Employment Security	January 1, 2002-June30, 2003	Employment and Earnings	Child at least 18 in 2003.
Medicaid Management Information system, Illinois Department of Public Aid	July 1, 1990 – June 30, 2001	Teen Births	Girls at least 15 in 2001.
Delinquency File Juvenile Court of Cook County, Illinois	July 1, 1990- December 31, 2000	Juvenile Delinquency	Child at least 15 in 2000

Table 1: Summary Statistics: Delinquency Sample

Variable		Mean	Std Dev	Max	Min
	Foster Care Placement	0.27	0.44	0	1
Initial Reporter	physician	0.12	0.33	0	1
	school	0.13	0.33	0	1
	police	0.13	0.34	0	1
	family	0.29	0.46	0	1
	neighbor	0.06	0.23	0	1
	other government	0.09	0.29	0	1
	anonymous	0.15	0.35	0	1
	other reporter	0.03	0.16	0	1
Age at Report	age	11.3	2.5	5	15
Sex	boy	0.47	0.50	0	1
Race	white	0.11	0.31	0	1
	African American	0.76	0.43	0	1
	Hispanic	0.12	0.32	0	1
	other race/ethnicity	0.01	0.10	0	1
Allegation	physical abuse	0.17	0.38	0	1
	substantial risk of harm	0.24	0.43	0	1
	other abuse	0.02	0.15	0	1
	lack of supervision	0.37	0.48	0	1
	environmental neglect	0.15	0.36	0	1
	other neglect	0.04	0.20	0	1
Location	Cook County	1.00	0.00	1	1
Outcome	delinquency	0.17	0.38	0	1
	Observations	15039			

Table 2: Child Characteristics and CM Assignment: Delinquency Sample

Dependent Variable: Case Manager Removal Differential

Variable		Coeff.	t	p-value
Initial Reporter (Other Reporter Excluded)	physician	-0.006	-0.81	0.416
	school	-0.005	-0.74	0.457
	police	-0.008	-1.11	0.269
	family	-0.003	-0.52	0.605
	neighbor	-0.005	-0.73	0.464
	other government	-0.007	-0.96	0.339
	anonymous	-0.007	-1.07	0.287
Age at Report (Youngest age Excluded)	age 6	0.005	0.41	0.679
	age 7	0.012	1.07	0.284
	age 8	0.009	0.90	0.367
	age 9	0.015	1.42	0.156
	age 10	0.008	0.72	0.470
	age 11	0.009	0.94	0.346
	age 12	0.010	0.99	0.324
	age 13	0.013	1.26	0.207
	age 14	0.009	0.91	0.366
	age 15	0.009	0.89	0.373
Sex	boy	-0.002	-1.20	0.232
Race/Ethnicity (Other race Excluded)	white	-0.014	-1.32	0.186
	African American	-0.015	-1.22	0.224
	Hispanic	-0.012	-0.88	0.377
Allegation (Other neglect Excluded)	physical abuse	-0.002	-0.43	0.668
	substantial risk of harm	-0.006	-0.94	0.348
	other abuse	0.003	0.43	0.670
	lack of supervision	-0.005	-0.98	0.325
	environmental neglect	-0.007	-1.29	0.199
	Mean of Dependent Variable	0.0001		
	Standard Deviation	0.0921		
	F-statistic of joint significance	0.84		
	p-value	0.75		
	Number of case managers	409		
	Observations	15039		

t-statistics and F-statistic are calculated using standard errors clustered by case manager.

Table 3: Child Characteristics and Case Manager Assignment

Dependent Variable: Case Manager Removal Differential

	Sample:	Delinquency	Teen Motherhood	Employment
		(1)	(2)	(3)
F-statistic of joint significance		0.84	1.07	0.96
p-value		0.75	0.34	0.54
Mean of Dep. Var.		0.0001	-0.0007	-0.0007
Std. Dev. of Dep. Var.		0.0921	0.1035	0.0729
Number of case managers		409	705	815
Observations		15039	20091	30415

All models include full controls including individual year, month, and age indicators.

F-statistics are calculated using standard errors clustered by case manager.

Table 4: CM Assignment and Foster care Placement: Juvenile Delinquency Sample

Dependent Variable: Case Manager Removal Differential

Key Explanatory Variables	Model:	Probit			Probit		
		Coefficient	S.E.	p-value	Coefficient	S.E.	p-value
Case Manager Removal Differential		0.30	0.07	0.00	0.27	0.05	0.00
Initial Reporter (Other Reporter Excluded)	physician				0.10	0.03	0.00
	school				-0.02	0.03	0.43
	police				0.14	0.03	0.00
	family				0.05	0.03	0.06
	neighbor				0.02	0.03	0.53
	other government				0.07	0.03	0.03
	anonymous				-0.06	0.03	0.02
Age at Report (Youngest age Excluded)	age 6				0.05	0.05	0.21
	age 7				0.05	0.04	0.18
	age 8				0.02	0.04	0.66
	age 9				0.03	0.04	0.44
	age 10				0.03	0.04	0.42
	age 11				0.02	0.04	0.55
	age 12				0.00	0.04	0.97
	age 13				-0.02	0.04	0.63
	age 14				-0.04	0.04	0.32
	age 15				-0.07	0.03	0.08
Sex	boy				-0.01	0.01	0.14
Race/Ethnicity (Other race Excluded)	white				0.00	0.05	0.95
	African American				0.11	0.04	0.02
	Hispanic				-0.03	0.05	0.50
Allegation (Other neglect Excluded)	physical abuse				-0.07	0.02	0.00
	substantial risk of harm				0.00	0.02	0.88
	other abuse				-0.09	0.02	0.00
	lack of supervision				0.00	0.02	0.89
	environmental neglect				-0.08	0.02	0.00
	Chi-squared (1) stat.	17.9			27.8		
	Mean of Dep. Var.	0.27					
	Observations	15039					

Marginal effects and standard errors clustered at the case manager level are reported.

