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CHILD PROTECTION AND ADULT CRIME: USING INVESTIGATOR ASSIGNMENT TO ESTIMATE CAUSAL EFFECTS OF FOSTER CARE

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Child Protection and Adult Crime: Using Investigator Assignment to Estimate Causal Effects of Foster Care

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ABSTRACT

Nearly 20% of young prison inmates spent part of their youth in foster care - the placement of abused or neglected children with substitute families. Little is known whether foster care placement reduces or increases the likelihood of criminal behavior. This paper uses the placement frequency of child protection investigators as an instrument to identify causal effects of foster care placement on adult arrest, conviction, and imprisonment rates. A unique dataset that links child abuse investigation data to criminal justice data in Illinois allows a comparison of adult crime outcomes across individuals who were investigated for abuse or neglect as children. Families are effectively randomized to child protection investigators through a rotational assignment process, and child characteristics are similar across investigators. Nevertheless, investigator placement frequencies are predictive of subsequent foster care placement, and the results suggest that school-aged children who are on the margin of placement have lower adult arrest rates when they remain at home.

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1. Introduction

When parents are suspected of child abuse or neglect, their children may be placed in foster care until reunification is deemed safe or adoptive homes are sought. Each year, states spend $20 billion dollars on child protection services, including the investigation of over 2 million children and the temporary housing of 800,000 (Bes et al., 2002; US DHHS, 2004; US DHHS, 2006). Aside from the immediate goal of safety, foster care is a powerful intervention in the lives of children who appear to be at great risk of poor life outcomes. An estimated 28% of the homeless population spent time in foster care as a youth (Burt et al., 1999). Former foster children have also been found to be far more likely to drop out of school, join welfare, and experience substance abuse problems (Clausen et al., 1998; Courtney and Piliavin, 1998; Dworsky and Courtney, 2000; US DHHS, 1999; Vinnerljung et al., 2006).

One area where the association between child maltreatment, foster care, and poor life outcomes is particularly strong is criminality.[1] Nearly 20% of the prison population under the age of 30, and 25% of prisoners with prior convictions, report that they spent part of their childhood in foster care.[2] This is not surprising given the strong correlation found between poor family backgrounds and later criminal behavior (Loeber and Stouthamer-Loeber, 1986; Widom, 1989; Case and Katz, 1991; Sampson and Laub, 1993; Donohue and Levitt, 2001, Currie and Tekin, 2006; Pezzin, 2004). Meanwhile, interventions for youth at risk for criminal behavior are thought to have some impact and

[1] Criminal activity has received considerable attention from economists following Becker (1968). Recent papers and reviews include Levitt, 1997; Freeman, 1999; Glaeser and Sacerdote, 1999; Jacob and Lefgren, 2003; Di Tella and Schargrodsky, 2004; Lee and McCrary, 2005; Lochner and Moretti, 2004, among others.

[2] Data from the nationally-representative Survey of Inmates in Adult State and Federal Correctional Facilities (1997).

provide motivation for child welfare policy. For example, high quality day care and improved neighborhood settings have been associated with lower criminality (Belfield et al., 2006; Oreopolous, 2003; Kling, Ludwig and Katz, 2005).

Foster care and juvenile delinquency have also been linked. Courtney, Terao, and Bost (2004) surveyed children who will turn 18 in foster care in the Midwest and found that two-thirds of the boys and half of the girls had a history of delinquency. Jonson-Reid and Barth (2000a, 2000b) considered children in California and found a modest reduction in delinquency with in-home services compared to foster care placement. Meanwhile, Doyle (2007) finds that children on the margin of foster care placement in Cook County, Illinois (which includes the City of Chicago) were more likely to enter the juvenile delinquency system if they were placed in foster care.

Little is known whether foster care placement is likely to reduce or exacerbate the propensity for adult criminal behavior (Courtney, 2000; Gelles, 2000; Goerge, Wulzcyn, and Fanshel, 1994; Jonson-Reid and Barth, 2000; National Research Council, 1998; McDonald et al. 1996). While child abuse may lead to criminality later in life, the removal of children from parents is thought to be traumatic as well. For example, placement instability has been highlighted as a problem for children in foster care, with the average foster child experiencing at least one placement disruption and a quarter experiencing three or more moves.[3] This leads to a difficult tradeoff between two competing goals: child protection and family preservation (Barth, 1999; Maluccio, Pine, and Warsh, 1994). The uncertainty over the effectiveness of placement is evident in the number of children in foster care at the end of each year increasing from 200,000 to

[3] There is a large empirical literature on placement instability, as it is one observable characteristic in administrative data. See Zinn, et al. (2006), James et al. (2004), Newton et al. (2000), and Smith et al. (2001).

500,000 in the 1960s, dropping back to 200,000 in the 1970s, and rising to more than 500,000 in the 1980s and 1990s. The current emphasis is increasingly placed on family preservation (McDonald et al., 1996; Annie E. Case Foundation, 2002).

One of the limitations on previous research is the lack of long-term outcome data. In addition, there are endogeneity concerns: worse outcomes for foster children could be due to worse family backgrounds, as opposed to any effect of foster care placement (Kerman, Wildfire, and Barth, 2002). In addition, children placed in foster care are likely those who benefit most from placement, which can lead to a selection bias where average outcomes may overstate the benefit of placement for marginal cases.

This paper uses a unique dataset that links child abuse investigation data with criminal justice data in Illinois to compare adult crime outcomes across children who were placed in foster care with children who were also investigated for abuse or neglect but not subsequently placed in care. The foster care placement frequency of child protection investigators is used as an instrumental variable to identify causal effects of foster care placement on adult arrest, conviction, and imprisonment rates. Families are assigned to investigators on a rotational basis within geographic field teams to smooth the caseload. This has the empirical advantage of essentially randomizing families to investigators: one family may receive an investigator who is more likely to recommend foster care placement, while another family may draw an investigator who is more likely to stress family preservation. The assignment process results in family characteristics that are similar across investigators, and their placement tendencies provide a plausible instrument to estimate the effects of foster care on later criminal activity. One advantage of the approach is that the instrumental variable estimates apply to particularly policy-

relevant cases: children on the margin of placement where investigators may disagree about the recommendation of removal.

The results suggest that school-aged children on the margin of placement have lower arrest, conviction, and imprisonment rates when they remain at home, especially for children outside of the Chicago area where the linkage across the databases appears more accurate. The large size of the estimated effects and their relative lack of precision suggest caution in the interpretation, though large preventative effects of foster care placement on later criminal justice problems appear unlikely for these children.

The paper is organized as follows. Section two presents the empirical framework that incorporates heterogeneous treatment effects. Section three provides background information on child abuse investigations and the investigator assignment process. Section four describes the data sources and reports summary statistics. Section five presents the results, and section six concludes.

2. Empirical Framework

The decision to remove a child from home is notoriously difficult. Placement in foster care may promote child protection, but may be traumatic as well. The empirical framework follows Doyle (2007) and considers this treatment effect heterogeneity using a random coefficient model (Bjorklund and Moffitt (1987); Heckman and Vytlacil (2005)). Consider an outcome Y, such as an indicator for an adult arrest, observable case characteristics X, and an indicator for removal from home R, for child i:

$$(1)\ Y_i = X_i\beta + \alpha_i R_i + \varepsilon_i$$
$$(2)\ R_i = 1(Z_i\gamma + X_i\delta + \theta_i > 0)$$

where Z is a random variable that influences selection into foster care placement but is excluded from the outcome equation.[4] α_i will be negative for children where the placement is associated with a lower propensity for an arrest, but may be positive for children where the disruption of placement is associated with a higher arrest propensity.

One problem that arises when estimating treatment effects is that the placement indicator, R, may be correlated with ε: those from the most abusive families may be more likely to be placed in foster care and more likely to be arrested. Second, the heterogeneous treatment effects create the possibility that R may be correlated with α — the correlated random coefficient model—if child protection agents place children who are most likely to benefit from the placement. This leads to a selection bias that tends to overstate the benefits of foster care placement. Although the placement decision may not be based on α_i itself, if the effect of placement on arrest propensities were indicative of child well being in general, then such a correlation may exist. Last, α may be correlated with ε, for example if those who benefit most from placement have the highest underlying propensity for later arrests.