Table 5: Case Manager Assignment as a Predictor of Removal

	Delinquency Sample		Teen Motherhood Sample		Employment Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
Case Manager Removal Differential	0.301 (0.071)	0.274 (0.052)	0.231 (0.050)	0.204 (0.035)	0.327 (0.060)	0.288 (0.039)
Mean of Dep. Var.	0.27		0.21		0.23	
Chi-squared (1) statistic	17.9		21.5		29.3	
Observations	15039		20091		30415	
Full Controls	No	Yes	No	Yes	No	Yes

Results of probit models, with marginal effects and standard errors clustered at the case manager level are reported.

Table 6: Foster Care Placement and Juvenile Delinquency

Dependent Variable: Juvenile Delinquency

		Model:		Probit		IV Probit				
		Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	
FC Placement		0.01	0.01	0.00	0.01	0.26	0.14	0.35	0.14	
Initial Reporter (Other Reporter Excluded)	physician			0.00	0.02			-0.02	0.02	
	school			0.00	0.02			0.00	0.02	
	police			0.02	0.02			-0.01	0.03	
	family			0.00	0.02			-0.01	0.02	
	neighbor			0.01	0.03			0.00	0.03	
	other government			0.03	0.02			0.01	0.02	
	anonymous			0.01	0.02			0.03	0.02	
Age at Report (Youngest age Excluded)	age 5			.	.			.	.
	age 6			0.06	0.05			0.04	0.05	
	age 7			0.10	0.05			0.08	0.05	
	age 8			0.13	0.05			0.12	0.05	
	age 9			0.13	0.05			0.12	0.05	
	age 10			0.17	0.06			0.15	0.05	
	age 11			0.19	0.06			0.18	0.05	
	age 12			0.22	0.06			0.21	0.05	
	age 13			0.23	0.06			0.23	0.06	
	age 14			0.23	0.06			0.23	0.06	
	age 15			0.12	0.05			0.14	0.05	
	Sex	boy			0.19	0.01			0.19	0.01
		girl								
	Race/Ethnicity (Other race Excluded)	white			-0.07	0.03			-0.07	0.03
		African American			-0.02	0.04			-0.05	0.04
Hispanic				-0.07	0.03			-0.07	0.03	
Allegation (Other neglect Excluded)	physical abuse			-0.01	0.02			0.01	0.02	
	substantial risk of harm			-0.03	0.01			-0.03	0.02	
	other abuse			-0.02	0.02			0.01	0.03	
	lack of supervision			-0.02	0.02			-0.03	0.02	
	environmental neglect			-0.02	0.02			0.00	0.02	
Mean of Dep. Var.		0.17								
Observations		15039								

Marginal effects and standard errors clustered at the case manager level are reported.

Table 7: Foster Care Placement and Teen Motherhood

Dependent Variable:	Teen Pregnancy				
	Model:	Probit (1)	Probit (2)	IV Probit (3)	IV Probit (4)
Foster Care Placement		0.106 (0.009)	0.090 (0.010)	0.171 (0.158)	0.291 (0.171)
Mean of Dependent Variable		0.35			
Full Controls		No	Yes	No	Yes
Observations		20091			

Marginal effects and standard errors clustered at the case manager level are reported.

Table 8: Foster Care Placement and Employment & Earnings

Dependent Variable:	Fraction of Quarters Working in 2002				Average Quarterly Earnings in 2002				
	Model:	OLS	OLS	2SLS	2SLS	OLS	OLS	2SLS	2SLS
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(7)
Foster Care Placement		-0.023 (0.006)	0.002 (0.006)	-0.110 (0.120)	-0.154 (0.113)	-82.8 (29.5)	-50.4 (30.6)	-851 (597)	-1296 (626)
Mean of Dep. Var.		0.320				1044			
Full Controls		No	Yes	No	Yes	No	Yes	No	Yes
Observations		30415							

Standard errors clustered at the case manager level are reported. Average quarterly earnings include those with zero earnings.