In this paper, Z is a measure of how likely the investigator assigned to child i tends to have children placed in foster care. Consider if there were two types of investigators: strict and lenient. Strict investigators would be defined as having a high placement rate, $Z=z_H$, while lenient ones would be defined as having a low placement rate, $Z= z_L$. The difference in outcomes across these investigators could then be used to measure a local average treatment effect (LATE) (Imbens and Angrist, 1994). The parameter can be written using a potential outcomes framework and the above latent

[4] Heckmand and Vytlacil (2005) note that the restrictions inherent in the latent index model may be relaxed. The model is used here for ease of exposition.

index model, letting a superscript on Y equal 1 if the child is placed in foster care and zero otherwise (and conditioning on X kept implicit) as:

$$(3)\ \alpha^{\text{LATE}} = E(Y^1 - Y^0 \mid R(Z = z_H) = 1, R(Z = z_L) = 0)$$
$$= E(Y^1 - Y^0 \mid z_H\gamma + \theta > 0, z_L\gamma + \theta \le 0)$$
$$= E(Y^1 - Y^0 \mid -z_H\gamma < \theta \le -z_L\gamma)$$

The local average treatment effect is the average effect for children induced into foster care on the basis of the investigator assignment. Letting P(z)=P(R=1|Z=z), the parameter can be calculated using sample means according to:

$$(4)\ \alpha^{\text{LATE}}(P(z_H), P(z_L)) = \frac{E[Y \mid P(Z) = P(z_H)] - E[Y \mid P(Z) = P(z_L)]}{P(z_H) - P(z_L)}$$

The identifying assumptions that justify interpreting (4) as a local average treatment effect are:

$$(5)\ E(Z\varepsilon) = 0; E(Z\alpha) = 0; E(Z\theta) = 0; \gamma \neq 0$$

The first three conditions represent the exclusion restriction that Z is not in the outcome equation, is unrelated to unobserved heterogeneity in the gains from treatment, and is unrelated to unobservable characteristics associated with selection into foster care. In a standard correlated random coefficient model, the heterogeneous returns would be associated with the unobserved propensity to be placed in care. Relaxing the assumption that Z is not related to unobservables included in the selection process would result in an estimate that incorporates the selection bias associated with foster care placement decisions, which may be policy relevant. If investigators were randomized to families, the exclusion restriction would appear to be an accurate description of the role of the investigators.

The fourth condition is that the instrument is associated with foster care placement. Implicit in the common coefficient γ is also a monotonicity condition: any child removed by a lenient investigator would also be removed by a strict one, and a child not removed by a strict investigator would not be removed by a lenient one. This condition rules out the case where assignment to an investigator described as "lenient" would result in an increased likelihood of placement.

The monotonicity condition is less straightforward in the setting considered here compared to a treatment and control environment, where, for example, the treatment may be denied to a control group (Imbens and Angrist, 1994). Instead, the model here relies more heavily on the varying ethos between family preservation and child protection across child welfare investigators, as discussed below.

Angrist, Imbens, and Rubin (1996) describe 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 quite 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 (MTE).

A marginal treatment effect is the average effect for children on the margin of foster care placement, and that margin varies with the instrument. It is the limit of the local average treatment effect as the thresholds for different types of investigators goes to zero:

$$(6)\quad \alpha^{\text{MTE}} = \lim_{z_L \to z_H} E(Y^1 - Y^0 \mid -z_H\gamma < \theta \leq -z_L\gamma)$$
$$= E(Y^1 - Y^0 \mid \theta = -z\gamma)$$

In terms of the calculation in (4), the MTE calculation can be written as a derivative:

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

The marginal treatment effect may vary with the probability of placement. Consider children assigned to relatively strict investigators. These investigators should observe a similar distribution of child abuse severity levels, yet they remove more children. Children on the margin in this group likely have unobservable characteristics that make them the least likely to be placed. For cases of serious abuse or no abuse at all, all investigators would agree on the placement referral. This would result in no variation in placement and the likely benefit of placement cannot be identified.

In this setting, the MTE estimates are of interest in themselves, as they describe whether outcomes for children on the margin of foster care improve or become worse as we move from more lenient to more strict investigators. For comparisons of marginal treatment effects across investigators with large differences in recommendation thresholds, however, violations of the monotonicity condition become more salient.

3. Background

Reports of abuse or neglect are typically made by physicians, school principals, police, and family members. In Illinois, all reports of abuse or neglect are made to the Department of Children and Family Services (DCFS). The case is 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, though they differ from the case managers who supervise children once they are placed in foster care.

There are three main reasons why the investigator assignment may predict 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, in most cases that result in foster care placement, the decision is ultimately made by a judge in each county's Child Protection Division of the Juvenile Court. The investigator is responsible for collecting the evidence for the case, and presents this evidence along with a recommendation. Some investigators may be more likely to convince a judge that a placement is warranted, either by the way the investigation is conducted or the evidence is presented.[5]

The main analysis relies on the variation in placement across investigators. Previous research suggests that there is variation in investigator recommendations for similar cases. In particular, case managers are thought to rely more heavily on "practice wisdom" rather than administrative rules to make placement referrals (Cash, 2001). Nasuti and Pecora (1993) and Rossi, Schuermand, and Budde (1996) found that case

[5] This approach is similar to that of 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.

managers had inter-rater reliability ranging from 60-80% when assessing fictional cases. 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 (Simon, 1975; Campbell and Downs, 1987; Chamberlain et al., 1992; Doyle and Peters, 2004; Hegar and Scannapieco, 1995). It appears that the threshold for placement is not constant, and may differ across investigators.

Investigator Assignment

Most 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.[6]

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, some field teams assign case managers to particular neighborhoods. For example, one team divides the county into east and west, with half of the case managers assigned to each sub-team. If particular types of case managers were assigned to neighborhoods that were 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.

Second, if a family were investigated more than once, an effort is made to re-assign the same case manager to investigate the most recent allegation. The exogenous

[6] Conversations with case managers.

variation in case manager assignment stems from the initial investigation, and the case manager assigned to the family's first investigation will be considered in the analysis.

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, Hispanic cases will be considered separately.

Fourth, cases involving sexual abuse and substance-exposed infants are assigned to specially-trained case managers. These allegations are dropped from the analysis as they are less likely to enter the rotational assignment. Taking these exceptions into account, the analysis below will consider the relative frequency of foster care placement within sub-teams defined by field team x ZIP code x Hispanic x report-year cells.

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 crime outcomes as adults. One question that arises is whether these investigators affect families in ways other than through foster care placement. Recall that 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.[7]

4. Data Description

A unique data set that matches individuals across 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 Children, a research institute located at the University of Chicago, and linked using name, address, social security number, date of birth, and other identifiers to create the Illinois Integrated Database (Goerge, Van Voorhis, and Lee, 1994).

First, longitudinal, administrative data used by the Illinois Department of Children and Family Services for their abuse investigations and foster care placements are considered. In particular, the Child Abuse and Neglect Tracking System (CANTS) provides details of the investigation, including the initial reporter of the abuse, the allegations, the alleged perpetrator, the field team assigned to the case, and the case manager assigned to investigate. CANTS data also include the child's name, date of birth, sex, race, and address. Meanwhile, the Child and Youth Centered Information System (CYCIS) tracks children in foster care, and the two systems have been linked to determine whether the child was ever placed in care. The two information systems

[7] 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 workers, and those considered here are focused on the investigation.

reflect the fact that children under investigation are served by a different set of case managers than children who are placed in foster care.

The Illinois Integrated Database also includes the Computerized Criminal History System of the Illinois State Police, which records all arrests in the state. The system relates these arrests to the associated charges, offenses, court dispositions, and sentences. The main identifiers to link children to adults are the social security number, name, and date of birth. One issue with the state police data is that the reports, especially linkages between the arrest and court systems, is known to be of higher quality outside of Cook County.[8] The results below will be presented for children separately for children residing in and outside of Cook County.

The fourth data set is the Illinois Longitudinal Public Assistance Database. Children investigated for abuse are linked to this Public Assistance database using the rich set of personal identifiers. The main reason for this linkage is to obtain the child's social security number for the linkage to the state police database.

Sample Construction

The investigation data are considered more reliable beginning in 1990, so all first investigations of parental abuse or neglect between July 1, 1990 and June 30, 2003 are considered. The arrest data include the social security number beginning in 2000, so all arrests in Illinois from 2000 to 2005 are considered for the outcome measures.

There are two main restrictions of the data. First, every foster child is statutorily eligible for Medicaid. Once in Medicaid, the personal identifiers known for the match improve, including the availability of the social security number. It may be possible, then, to find foster children more likely to be matched to the criminal justice data simply

[8] Conversations with researchers at the Illinois Criminal Justice Information Authority.

due to the greater availability of the identifiers. To compare children with the same known identifiers, the analysis here will focus on all children who received Medicaid prior to the abuse/neglect report. This represents 43% 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% had received Medicaid prior to the first abuse report.

The second major restriction is on the age of children to ensure that they are old enough at the end of the sample period to be at risk for adult arrests. While individuals who are 17 years old can be arrested as an adult in Illinois, very few below the age 18 were found to be arrested on adult charges. As a result, all children who are at least 18 in 2005 will be considered, resulting in a sample consisting of children ranging from 4-16 years old at the time of the abuse report. This also results in a foster care placement measure that is uncensored. The estimates below should be regarded as the effects of foster care placement for school-aged children.

Further, to consider the effect of removal from home, the analysis focuses on the 81% of cases where the alleged perpetrator is a natural parent, step parent, or co-habitating adult. Also, as noted in section two, sexual abuse cases, which represent 8% of all investigations, are excluded as well, as they are unlikely to enter the rotational assignment.[9] Last, less than 1% of the observations had missing child characteristics or had too few case manager investigations to calculate the instrument defined below.

[9] Drug exposure cases that do not enter the rotation largely relate to infants and are excluded due to the age restriction. The few cases where the initial reporter was listed as the Department of Children and Family Services were also dropped from the analysis as they likely reflect previous DCFS involvement with the family.

In terms of the linkage, 3% of the school-aged children considered here had missing social security number information. More importantly, social security numbers were available for roughly 80% of those arrested outside of Cook County in each of the years, and 65% for those within Cook County. Comparisons of the results for children from Cook County and those from outside of Cook are complicated by this match quality and should be considered in the interpretation. Results that use name and date of birth to link the data sets will be considered as well.

Summary Statistics

The analysis sample includes nearly 45,000 children, roughly half in Cook County (which includes the City of Chicago) and half outside of Cook at the time of the child abuse investigation. To better understand the types of allegations, reporters, and child characteristics, Table 1 reports summary statistics for children who lived in Cook County and children who resided outside of Cook County at the time of the abuse investigation. 16% of the children investigated outside of Cook were eventually placed in foster care, while 26% of those in Cook County were placed. Approximately 10% of investigated children are placed in foster care in the U.S. as a whole, and the higher figures here largely reflect the restriction of the sample to children who received Medicaid benefits prior to the abuse report.

Race is one variable that differs greatly between Cook County and non-Cook investigated children. 71% of the investigated children outside of Cook County are white, compared to 87% of the population aged 5-14 in 2000. In Cook County, only 12% of the investigated children are white compared to 60% of the 5-14 year old population. 76% of the investigated children in Cook are African American and 11% are Hispanic

compared to 26% and 20% of children in Chicago Public Schools in 1998 (CPS, 1998), respectively. Roughly half of the investigated children are boys in both groups.

The most common reporters outside of Cook County were the police (21%), the family itself (18%), and schools (17%). The police and schools are mandated reporters—they are required by law to report suspected abuse or neglect. Family reports can stem from domestic violence reports or from a concerned grandparent, possibly a grandparent who already houses the child. These family reports are the most common report in Cook County (27%). The children considered here tend to be older at the time of the report, with an average age of 11 years old. The average age for all first investigations in Illinois is 6 years old, and this sample is older due to the restriction that these children are at least 18 years old in 2005.

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, which usually implies that the parent has abandoned a child, though it can reflect problem behavior for the child as well. 13% of the allegations are due to environmental neglect, when the child's living conditions are hazardous. The primary allegation of abuse is "substantial risk of harm" (29%), which describes situations where physical harm is thought to be imminent. Physical abuse is cited as the main allegation 18% of the time and is usually described as bruises, cuts, burns, or broken bones. 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 individual indicators for each age.

Apart from the age difference, the observable characteristics for all investigated children in Illinois are similar. There were fewer physician reports among the sample compared to the population of first-investigated children (7-13% vs.17%), reflecting physician interventions for younger children. Meanwhile, more school reports are found for this school-aged sample (13-17% vs. 9%). The statewide population is also less likely to be African American (41% vs. 49%). In terms of allegations, physical abuse reports were less common among the full population (12% vs. 18%), with much of the difference coming from the 8% sexual abuse and 5% drug-exposed children who were excluded because they are less likely to enter the rotational assignment or are too young to be at risk for an adult arrest by the end of the sample period. Rates of the other major allegation categories were similar in the full population. Last, the full population included 43% from Cook County compared to the 48% in the analysis sample.

The sample of investigated children comes from Illinois, and another comparison is with all children currently in foster care in the U.S. as a whole. One advantage of considering Illinois is that it includes a large city as well as smaller cities to compare results. The average length of stay is 2 years in the U.S. compared to an average length of stay of 4 years in Illinois during the mid-1990s.[10] The average age of foster children currently in care is 10 years old, with 30% under the age of 5 (US DHHS, 2004). Illinois also relies more heavily on kinship foster care, with half of all initial placements going to a relative, compared to 23% for all children currently in family foster care in the U.S. Last, the sample studied here is disproportionately African American compared to the US foster care population (49% vs. 35%), with a similar proportion of whites, and

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

fewer Hispanics (7% vs. 17%). The focus on older, poorer children should be kept in mind when interpreting the results.

5. Estimation

A. Investigator Assignment

Given the rotational assignment process within geographic teams, the instrument will be calculated for each case manager-team cell, where the team is defined by the case team x ZIP code x Hispanic x report year. It measures the fraction of children assigned to the child's case manager who are placed in foster care, relative to the placement rate for children that the investigator was eligible to receive as part of the rotation. 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:

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

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, $\overline{R}^{ck}$ is the fraction of children investigated by case manager c in sub-team k that are eventually removed from home, and $\overline{R}^{k}$ if that fraction of removals for sub-team k. Results are similar when the instrument is the mean removal rate the a child's investigator (outside of the child's investigation team) and the analysis uses investigation team fixed effects, though this global measure is useful in demonstrating the results as shown in the figures below.

The case manager placement differential is analogous to a case manager fixed effect in a model predicting removal with sub-team fixed effects. It is calculated for all sub-teams not including 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 case manager placement tendencies are related 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 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. 733 case managers are considered outside of Cook County and 581 case managers considered in Cook County, with a weighted average of 74 investigations per case manager outside of Cook and 80 investigations in Cook County.[11] All analyses are done at the child level, which serves to weight the measures by the number of children to extract the signal from cells with the least noise.

The measure is constructed on sub-team cells with more than 1 case manager and at least 8 cases. Children investigated in sub-team cells that do not meet these requirements will have a non-missing instrument, however, as it is calculated for all other sub-team cells. Coincidentally, there are 670 sub-teams used in the calculation in each of the groups with an average of 24 and 20 observations per cell outside of Cook and within Cook, respectively. Further, the results were similar when the year interactions were not used in the cell construction to increase the number of children per cell.

[11] 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 placement differential, however, as this measure is for all cells other than for a given family.

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 37% of case managers who began in 1991 no longer working 5 years later: a cohort with a median tenure of 8 years. 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 relationship will instead be an empirical one described by the first stage.

The resulting instrument reveals some variation in placement rates across case managers. The instrument has a mean of zero and a standard deviation of 9-11% in the non-Cook and Cook County samples.

The rules and regulations described in section three 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 placement differential. To test this hypothesis, the instrument was regressed on the child characteristics, including year of investigation indicators. The standard errors were clustered at the case manager level to reflect dependence across children assigned to the same investigator.

Table 2 reports the results and shows that the observable characteristics are unrelated to the investigator placement differential. In particular, physician, police, and other government reporters, as well as an indicator for African Americans, are highly positively correlated with foster care placement, yet little relationship is found with the investigator differential in both the magnitude and sign of the coefficients.

Another test to see whether case managers with high removal frequencies are assigned more problematic 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 home. If strict case managers are assigned to these families, then length of stay should be correlated with the placement differential. In these samples, children typically stay in care for 4 years outside of Cook and for 5 years within Cook. A higher case manager placement differential is not related to the length of stay, however.[12]

To further explore the type of care received, the type of placement 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 three. Nevertheless, an initial placement with relatives is not related to the case manager placement differential. Of the children placed in foster care in the samples considered here, 31% of children outside of Cook and 59% of children in Cook were initially placed with relatives. A ten percentage-point increase in the case manager placement differential is associated with only a 0.006 percentage-point increase in the likelihood of relative placement for children outside of Cook County, and a 0.0004 percentage-point decrease in the likelihood of relative placement in Cook County. 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.

[12] A ten percentage-point increase in the case manager placement differential is associated with a 0.2% reduction in the length of stay in foster care outside of Cook County, and a 0.3% reduction in the length of stay for children in Cook County, with neither estimate statistically significant. This also suggests that the foster care system does not correct for investigator tendencies by varying the length of stay of children once they are placed.

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 placement differentials, *conditional on foster care placement*. When the case manager placement differential is regressed on child characteristics for children placed in foster care, however, child characteristics are again unrelated to the case manager placement differential in each of the samples.

B. Foster Care Placement and Crime Outcomes

A first look at the results is shown in Figure 1. Consider Figure 1A, which considers children outside of Cook County. The x-axis is the investigator placement differential, which is mean zero and ranges from -0.25 to 0.25. The two lines report local linear regressions of the removal indicator and the arrest indicator against the case manager placement differential, evaluated at each percentile of the differential.[13]

The placement differential is positively related to the foster care placement rate in both geographic groups. Outside of Cook, an increase in the differential from the 10th percentile to the 90th percentile, representing an increase from -0.10 to 0.11, is associated with an increase in foster care placement from 0.14 to 0.21, for an implied first-stage estimate of 0.33. That would imply that an increase in the placement rate by 10% is associated with an increase in the placement rate by 3.3%, or 21% of the mean placement

[13] The results are shown using pilot bandwidths that were chosen by minimizing the sum of squared errors between the local linear estimator and a fourth-degree polynomial model. For the foster care placement regression, the bandwidth is 0.034. For the arrest regression the bandwidth is 0.056. Results are robust to bandwidths down to 0.01, with larger fluctuations with bandwidths below 0.02, although the similarity in shapes remains at the smaller bandwidths.

rate. Figure 1B shows a similar increase in Cook County: from 0.22 to 0.31, for a first-stage estimate of 0.43.

Given the implied 1st stage coefficients of close to one-third, the arrest rate graphs use the second vertical axis and the scale is one-third of the placement rate axis. One feature is that the arrest rates are fairly high despite the potential for measurement error due to the linkage between the systems. 26% of the investigated children outside of Cook County, and 22% of those from Cook, were found arrested between 2000 and 2005. When restricted to children aged 25 in 2005, the arrest rates are 40% and 35% for boys for the two geographic categories and 27% for girls in both samples.