Table 9: Instrumental Variable Results, by Child Characteristics

A. Dependent Variable: Delinquency

	Allegation		Age Group		Race	Sex		Location	Predicted P(Placed|X)	
	abuse (1)	neglect (2)	age < 10 (3)	age 10+ (4)	nonwhite (5)	girl (6)	boy (7)	Cook County (8)	<Median (9)	>=Median (10)
Foster Care Placement	0.192 (0.226)	0.421 (0.167)**	0.078 (0.202)	0.452 (0.152)***	0.352 (0.133)***	0.473 (0.176)***	0.268 (0.207)	.	0.701 (0.120)***	0.165 (0.145)
Mean of Dep. Var.	0.161	0.179	0.152	0.177	0.177	0.082	0.270		0.157	0.185
Mean of placement	0.237	0.297	0.403	0.226	0.282	0.270	0.273		0.136	0.406
Chi-Squared (1) statistic	15.36	16.37	10.53	23.18	28.46	18.59	17.94		10.28	18.63
Observations	6566	8473	3821	11218	13412	7920	7119		7508	7508

B. Dependent Variable: Teen Motherhood

	Allegation		Age Group		Race	Sex		Location	Predicted P(Placed|X)	
	abuse (1)	neglect (2)	age < 10 (3)	age 10+ (4)	nonwhite (5)	girl (6)	boy (7)	Cook County (8)	<Median (9)	>=Median (10)
Foster Care Placement	0.495 (0.143)***	-0.172 (0.249)	-0.123 (0.217)	0.449 (0.152)***	0.399 (0.137)***	.	.	0.354 (0.168)**	0.460 (0.360)	0.241 (0.163)
Mean of Dep. Var.	0.343	0.360	0.226	0.404	0.395			0.373	0.314	0.391
Mean of placement	0.175	0.239	0.287	0.171	0.254			0.263	0.091	0.321
Chi-Squared (1) statistic	26.18	11.74	8.41	30.99	35.06			26.34	10.37	28.34
Observations	10477	9614	5957	14134	11753			9507	9961	9961

Panels A & B are estimated with an IV Probit model with full controls. Marginal effects and standard errors clustered at the case manager level are reported.

Chi-Squared(1) statistics test the first-stage relationship between the instrument and foster care placement.

Columns (9) and (10) used a predicted probability of removal from a probit model with full controls and indicators for the 3-digit ZIP code of residence.

*=significant at 10% level, **=significant at 5% level, ***=significant at 1% level.

Table 9: Instrumental Variable Results, by Child Characteristics (Continued)

C. Dependent Variable: Fraction of Quarters Working

	Allegation		Age Group		Race	Sex		Location	Predicted P(Placed|X)	
	abuse (1)	neglect (2)	age < 10 (3)	age 10+ (4)	nonwhite (5)	girl (6)	boy (7)	Cook County (8)	<Median (9)	>=Median (10)
Foster Care Placement	-0.150 (0.146)	-0.143 (0.166)	-0.308 (0.205)	-0.110 (0.132)	-0.128 (0.128)	-0.091 (0.149)	-0.221 (0.159)	-0.424 (0.192)**	0.003 (0.274)	-0.228 (0.130)*
Mean of Dep. Var.	0.344	0.295	0.291	0.325	0.273	0.357	0.280	0.275	0.346	0.296
Mean of placement	0.196	0.258	0.321	0.209	0.271	0.223	0.229	0.283	0.110	0.343
F statistic	32.82	21.01	16.90	44.47	31.56	40.78	27.86	20.33	19.54	34.87
Observations	15533	14882	4739	25676	17536	15946	14469	14210	15100	15099

D. Dependent Variable: Quarterly Earnings

	Allegation		Age Group		Race	Sex		Location	Predicted P(Placed|X)	
	abuse (1)	neglect (2)	age < 10 (3)	age 10+ (4)	nonwhite (5)	girl (6)	boy (7)	Cook County (8)	<Median (9)	>=Median (10)
Foster Care Placement	-1684 (749)**	-731 (974)	-898 (946)	-1438 (784)*	-1293 (701)*	-1128 (752)	-1481 (962)	-2160 (1029)**	-1699 (1563)	-1226 (670)*
Mean of Dep. Var.	1125	960	752	1098	892	1098	986	978	1080	1014
Mean of placement	0.196	0.258	0.321	0.209	0.271	0.223	0.229	0.283	0.110	0.343
F statistic	32.82	21.01	16.90	44.47	31.56	40.78	27.86	20.33	19.54	34.87
Observations	15533	14882	4739	25676	17536	15946	14469	14210	15100	15099

Panels C & D are estimated with a 2SLS model with full controls. Standard errors clustered at the case manager level are reported.

F-statistics test the first-stage relationship between the instrument and foster care placement.

Columns (9) and (10) used a predicted probability of removal from a probit model with full controls and indicators for the 3-digit ZIP code of residence.

*=significant at 10% level, **=significant at 5% level, ***=significant at 1% level.

Table 10: Model Specification Checks

Model	Dependent Variable:	Delinquency		Teen Motherhood		Employment		Quarterly Earnings	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. 2SLS	Foster Care Placement	0.226 (0.122)*	0.282 (0.117)**	0.169 (0.151)	0.269 (0.162)*	-0.110 (0.120)	-0.154 (0.113)	-851 (597)	-1296 (626)**
B. 2SLS w/ ZIP Fixed Effects	Foster Care Placement	0.261 (0.120)**	0.314 (0.119)***	0.194 (0.132)*	0.270 (0.144)*	-0.115 (0.096)	-0.156 (0.106)	-980 (549)*	-1374 (603)**
C. LATE (binary instrument)	Foster Care Placement	0.205 (0.102)**	0.322 (0.133)**	0.255 (0.146)*	0.391 (0.181)**	-0.119 (0.136)	-0.157 (0.138)	-1193 (671)*	-1803 (814)**
	Full controls	No	Yes	No	Yes	No	Yes	No	Yes
	Mean of Dep. Var.	0.17		0.36		0.32		1044	
	Observations	15039		20091		30415		30415	

Standard errors reported are clustered at the case manager level. *=significant at 10% level; **=significant at 5% level; ***=significant at the 1% level.