Figure 1A shows that the arrest rate relationship is remarkably similar in shape to the foster care placement relationship for children outside of Cook County. For the change from the 10th percentile to the 90th percentile considered above, the arrest rate for children outside of Cook County increases from 0.25 to 0.28. For children from Cook County, the arrest rate does not vary as systematically with the placement differential.[14]

As a means of comparison, a predicted probability of placement was calculated from a probit model that included the control variables listed in Table 1. This combination of the child characteristics is unrelated to the case manager placement differential, as expected given the rotational assignment process (see Appendix Figures A1A and A1B).[15] While children assigned to investigators with high placement rates are more likely to be placed in foster care themselves, and have higher arrest rates later in life among those from outside of Cook County, their observable characteristics do not predict

[14] Bandwidths were chosen as with Figure 1A, with the placement bandwidth of 0.080 and the arrest bandwidth of 0.043.
[15] Bandwidths in Figures A1A and A1B mirror those for the placement relationship in Figures 1A and 1B.

that they would be more likely to placed in foster care compared to children assigned to low removal rate investigators.

Foster Care Placement

To test the first-stage relationship that children assigned to case managers with high removal differentials are more likely to be placed in foster care with and without controls for child characteristics, the estimating equation for child i assigned to an investigator c in sub-team j in year t is:

$$(9)\ R_{icj} = \phi_0 + \phi_1 Z_{icj} + \phi_2 X_i + \sum_k \delta_k 1(t_i = k) + \omega_{icj}$$

where δ represents a vector of year effects for the date of child i's investigation. This equation will be estimated using a linear probability model, though results are similar with a probit model.

Table 3 reports the results. Columns (1) and (5) report the coefficients for models without any controls. The coefficient for the sample outside of Cook is 0.23 and within Cook it is 0.27. When controls are introduced, the coefficients are similar: 0.23 and 0.26, reflecting that the instrument is unrelated to the observable child characteristics. In contrast, these variables are associated with foster care placement. For example, physician, police, and other government 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.

The probability of removal does not increase one-for-one with the case manager removal rate. This is likely due to 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 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 F-statistics of close to 40, well above the rule of thumb of 10 for weak instruments (Stock, Wright, and Yogo, 2002).

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's placement differential, however. It appears that differences in removal rates are more idiosyncratic than systematic when it comes to case manager characteristics.

Child Outcomes

To consider a model of child outcomes, with and without controls, the empirical models will consider outcomes, Y, for child i investigated by case manager c in sub-team j during in year t of the form:

$$(10)\ Y_{icj} = \alpha_0 + \alpha_1 R_{icj} + \alpha_2 X_i + \sum_k \delta_k 1(t_i = k) + \nu_{icj}$$

where the case manager placement differential, Z_{icj}, will be used as an instrument for the indicator for removal, R_{icj}.

Adult Arrests

Table 4 reports the results for arrests. The first two columns report the mean comparisons across children who were placed in foster care with investigated children who were not placed. These results are of some interest in themselves, as long-term

outcome data are generally unavailable for this group of children. The results show that children who were placed in foster care have higher arrest rates: 6-7.5 percentage points higher (compared to a mean arrest rate of 26%) for children outside of Cook County. A 3 percentage-point difference is found in Cook County (compared to a mean of 22%) shown in columns (7) and (8).

Columns (3), (4), (9), and (10) mirror the reduced-form results from Figure 1A and 1B. An increase in the investigator placement differential from -0.1 to 0.1 is associated with an 18 percentage-point increase in the likelihood of an arrest outside of Cook County, while a similar change in the differential within Cook County is associated with only a 4-5 percentage-point increase. The Cook County result is not significantly different from zero as well.

Last, Columns (5) and (6) report the 2SLS results for children who were residing outside of Cook, and foster care placement is associated with very large (39 percentage points) differences in arrest rates, with a relatively large standard error (19 percentage points) as well. The larger IV results suggest that the estimated causal effects of foster care on arrest rates are worse than the conditional means comparison in Columns (1) and (2) 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, the means comparison may understate any negative effect from placement among marginal cases.

The results suggest that if 10% of "marginal" cases are placed in foster care, then the arrest rate would be 3 times higher for foster children outside of Cook County, which is possible with juvenile arrest rates of 50-67% for children who age out of foster care.[16] The large coefficients and standard errors suggest that caution in the interpretation is warranted.

Columns (11) and (12) report the 2SLS results for children from Cook County. The estimates have coefficients of 0.10 and 0.08, with standard errors of 0.10. The point estimate suggests that the arrest rate is 1.5 times higher for children who were placed in foster care compared to investigated children who were not placed in care, though the large standard errors place less confidence in these estimates.

Doyle (2007) used the IV strategy employed here to consider juvenile delinquency in Cook County and found point estimates that suggested a delinquency rate that was 3 times higher for children placed in foster care. This suggests that some of these children may have already been in prison during 2000-2005, though the point estimates are nearly identical when the subset of children who were less than 18 in 2000 were considered to avoid left censoring in the arrest indicator.

One issue with the Cook vs. non-Cook comparison is that the data quality appears to be better outside of Cook as described in the data description and evidenced by an imprisonment match rate that is more consistent with the population (described below).

[16] To have a 26% arrest rate, a 10% placement rate, and a 39 percentage-point difference would require arrest rates of 61% for those placed and 22% for those not placed [$0.1(X+0.39) + 0.9(X) = 0.26 \rightarrow X=0.22$]. Similarly for those in Cook County the implied arrest rates woujld be 30% vs. 20% [$0.1(X+0.1) + 0.9(X) = 0.21 \rightarrow X=0.20$].

When matches were done by the name and date of birth (where names were first transformed using SOUNDEX software so that similar names have the same linkage variable) 34% of children outside Cook County, and 40% of children within Cook County, are matched to the arrest database. The imprisonment rate remains low for the Cook County sample, however. The IV estimate for arrests increases for children from Cook County to 0.20 (s.e.=0.11), as shown in Appendix Table A1. Meanwhile, the estimates are slightly smaller for children from outside of Cook: 0.23 with a standard error of 0.21. These results suggest that the comparison of Cook vs. non-Cook children should be treated with caution as differences may stem from the ability to match children to adults.

Heterogeneity in Treatment Effects

The remainder of the paper explores these results further by considering related outcomes such as convictions and prison sentences following the arrest; marginal treatment effects discussed in section two; and results for subgroups such as boys versus girls and older children versus younger ones at the time of the investigation. Given the fairly large standard errors in the instrumental variables estimates, these results should be considered more exploratory than definitive. Further, the discussion will focus on the differences found for children from outside of Cook County, with Cook County results reported in the appendix.

Convictions and Prison Sentences

First, it is possible to consider whether these arrests lead to worse outcomes such as convictions and prison sentences. Panel A of Table 5 reports regressions of the form of equation (10), where the outcome is whether the individual was found guilty or had a

judgment withheld during 2000-2005. Results are similar when the outcome is simply a guilty verdict[17], though a withheld judgment is often used as a probationary measure. These results are not independent of the arrest results, as those with a conviction were arrested first.

The results outside of Cook County mirror the arrest results, with higher mean differences among former foster children compared to those who were not placed in care (4 percentage points higher compared to a mean of 15%). The reduced-form estimate shows that children assigned to high removal investigators have higher conviction rates, with a coefficient of 0.09 (s.e.=0.035), and a 2SLS coefficient of 0.40 (s.e.=0.15).

Prison Sentences

The prison sentence rate for this sample is 6.6%, including 9.8% for boys.[18] By comparison, 0.73% of white males between the ages of 20 and 24 residing in Illinois outside of Cook County entered prison in 2000, while 5.4% of African American males in that group entered prison in 2000.[19] When the age is restricted to children who were 18 in 2000, to avoid any left censoring, the prison sentence rate for boys outside of Cook County increases to 15%.[20]

Panel B of Table 5 shows the results for a prison sentence between 2000 and 2005. The prison sentence results again mirror the earlier results, with higher OLS

[17] The mean of the guilty-only outcome is 11%, and the reduced form coefficient is 0.075 (s.e.=0.031) with a 2SLS estimate of 0.33 (s.e.=0.14)

[18] Despite high arrest rates, the prison sentence rate in Cook County is 1.9%, much lower than Cook County imprisonment rates for this population would imply. This suggests that the linkage to the sentencing data may be worse in Cook County. Another consideration is that these individuals may already be in prison by 2000. When children who were 18 in 2000 were considered, 4% of boys in Cook County were found to be sentenced to prison during the 2000-2005 time period in these data.

[19] Author's calculations using the US Census population data by county and prison data from the Bureau of Justice Statistics' National Corrections Reporting Program for 2000. The rate is similar to the published numbers described in US DOJ (2007).

[20] When children who were less than 18 in 2000 are considered, the results are qualitatively similar. The reduced-form coefficient for the arrest outcome is 0.08 (s.e.=0.047), and the coefficient for the prison sentence outcome is 0.053 (s.e.=0.023).

differences in imprisonment (3 percentage points compared to a mean of 6.6%), as well as higher imprisonment rates for those assigned to investigators with higher removal rates: a reduced form coefficient of 0.05 (s.e.=0.023) and a 2SLS coefficient of 0.22 (s.e.=0.10).