Columns (5) and (6): employment measure is the fraction of quarters worked in 2002.

Panel C: An indicator that the CM Removal Differential is greater than zero is the instrumental variable. Marginal effects from IV probit models are reported for delinquency and teen motherhood. Standard errors are clustered at the case manager level.

Figure 1: Abuse Thresholds for Removal

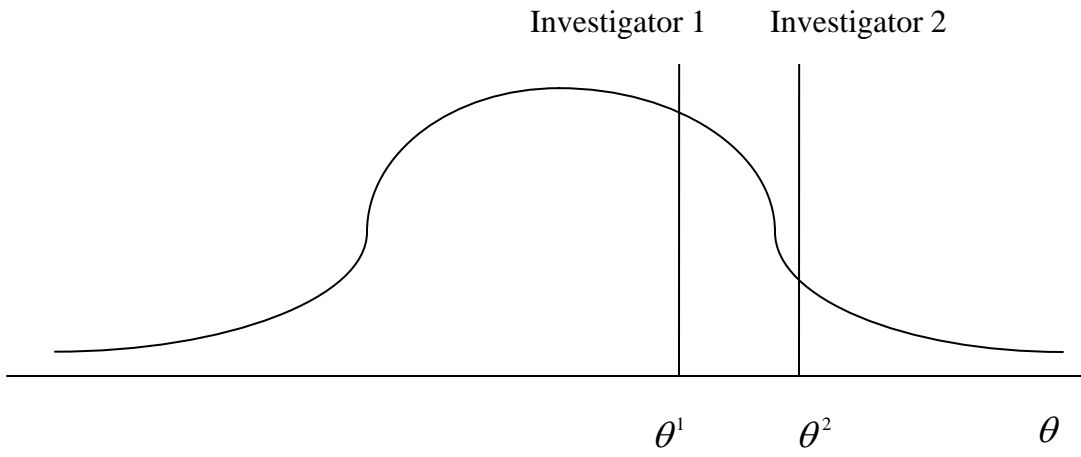
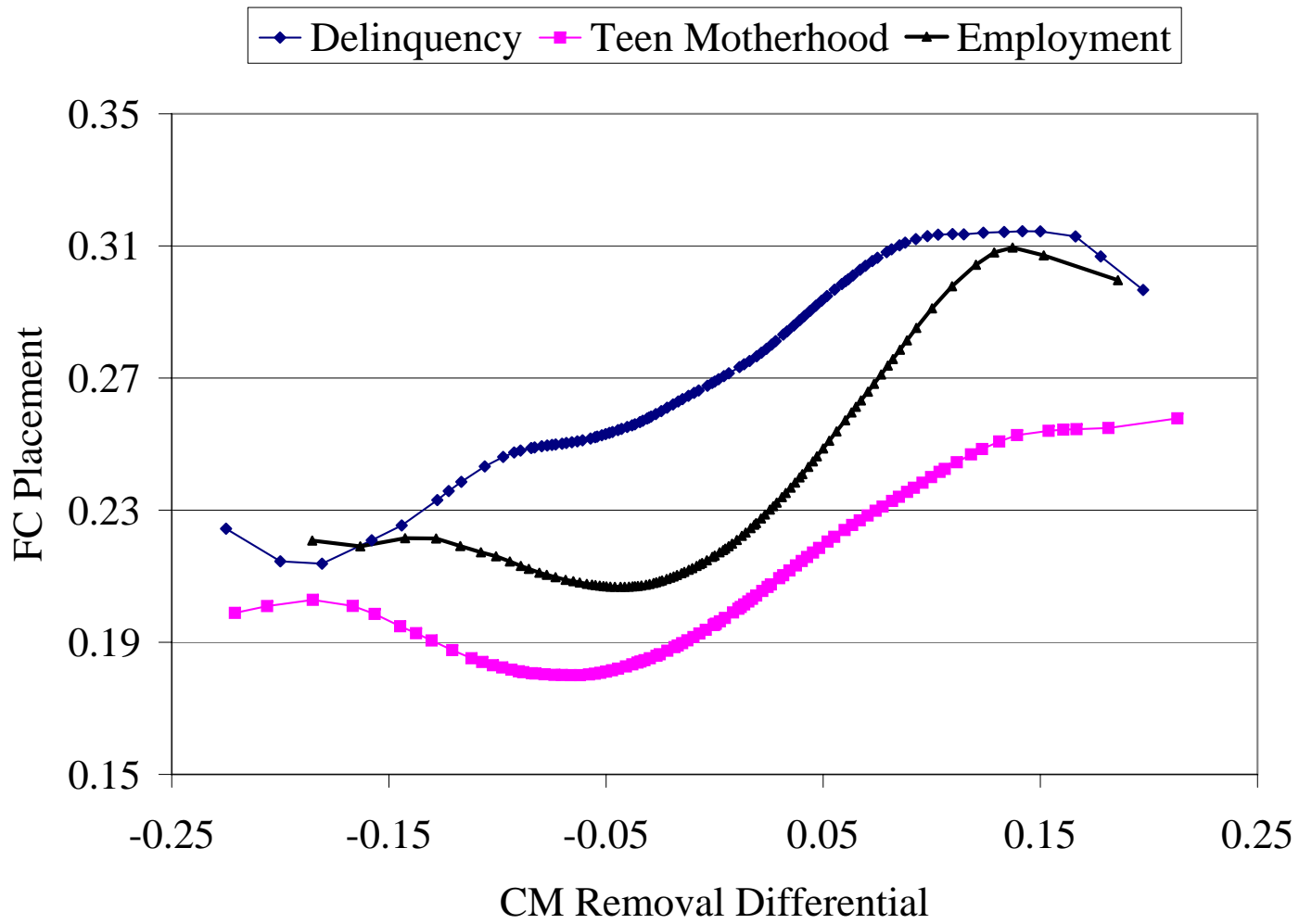


Figure 2:
FC Placement vs. Case Manager Removal Differential



Local linear regressions for the three samples. Bandwidth=0.05

Figure 3A: Delinquency MTE

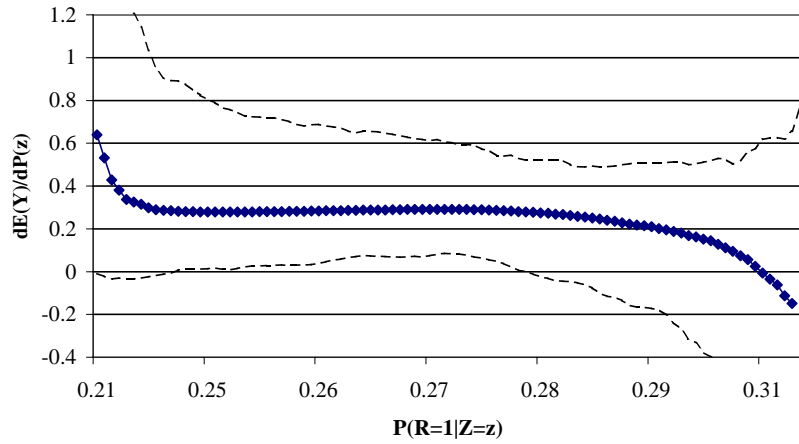


Figure 3B: Teen Motherhood MTE

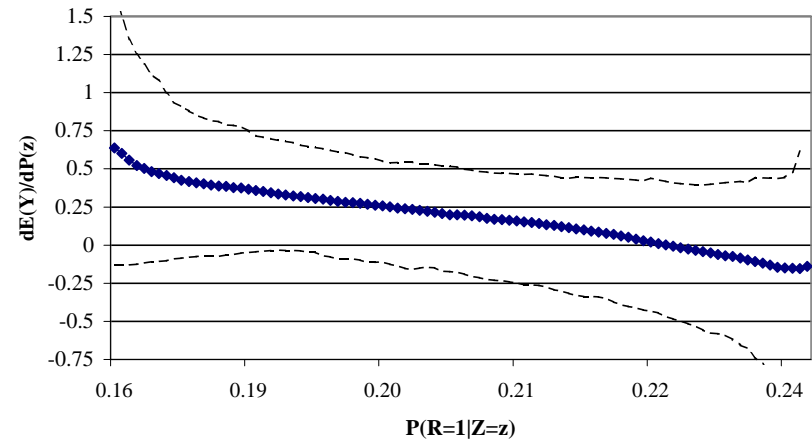


Figure 3C: Earnings MTE

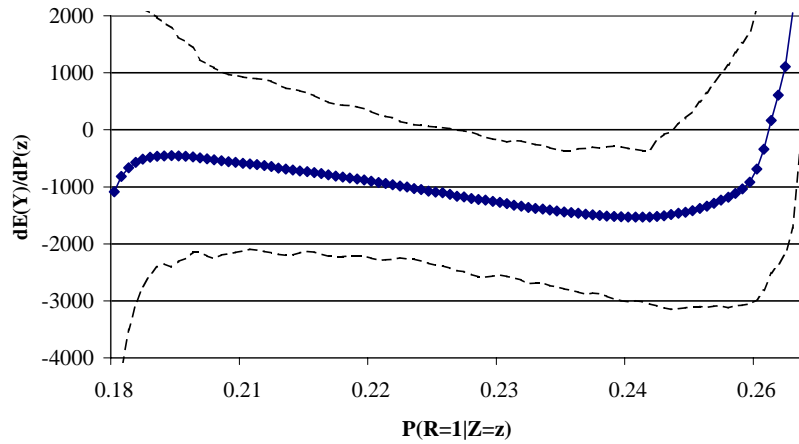
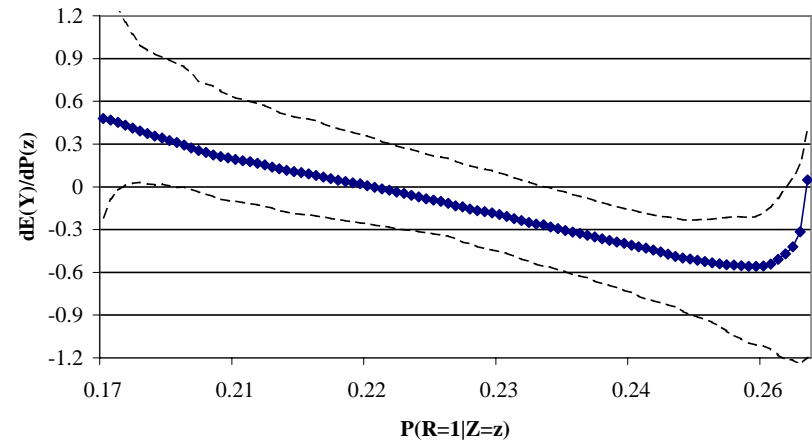