Within Cook County, the results for convictions and prison sentences show little effect of foster care placement for marginal cases. When the databases were matched by name and date of birth instead of the social security number, however, the estimated effect for convictions increases to 0.097 (s.e.=0.10), and an imprecisely estimated (but positive) point estimate for the prison sentence outcome is found as well. For children from outside of Cook, the estimates are somewhat smaller for convictions, though a similar estimate is found for the prison outcome (see Appendix Table A1).

Marginal Treatment Effects

To further explore the source of the linear IV results, it is possible to estimate marginal treatment effects as described in section two. Four sets of results are presented: the arrest indicator for children from outside of Cook and within Cook, as well as the conviction and prison indicators for children from outside of Cook. Given that the linear IV results were similar with and without controls, the MTE estimates will be calculated without controls for child characteristics.

To estimate the marginal treatment effects, the predicted probability of placement was estimated using a probit model. The case manager placement differential was the only explanatory variable in the model to capture the variation in placement solely due to the instrument. These predicted probabilities range from 0.11 to 0.23 for children from outside of Cook and 0.20 to 0.34 for children from Cook. With the lack of full support

for the probability of placement on the unit interval, especially at the extremes, it is not possible to estimate parameters such as the average treatment effect. Instead, marginal treatment effects can be estimated. 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.

Next, the relationship between the outcome indicators and this predicted probability was estimated using a local quadratic estimator.[21] As suggested by Figure 1, the arrest rate increases with the placement propensity. For arrests among children from outside of Cook County, for example, an increase from the 10th percentile of predicted placement to the 90th percentile (an increase from 0.13 to 0.19) is associated with an increase in the arrest rate from 0.25 to 0.27, for an estimated local average treatment effect of 0.33 (see Appendix Figure A2A).

The derivative of these relationships provides the marginal treatment effect estimates.[22] Figure 2 reports the results, along with 5 to 95% percent confidence intervals 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.

Figure 2A shows that the MTE function for arrests among children from outside of Cook County is above zero and the mass is centered around the linear IV estimate of

[21] The local quadratic estimator was chosen because the first derivative of the relationship is sought and local quadratic estimators are thought to have better properties (Fan and Gijbels, 2000). In practical terms, the results are nearly identical when a local linear regression was estimated instead. The pilot bandwidths were again chosen by minimizing the sum of squared errors between the local quadratic estimator and a fourth-degree polynomial model, and are 0.031, 0.060, 0.085, and 0.048 to arrive at the MTE estimates in Figures 2A-2D, respectively. Results are robust to bandwidths from 0.01 to 0.1. For example, at a bandwidth of 0.01, the arrest rate for children from outside of Cook County is increasing for the first thirty percentiles of predicted placement, is flat for the next thirty percentiles at 0.26, and increases for the remaining percentiles up to a maximum of 0.29 at the 97th percentile.

[22] The derivative comes directly from the local quadratic coefficients.

0.4. The function is also upward sloping, with noisy estimates at the extremes, although it is not possible to reject a zero slope. Nevertheless, the implied upward slope in the point estimates is suggestive that the children on the margin of placement among the high removal investigators have the largest increases in arrest rates. These are likely children with unobservable characteristics that make them the least likely to be placed in foster care, reflecting the selection of children into foster care who are more likely to benefit (or, in this case, appear less likely to be harmed in terms of adult arrests).

Figure 2B shows that the IV estimate of zero for children from Cook County is at the center of the MTE estimates. The estimates are above zero with higher arrest rate effects found for children with both low and high propensities of placement associated with the investigator assignment. Figure 2C shows the conviction results for children from outside Cook, and again the estimates are above zero and the function has an upward slope. Last, Figure 2D reports the results for the prison outcome and here the MTE estimates are close to 0.25 for the bulk of the data, with lower estimates for the first 10 percentiles of predicted placement.

Among children who are not on the margin, either because it is clear there was no abuse or it is clear the child must be protected, the effects of foster care placement are not identified. For less clear cases, the upward slopes, especially for arrests and convictions, suggest that children who are on the margin among high removal rate investigators—children likely to have unobservables associated with a lower likelihood of placement—have worse crime outcomes when placed in foster care compared to children on the margin among low removal rate investigators.

Child Characteristics

Given that the instrumental variable results are imprecisely estimated, differences across groups of children are not found to be statistically significantly from one another. These results are again more exploratory than definitive, but may highlight the types of children whose placement in foster care may lead to criminal activity.

Table 6 reports the results for the three outcomes of arrests, convictions, and prison sentences for children outside of Cook County. The largest difference in both the level of the outcomes and the size of the estimated effects is found for the comparison of boys versus girls. Boys are more likely to be found arrested (31% vs. 22%), more likely to be found guilty or have a verdict withheld (19% vs. 11%), and more likely to be found sentenced to prison (10% vs. 3.3%). The OLS results show that those who are placed in foster care have higher arrest, conviction, and imprisonment rates for both boys and girls. The IV results show larger coefficients for girls in terms of arrests and convictions. In terms of prison sentences, boys have the large IV coefficient and the girl's coefficient is much smaller and statistically insignificant. Once subgroups are considered, some of the estimates lose their statistical significance, although the similarity in the point estimates tends to confirm the earlier results. The one exception is the point estimate for the prison outcome among girls, which loses economic and statistical significance.

In terms of allegations, the results are similar whether the allegation is abuse or neglect, though the prison sentence outcome is found to be stronger for abuse cases.[23] The results are similar when broken out separately for white cases and African American cases, with larger IV point estimates for each outcome category compared to the pooled results.

[23] Another difference between Cook and non Cook cases is the frequency of family reports. When these are excluded, the IV point estimates remain large, but are somewhat smaller. For example, in terms of arrests, the 2SLS estimate is 0.275 with a s.e. of 0.19.

One important caveat when interpreting the main results is that these children are between 4 and 16 years old when they are investigated to allow for an examination of longer-term outcomes. 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 were 10 years old or older. The removal rates are somewhat higher for the younger children (17% vs. 15%), as they were at risk of removal for longer periods of time. The point estimates suggest that the effects are similar for both age groups.

Last, the probability of foster care placement was estimated with a probit including only the child controls. Then the sample was broken into two groups based on their predicted foster care placement. 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 last two columns of Table 6 report the results for these two groups. The placement rate is 11% in the low predicted placement group and 25% in the high-predicted placement group. The results are fairly similar across the groups with a somewhat larger IV point estimate in terms of arrests for the high probability of removal group, and somewhat larger point estimates for the low removal rate group for the conviction and prison outcomes.

The results for Cook County are in the appendix and, as expected, these results are somewhat less stable. Smaller point estimates are found for children suspected of being neglected, within race categories (where the relationship is often negative), and for boys.

Violent vs. Property Crime

The arrest data also record whether the nature of the offense is drug related, property, violent, or other. Results are compared across the different types of arrest categories. These categories are not mutually exclusive, as each individual may be arrested within one or more categories over the 2000-2005 time period.

The results are reported in Table 7 for children investigated outside of Cook County. When arrests for each type of offense were estimated separately, the results revealed no effect on drug arrests, either in OLS or in the reduced form, despite a 7.5% drug arrest rate. Property crime arrests were found for 10.5% of the investigated children, and the OLS results show that those placed in foster care had a 3.5 percentage-point higher property-crime arrest rate (s.e.=0.6). The reduced-form coefficient was 0.058 with a 2SLS estimate of 0.21 (s.e.=0.10). Results were similar for violent crime, which had an 8.7% arrest rate, with an OLS estimate of 0.027 (s.e.=0.006), a reduced form coefficient of 0.050 (s.e.=0.023), and a 2SLS estimate of 0.16 (s.e.=0.11).

It might be expected that abuse cases lead to more violent crime compared to neglect cases though a "cycle of violence" (Widom, 1989). The violent crime arrest rate measured here is 8.4% for children investigated for abuse, and a similar rate of 7.9% is found for those investigated for neglect. In terms of the estimated effects of foster care, the IV point estimates were somewhat larger for abuse cases compared to neglect cases, similar to Table 6, although this was found for both the violent crime and property crime arrest categories.

Recidivism, Felony convictions, and Prison Sentence Length

The results largely mirror those above for children outside of Cook County when other severity measures are considered. For example, repeat arrests during 2000-2005

show similar increases with foster care placement, with a mean of 14% and an IV point estimate of 0.34 (s.e.=0.15). An indicator for being found guilty or having a judgment withheld when the arrest offense was a felony has a mean of 5.3% and an IV point estimate of 0.19 (s.e.=0.088). Another measure of the severity of the arrests is whether the individual ever received a prison sentence of one or more years. 2.3% of the investigated children were found to have at least one such sentence between 2000 and 2005, and the IV point estimate is 0.13 with a standard error of 0.067.

Robustness Checks

Appendix Table A1 reports some robustness checks. First, the results outside of Cook County were similar when a probit and IV probit models were used, with somewhat larger point estimates and somewhat smaller standard errors in terms of arrests and convictions. The indicator for a prison sentence, the outcome that was least likely and, therefore, more likely to be affected by the functional form chosen, exhibits a larger IV point estimate and a larger standard error when the probit model was used. Within Cook County, the arrest estimates are again similar with the probit model.

Second, models with ZIP code fixed effects to control for neighborhood characteristics that may influence criminal activity showed similar results, as expected as the instrument was calculated within ZIP code categories. Last, the estimates when the databases were matched by name and date of birth are reported, as described above.

Limitations

In addition to the potential for violations of the identifying assumptions described in section two, one limitation of the estimation is that the outcomes are for adults in Illinois. To the extent that children in foster care are more likely to remain in Illinois as

adults, we may find a higher match rate.[24] In fact, it may be that assignment to strict case manager may encourage families to leave the state, although this should lead to smaller estimated effects of foster care. One piece of evidence against this possibility of differential migration among those assigned to strict investigators is that Doyle (2007) found lower employment rates (matches to the Illinois unemployment insurance database) among those who entered foster care. In the end, foster care may have an effect on both the propensity to be imprisoned (and employed), as well as on migration.

Another limitation is that the empirical strategy does not lend itself to an analysis of the effect of the length of stay in foster care on outcomes. When models are considered for children who were either not removed or were in foster care for more than 1 year, the results are nearly identical. This is partly due to the fact that most children are in care for more than 1 year in these samples.

7. Conclusion

Foster care placement is a major intervention into the lives of children who appear to be at high risk of poor life outcomes, including adult criminality and subsequent arrests and incarceration. Previous work has found strong correlations with foster care placement and incarceration, yet whether placement results in greater or lower arrest rates has not been considered. The analysis here uses the effective randomization of abuse investigators to families to estimate causal effects of placement on crime outcomes. Children assigned to investigators with higher removal rates are more likely to be placed in foster care and are found to have higher arrest and imprisonment rates, as well. The

[24] In fact, it may be that assignment to strict case manager may encourage families to leave the state. This should lead to lower Illinois arrest rates, however.

point estimates are large and relatively imprecisely estimated, however, which suggests some caution in the interpretation. Nevertheless, the estimates suggest that large benefits from foster care placement are unlikely for this group of children at the margin of placement, at least for the outcomes considered here.

The results are strongest for children outside of Cook County, where the match to the state police data appears more accurate. When children and arrested adults were matched by names and dates of birth, the results are less precise, but the point estimates show similar increases in arrest rates across the geographic areas.

When interpreting the results three main caveats should be kept in mind. First, the sample consists of school-age welfare recipients investigated in Illinois, a large urban state where placement of children with family members is more popular than the nation as a whole. Future work will consider younger children as they become at risk for adult arrests.

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 in care.

Last, the outcomes studied here may relate to child wellbeing, 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 adult crime rates for slightly lower levels of serious abuse.

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Figure 1A: FC Placement & Arrest Rate vs. CM Placement Differential: Outside Cook County

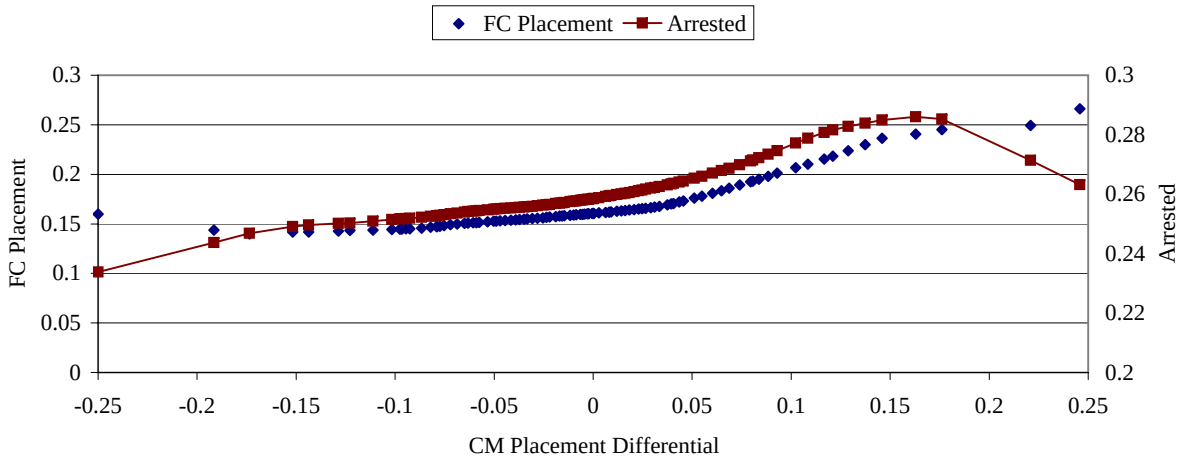
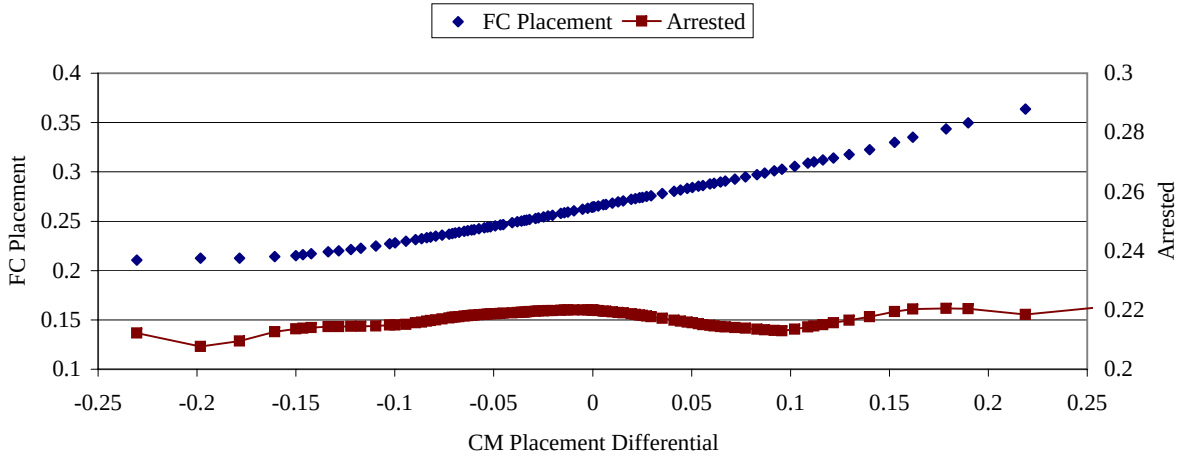


Figure 1B: FC Placement Rate & Arrest Rate vs. CM Placement Differential: Cook County



Local linear regressions evaluated at each percentile of the placment differential.