Figure 3D: Employment MTE



Figures report the results of a local quadratic estimator evaluated at each percentile of $P(z)$. 5-95% confidence intervals reported, calculated using a bootstrap with 250 replications, clustered at the case manager level. Bandwidth=0.037.

Data Appendix

Source	Time Frame	Key Variables	Age Restriction
Child Abuse and Neglect Tracking System, Illinois Department of Children and Family Services	July 1 1990- June 30, 2001	Investigation Data	Infant – Age 16 at time of the report
Child and Youth Centered Information System, Illinois Department of Children and Family Services	July 1 1990- June 30, 2003	Removal	Infant – Age 16 at time of the report
Online Data Entry and Display System, Illinois Department of Employment Security	January 1, 2002-December 31, 2002	Employment and Earnings	Child at least 18 in 2002.
Medicaid Management Information system, Illinois Department of Public Aid	July 1, 1990 – December 31, 2003	Teen Births	Girls at least 15 in 2001.
Delinquency File Juvenile Court of Cook County, Illinois	July 1, 1990- December 31, 2000	Juvenile Delinquency	Child at least 15 in 2000

Table A1: Summary Statistics

Variable		Teen Motherhood Sample				Employment and Earnings Sample			
		Mean	Std Dev	Max	Min	Mean	Std Dev	Max	Min
	Foster Care Placement	0.21	0.40	0	1	0.23	0.42	0	1
Initial Reporter	physician	0.10	0.29	0	1	0.10	0.30	0	1
	school	0.16	0.37	0	1	0.14	0.35	0	1
	police	0.17	0.38	0	1	0.19	0.39	0	1
	family	0.22	0.42	0	1	0.22	0.42	0	1
	neighbor	0.07	0.25	0	1	0.06	0.24	0	1
	other government	0.11	0.32	0	1	0.14	0.34	0	1
	anonymous	0.14	0.34	0	1	0.13	0.33	0	1
	other reporter	0.03	0.17	0	1	0.03	0.16	0	1
Age at Report	age	11.1	2.8	4	15	12.4	2.5	6	16
Sex	boy	0.00	0.00	0	0	0.48	0.50	0	1
Race	white	0.42	0.49	0	1	0.42	0.49	0	1
	African American	0.49	0.50	0	1	0.49	0.50	0	1
	Hispanic	0.08	0.27	0	1	0.07	0.26	0	1
	other race/ethnicity	0.01	0.11	0	1	0.01	0.11	0	1
Allegation	physical abuse	0.19	0.39	0	1	0.20	0.40	0	1
	substantial risk of harm	0.31	0.46	0	1	0.29	0.45	0	1
	other abuse	0.02	0.14	0	1	0.02	0.15	0	1
	lack of supervision	0.30	0.46	0	1	0.30	0.46	0	1
	environmental neglect	0.13	0.33	0	1	0.13	0.33	0	1
	other neglect	0.05	0.21	0	1	0.07	0.25	0	1
Location	Cook County	0.47	0.50	0	1	0.47	0.50	0	1
Outcome	delinquency	.				.			
	teen motherhood	0.35	0.48	0	1	.			
	fraction of quarters working	.				0.32	0.41	0	1
	quarterly earnings	.				1044	2134	0	64227
	Observations	20091				30415			

Table A2: Child Characteristics and CM Assignment (all variables & samples)