Figure 2A: Arrested Marginal Treatment Effects:
Outside Cook County

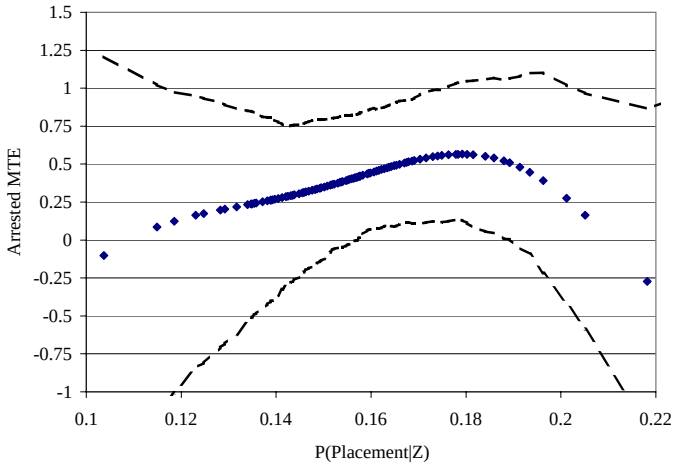


Figure 2B: Arrested Marginal Treatement Effects:
Cook County

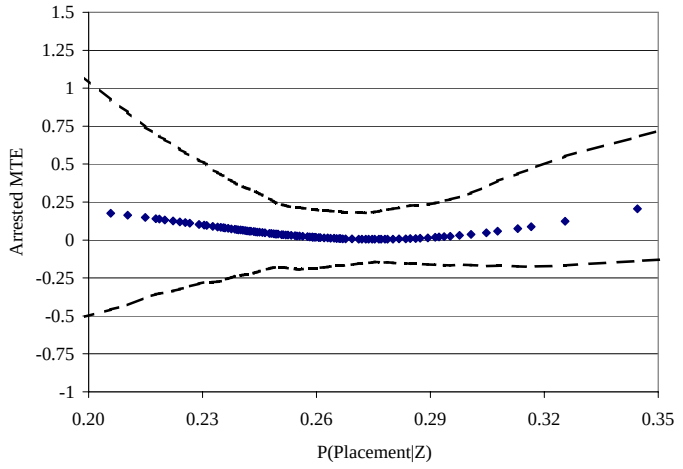


Figure 2C: Guilty/Withheld Marginal Treatment Effects
Outside Cook County

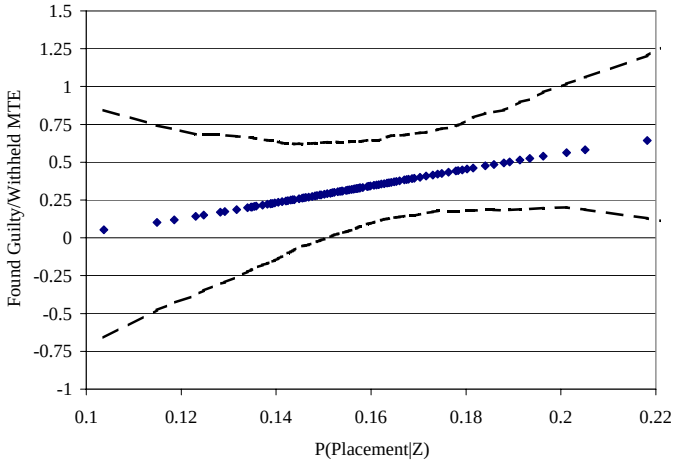
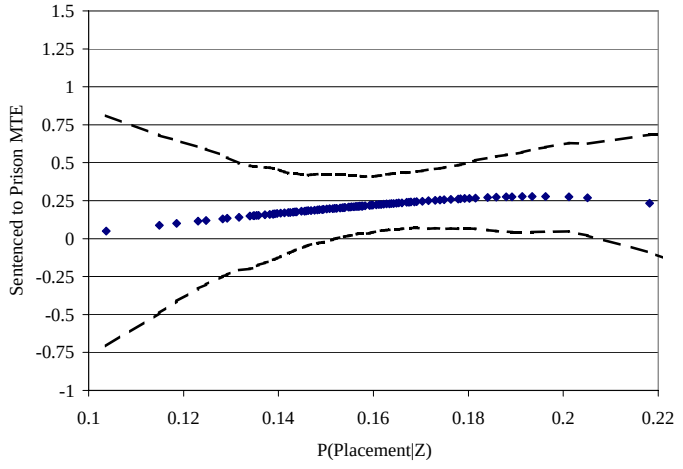


Figure 2D: Sentenced to Prison Marginal Treatment Effects: Outside
Cook County



Estimates for each percentile of P(Placement|Z): the predicted placement from a probit modle that includes only the CM placement differential. Dashed lines report 5-95% bootstrapped confidence intervals.

Table 1: Summary Statistics

Variable		Outside Cook County Mean	Outside Cook County Std Dev	Cook County Mean	Cook County Std Dev
	Foster Care Placement	0.16	0.36	0.26	0.44
Race	white	0.71	0.46	0.12	0.32
	African American	0.25	0.43	0.76	0.43
	Hispanic	0.03	0.18	0.11	0.31
Initial Reporter	physician	0.07	0.25	0.13	0.34
	school	0.17	0.38	0.13	0.33
	police	0.21	0.41	0.14	0.35
	family	0.18	0.38	0.27	0.45
	neighbor	0.07	0.25	0.06	0.23
	other government	0.14	0.35	0.09	0.29
	anonymous	0.12	0.33	0.15	0.36
	other reporter	0.03	0.17	0.03	0.17
Age at Report	age	11.0	3.1	11.0	3.0
Sex	boy	0.50	0.50	0.49	0.50
Allegation	lack of supervision	0.26	0.44	0.35	0.48
	environmental neglect	0.11	0.31	0.15	0.36
	other neglect	0.06	0.24	0.06	0.23
	substantial risk of harm	0.35	0.48	0.24	0.43
	physical abuse	0.20	0.40	0.17	0.38
	other abuse	0.02	0.16	0.03	0.16
	Observations	23254		21653	

Children investigated between July 1, 1990 and June 30, 2003 and were at least 18 in 2005. Cook County includes the City of Chicago.

Table 2: Child Characteristics and Case Manager Assignment

Dependent Variable: Case Manager Placement Differential

		Outside Cook County		Cook County	
Variable		Coeff.	p-value	Coeff.	p-value
Race	white	0.000	(1.000)	-0.032	(0.012)*
Other race	African American	-0.002	(0.782)	-0.023	(0.091)
Excluded	Hispanic	0.007	(0.528)	-0.026	(0.060)
Initial Reporter	physician	-0.001	(0.846)	0.002	(0.757)
Other Reporter	school	0.000	(0.988)	-0.003	(0.560)
Excluded	police	0.002	(0.739)	-0.007	(0.252)
	family	0.001	(0.759)	0.001	(0.908)
	neighbor	0.004	(0.513)	-0.008	(0.270)
	other government	-0.000	(0.965)	-0.002	(0.810)
	anonymous	-0.003	(0.482)	-0.010	(0.102)
Age at Report	age 6	0.003	(0.565)	-0.003	(0.653)
Youngest ages	age 7	0.010	(0.011)*	-0.013	(0.018)*
Excluded	age 8	0.001	(0.870)	-0.006	(0.330)
	age 9	0.000	(0.969)	-0.002	(0.782)
	age 10	0.002	(0.542)	-0.006	(0.261)
	age 11	-0.000	(0.960)	-0.007	(0.204)
	age 12	0.001	(0.806)	-0.004	(0.481)
	age 13	0.001	(0.720)	-0.006	(0.322)
	age 14	0.004	(0.433)	-0.000	(0.996)
	age 15	0.005	(0.285)	-0.006	(0.310)
	age 16	0.002	(0.596)	-0.009	(0.124)
Sex	boy	-0.001	(0.518)	0.000	(0.838)
Allegation	lack of supervision	-0.006	(0.084)	0.006	(0.102)
Other neglect	environmental neglect	-0.004	(0.226)	0.007	(0.088)
Excluded	substantial risk	-0.000	(0.915)	-0.002	(0.639)
	physical abuse	-0.000	(0.905)	0.005	(0.162)
	other abuse	-0.001	(0.867)	0.001	(0.895)
	Mean of Dep. Var.	-0.004		-0.001	
	Std. Dev. of Dep. Var.	0.091		0.111	
	Number of Investigators	733		581	
	Observations	23254		21653	

All models include year indicators. Estimated variance is clustered by investigator.
*=5% significance **=1% significance

Table 3: Case Manager Assignment and Foster care Placement

Dependent Variable: Foster Care Placement

Model:	Outside Cook County				Cook County			
	1	2	3	4	5	6	7	8
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Case Manager Placement Differential	0.229	0.036**	0.233	0.035**	0.269	0.046**	0.255	0.040**
white			-0.002	0.029			-0.029	0.031
African American			0.093	0.029**			0.091	0.031**
Hispanic			-0.030	0.031			-0.033	0.031
physician			0.043	0.018*			0.060	0.024*
school			0.025	0.015			-0.017	0.023
police			0.073	0.016**			0.102	0.023**
family			0.016	0.015			0.045	0.023
neighbor			-0.013	0.016			-0.001	0.025
other government			0.084	0.016**			0.060	0.026*
anonymous			0.002	0.016			-0.051	0.023*
age 6			-0.027	0.018			-0.000	0.024
age 7			0.001	0.016			0.017	0.021
age 8			0.008	0.017			-0.009	0.021
age 9			0.014	0.017			-0.019	0.021
age 10			0.016	0.017			-0.009	0.021
age 11			0.016	0.017			-0.004	0.022
age 12			0.020	0.017			-0.021	0.022
age 13			0.020	0.018			-0.036	0.022
age 14			0.016	0.017			-0.059	0.022**
age 15			-0.007	0.018			-0.072	0.022**
age 16			-0.017	0.018			-0.085	0.022**
boy			-0.016	0.005**			0.001	0.006
physical abuse			-0.172	0.015**			-0.118	0.015**
substantial risk			-0.180	0.015**			-0.046	0.016**
other abuse			-0.162	0.019**			-0.123	0.023**
lack of supervision			-0.152	0.015**			-0.029	0.015
env. neglect			-0.188	0.016**			-0.086	0.017**
F-stat. for instrument	39.4		44.2		34.0		39.5	
Mean of Dep. Var.	0.16				0.26			
Observations	23254				21653			

Standard errors are clustered at the case manager level. *=5% significance **=1% significance
Models include year indicators.

Table 4: Foster Care Placement and Arrest Outcomes: 2000-2005

Dependent Variable: Arrested, 2000-2005

	Outside Cook County						**Cook County**					
Model	OLS	OLS	OLS	OLS	2SLS	2SLS	OLS	OLS	OLS	OLS	2SLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
FC Placement	0.075	0.060			0.388	0.391	0.030	0.030			0.097	0.083
	(0.008)**	(0.008)**			(0.189)*	(0.182)*	(0.007)**	(0.007)**			(0.104)	(0.105)
CM Placement			0.089	0.091					0.026	0.021		
Differential			(0.043)*	(0.042)*					(0.027)	(0.026)		
Mean of Dep. Var.	0.260						0.218					
Full Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	23254						21653					

Standard errors are clustered at the case manager level. *=5% significance **=1% significance

Models include year indicators.