Dependent Variable:		Delinquency Sample			Teen Motherhood Sample			Employment Sample			
		Case Manager Removal Differential			Case Manager Removal Differential			Case Manager Removal Differential			
Variable		Coeff.	t	p-value	Coeff.	t	p-value	Coeff.	t	p-value	
Initial Reporter (Other Reporter Excluded)	physician	-0.006	-0.81	0.416	0.005	1.02	0.309	-0.001	-0.23	0.816	
	school	-0.005	-0.74	0.457	-0.001	-0.21	0.836	-0.002	-0.51	0.608	
	police	-0.008	-1.11	0.269	0.006	1.14	0.255	-0.004	-1.10	0.272	
	family	-0.003	-0.52	0.605	0.000	0.02	0.98	-0.004	-1.16	0.246	
	neighbor	-0.005	-0.73	0.464	0.006	1.11	0.268	-0.004	-0.94	0.349	
	other government	-0.007	-0.96	0.339	0.002	0.32	0.752	-0.004	-0.94	0.350	
	anonymous	-0.007	-1.07	0.287	0.000	-0.04	0.97	-0.005	-1.41	0.160	
Age at Report (Youngest age Excluded)	age 5	.	.	.	-0.006	-0.57	0.566	.	.	.	
	age 6	0.005	0.41	0.679	-0.006	-0.58	0.561	.	.	.	
	age 7	0.012	1.07	0.284	-0.007	-0.65	0.518	0.008	1.23	0.219	
	age 8	0.009	0.90	0.367	-0.010	-0.98	0.326	0.009	1.47	0.142	
	age 9	0.015	1.42	0.156	-0.009	-0.9	0.368	0.010	1.55	0.123	
	age 10	0.008	0.72	0.470	-0.011	-1.07	0.284	0.010	1.55	0.121	
	age 11	0.009	0.94	0.346	-0.013	-1.33	0.185	0.010	1.61	0.109	
	age 12	0.010	0.99	0.324	-0.010	-1.06	0.29	0.011	1.66	0.097	
	age 13	0.013	1.26	0.207	-0.012	-1.26	0.208	0.012	1.98	0.048	
	age 14	0.009	0.91	0.366	-0.012	-1.18	0.238	0.011	1.80	0.072	
	age 15	0.009	0.89	0.373	-0.008	-0.85	0.397	0.013	1.99	0.047	
	age 16	.	.	.	.	.	.	0.012	1.93	0.053
	Sex	boy	-0.002	-1.20	0.232	.	.	.	-0.001	-1.24	0.215
	Race/Ethnicity (Other race Excluded)	white	-0.014	-1.32	0.186	0.000	-0.02	0.982	0.002	0.43	0.670
		African American	-0.015	-1.22	0.224	-0.006	-0.76	0.447	0.002	0.31	0.753
		Hispanic	-0.012	-0.88	0.377	0.009	0.94	0.348	0.003	0.48	0.632
Allegation (Other neglect Excluded)	physical abuse	-0.002	-0.43	0.668	-0.004	-0.99	0.322	0.004	1.99	0.047	
	substantial risk of harm	-0.006	-0.94	0.348	-0.005	-1.08	0.283	0.004	1.47	0.142	
	other abuse	0.003	0.43	0.670	-0.001	-0.22	0.826	0.001	0.27	0.788	
	lack of supervision	-0.005	-0.98	0.325	-0.005	-1.05	0.296	0.003	1.31	0.191	
	environmental neglect	-0.007	-1.29	0.199	0.000	0.01	0.996	0.001	0.18	0.857	
Location	Cook County	.	.	.	0.006	0.77	0.442	0.001	0.17	0.863	
Year Indicators	fiscal year=1991	0.002	0.16	0.871	0.003	0.27	0.786	0.010	1.51	0.132	
	fiscal year=1992	-0.002	-0.17	0.865	0.002	0.2	0.838	0.009	1.62	0.105	
	fiscal year=1993	-0.004	-0.30	0.762	0.003	0.29	0.771	0.005	0.91	0.365	
	fiscal year=1994	-0.008	-0.67	0.504	-0.003	-0.28	0.783	0.003	0.62	0.532	
	fiscal year=1995	-0.007	-0.61	0.539	-0.003	-0.37	0.709	0.004	0.93	0.350	
	fiscal year=1996	-0.011	-1.07	0.286	-0.002	-0.24	0.812	0.001	0.22	0.824	
	fiscal year=1997	-0.007	-0.69	0.493	-0.006	-0.68	0.497	0.002	0.51	0.613	
	fiscal year=1998	-0.002	-0.19	0.853	-0.001	-0.06	0.955	0.003	0.65	0.517	
	fiscal year=1999	0.000	0.04	0.967	-0.001	-0.16	0.871	0.004	0.92	0.358	
	fiscal year=2000	.	.	.	0.002	0.23	0.816	.	.	.	
	month=1	-0.003	-0.58	0.562	0.002	0.41	0.681	-0.002	-0.69	0.490	
	month=2	.	.	.	.	.	.	.	.	.
	month=3	-0.005	-1.20	0.231	-0.002	-0.38	0.701	0.000	0.00	0.998	
	month=4	-0.005	-1.08	0.281	-0.008	-1.91	0.057	-0.004	-1.64	0.102	
	month=5	-0.001	-0.18	0.859	-0.006	-1.56	0.12	-0.004	-1.56	0.119	
	month=6	-0.004	-0.88	0.379	-0.004	-0.97	0.332	-0.005	-1.64	0.101	
	month=7	0.000	0.01	0.992	0.001	0.14	0.891	0.000	-0.00	1.000	
	month=8	-0.001	-0.22	0.829	-0.002	-0.57	0.57	-0.003	-1.25	0.213	
	month=9	0.002	0.39	0.697	0.004	1.04	0.298	0.001	0.40	0.687	
month=10	0.004	0.83	0.410	0.002	0.39	0.7	0.001	0.50	0.616		
month=11	0.001	0.20	0.838	-0.002	-0.43	0.668	-0.002	-0.66	0.507		
month=12	-0.005	-1.04	0.300	-0.001	-0.35	0.724	-0.002	-0.89	0.372		
Mean of Dep. Var.		0.0001			-0.0007			-0.0007			
S.D. of Dep. Var.		0.0921			0.1035			0.0729			
F-statistic		0.84			1.07			0.96			
p-value		0.75			0.34			0.54			
Observations	Case Managers	409			705			815			
	Children	15039			20091			30415			

t-statistics and F-statistics are calculated using standard errors clustered by case manager;

Figure A1: Delinquency as a function of $P(z)$

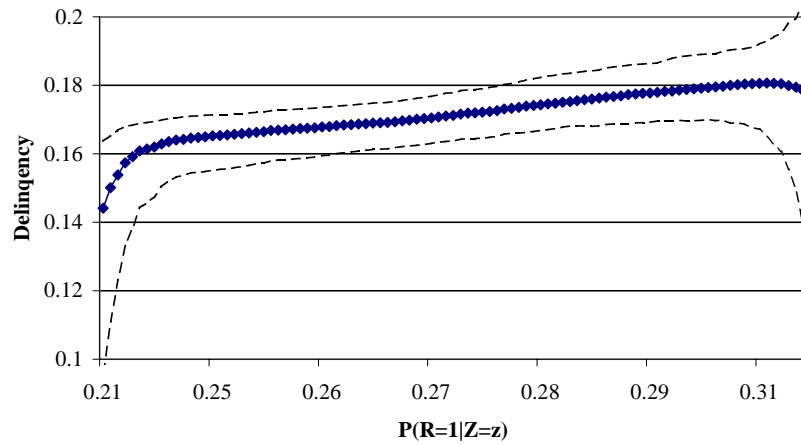


Figure A2: Teen Motherhood as a function of $P(z)$

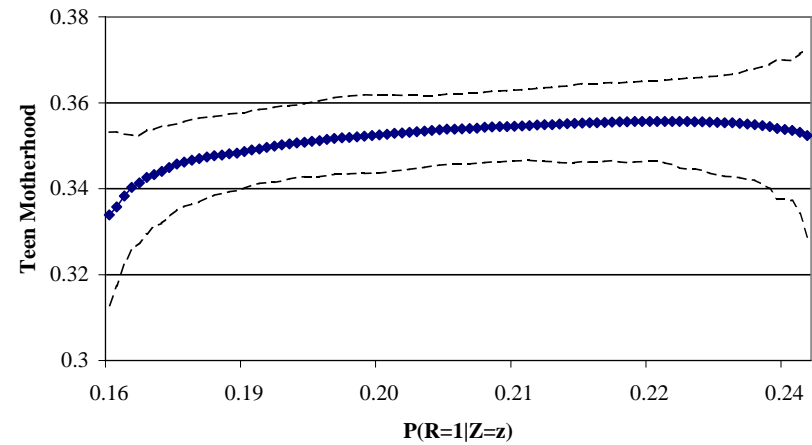


Figure A3: Earnings as a function of $P(z)$

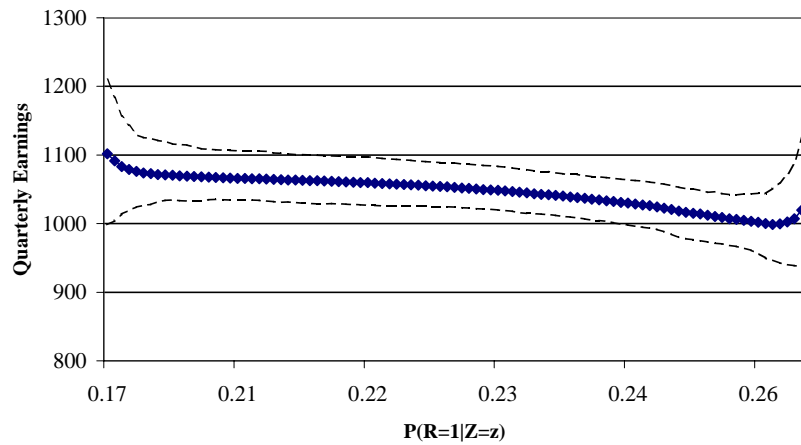
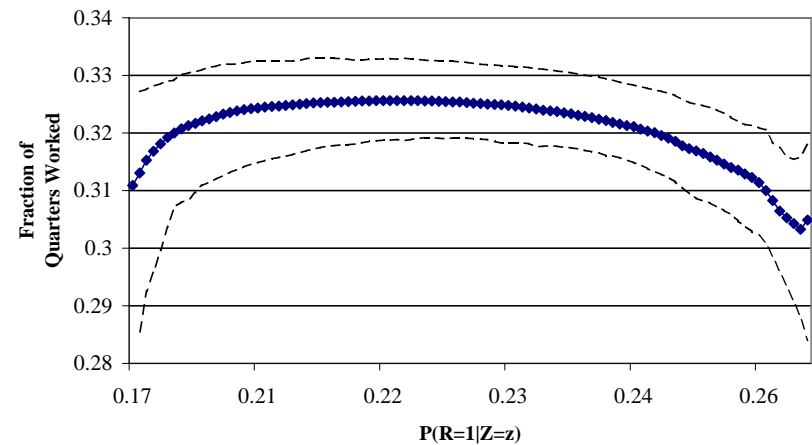


Figure A4: Employment as a function of $P(z)$



Figures report the results of a local quadratic estimator evaluated at each percentile of $P(z)$. 5-95% confidence intervals reported, calculated using a bootstrap with 250 replications, clustered at the case manager level. Bandwidth=0.037.