Table 5: Convictions and Prison Outcomes for Children from Outside Cook County

A. Dependent Variable: Sentence of Guilty/Withheld, 2000-2005

Model	OLS (1)	OLS (2)	OLS (3)	OLS (4)	2SLS (5)	2SLS (6)
FC Placement	0.045	0.039			0.403	0.405
	(0.007)**	(0.007)**			(0.160)*	(0.154)**
CM Placement Differential			0.092	0.095		
			(0.035)**	(0.034)**		
Mean of Dep. Var.	0.151					
Full Controls	No	Yes	No	Yes	No	Yes
Observations	23254					

B. Dependent Variable: Sentenced to Prison 2000-2005

Model	OLS (1)	OLS (2)	OLS (3)	OLS (4)	2SLS (5)	2SLS (6)
FC Placement	0.035	0.031			0.219	0.225
	(0.005)**	(0.005)**			(0.104)*	(0.102)*
CM Placement Differential			0.050	0.053		
			(0.023)*	(0.023)*		
Mean of Dep. Var.	0.066					
Full Controls	No	Yes	No	Yes	No	Yes
Observations	23254					

Standard errors are clustered at the case manager level. *=5% significance **=1% significance
Models include year indicators.

Table 6: Results by Child Characteristics for Children from Outside Cook County

A. Dependent Variable: Arrested, 2000-2005

	Sex		Allegation/Reporter		Race		Age Group		Predicted P(R|X)	
	Boy	Girl	abuse	neglect	white	Afr. Amer.	age < 10	age 10+	<Median	>Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OLS: FC Placement	0.062	0.060	0.051	0.070	0.059	0.057	0.069	0.056	0.055	0.068
	(0.012)**	(0.011)**	(0.012)**	(0.013)**	(0.011)**	(0.010)**	(0.013)**	(0.011)**	(0.012)**	(0.013)**
2SLS: FC Placement	0.221	0.509	0.385	0.389	0.541	0.591	0.400	0.379	0.346	0.435
	(0.298)	(0.187)**	(0.203)	(0.297)	(0.263)*	(0.249)*	(0.243)	(0.222)	(0.235)	(0.243)
Mean of Dep. Var.	0.305	0.215	0.261	0.259	0.249	0.248	0.208	0.286	0.253	0.274
F-statistic on instrument	18.401	36.594	35.323	16.507	23.939	26.647	18.136	34.487	27.757	21.211
Observations	11673	11581	13149	10105	16402	17459	7648	15606	15559	7695

B. Dependent Variable: Guilty/Withheld, 2000-2005

	Sex		Allegation/Reporter		Race		Age Group		Predicted P(R|X)	
	Boy	Girl	abuse	neglect	white	Afr. Amer.	age < 10	age 10+	<Median	>Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OLS: FC Placement	0.048	0.033	0.037	0.042	0.047	0.045	0.039	0.040	0.042	0.037
	(0.011)**	(0.009)**	(0.010)**	(0.010)**	(0.009)**	(0.009)**	(0.011)**	(0.009)**	(0.010)**	(0.010)**
2SLS: FC Placement	0.326	0.467	0.366	0.449	0.487	0.509	0.338	0.436	0.433	0.375
	(0.266)	(0.134)**	(0.165)*	(0.249)	(0.231)*	(0.221)*	(0.202)	(0.187)*	(0.198)*	(0.203)
Mean of Dep. Var.	0.190	0.112	0.151	0.152	0.150	0.149	0.120	0.166	0.147	0.159
F-statistic on instrument	18.401	36.594	35.323	16.507	23.939	26.647	18.136	34.487	27.757	21.211
Observations	11673	11581	13149	10105	16402	17459	7648	15606	15559	7695

C. Dependent Variable: Sentenced to Prison, 2000-2005

	Sex		Allegation/Reporter		Race		Age Group		Predicted P(R|X)	
	Boy	Girl	abuse	neglect	white	Afr. Amer.	age < 10	age 10+	<Median	>Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OLS: FC Placement	0.049	0.015	0.030	0.031	0.034	0.035	0.032	0.031	0.031	0.032
	(0.009)**	(0.005)**	(0.007)**	(0.008)**	(0.007)**	(0.007)**	(0.008)**	(0.007)**	(0.008)**	(0.007)**
2SLS: FC Placement	0.487	0.051	0.277	0.118	0.369	0.372	0.216	0.226	0.252	0.193
	(0.229)*	(0.072)	(0.109)*	(0.161)	(0.152)*	(0.144)*	(0.125)	(0.124)	(0.127)*	(0.133)
Mean of Dep. Var.	0.098	0.033	0.064	0.067	0.063	0.063	0.047	0.075	0.063	0.072
F-statistic on instrument	18.401	36.594	35.323	16.507	23.939	26.647	18.136	34.487	27.757	21.211
Observations	11673	11581	13149	10105	16402	17459	7648	15606	15559	7695

Each row and column represents a separate regression estimate. 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. The mean placement rates are 11% in the column(9) and 25% in column (10). * significant at 5%; ** significant at 1%

Table 7: Arrests by Type of Offense for Children from Outside Cook County

Dependent Variable: Arrested for Offense Listed, 2000-2005

Offense:	Drug	Property	Violent	Other
	(1)	(2)	(3)	(4)
OLS: FC Placement	0.004	0.035	0.027	0.042
	(0.005)	(0.006)**	(0.006)**	(0.007)**
2SLS: FC Placement	0.026	0.212	0.163	0.300
	(0.087)	(0.096)*	(0.106)	(0.169)
CM Placement Differential	0.025	0.058	0.050	0.067
	(0.022)	(0.024)*	(0.023)*	(0.038)
Mean of Dep. Var.	0.075	0.105	0.087	0.141
Observations	23254			

Each row and column represents a separate regression estimate.
Standard errors clustered at the case manager level are reported.
Models include the full set of controls. * significant at 5%; ** significant at 1%

Table A1: Robustness

A. Dependent Variable: Arrested, 2000-2005

	Outside Cook County			Cook County		
	Probit	ZIP Code Fixed Effects	Match using Name and DOB	Probit	ZIP Code Fixed Effects	Match using Name and DOB
	(1)	(2)	(3)	(4)	(5)	(6)
FC Placement: Marginal Effect	0.061	0.054	0.079	0.031	0.033	0.061
	(0.008)	(0.009)	(0.009)	(0.007)	(0.007)	(0.008)
FC Placement: IV Estimate	0.431	0.317	0.235	0.091	0.113	0.201
	(0.168)	(0.127)	(0.210)	(0.115)	(0.107)	(0.111)
Mean of Dep. Var.	0.260	0.260	0.344	0.218	0.218	0.403
Observations	23254	22711	23899	21653	21554	22357

B. Dependent Variable: Sentence of Guilty/Withheld, 2000-2005

	Outside Cook County			Cook County		
	Probit	ZIP Code Fixed Effects	Match using Name and DOB	Probit	ZIP Code Fixed Effects	Match using Name and DOB
	(1)	(2)	(3)	(4)	(5)	(6)
FC Placement: Marginal Effect	0.039	0.036	0.050	0.013	0.014	0.041
	(0.007)	(0.007)	(0.008)	(0.005)	(0.005)	(0.007)
FC Placement: IV Estimate	0.532	0.346	0.304	-0.0290	-0.0007	0.097
	(0.158)	(0.112)	(0.177)	(0.049)	(0.061)	(0.100)
Mean of Dep. Var.	0.151	0.152	0.211	0.087	0.087	0.206
Observations	23254	22711	23899	21653	21554	22357

C. Dependent Variable: Sentenced to Prison, 2000-2005

	Outside Cook County			Cook County		
	Probit	ZIP Code Fixed Effects	Match using Name and DOB	Probit	ZIP Code Fixed Effects	Match using Name and DOB
	(1)	(2)	(3)	(4)	(5)	(6)
FC Placement: Marginal Effect	0.028	0.030	0.042	0.002	0.002	0.018
	(0.005)	(0.006)	(0.007)	(0.002)	(0.003)	(0.004)
FC Placement: IV Estimate	0.416	0.201	0.249	-0.0017	0.0020	0.018
	(0.230)	(0.076)	(0.138)	(0.025)	(0.031)	(0.053)
Mean of Dep. Var.	0.066	0.066	0.102	0.019	0.019	0.056
Observations	23254	22711	23899	21653	21554	22357

The models with zip code fixed effects eliminated observations in ZIP Codes with only one observation, resulting in a slightly smaller sample size. Match using name and date of birth (DOB) allows the use of individuals with missing social security numbers, resulting in larger sample sizes. Columns (1) and (4) are estimates from probit models with marginal effects reported, while the remaining columns are estimates from linear models. All models include the full set of controls.

Table A2: Convictions and Prison Outcomes for Children from Cook County

A. Dependent Variable: Sentence of Guilty/Withheld, 2000-2005

Model	OLS	OLS	OLS	OLS	2SLS	2SLS
	(7)	(8)	(9)	(10)	(11)	(12)
FC Placement	0.013	0.013			-0.024	-0.029
	(0.005)**	(0.005)**			(0.057)	(0.058)
CM Placement			-0.006	-0.007		
Differential			(0.015)	(0.015)		
Mean of Dep. Var.	0.087					
Full Controls	No	Yes	No	Yes	No	Yes
Observations	21653					

B. Dependent Variable: Sentenced to Prison 2000-2005

	OLS	OLS	OLS	OLS	2SLS	2SLS
	(7)	(8)	(9)	(10)	(11)	(12)
FC Placement	0.002	0.002			0.001	0.002
	(0.002)	(0.002)			(0.030)	(0.032)
CM Placement			0.000	0.001		
Differential			(0.008)	(0.008)		
Mean of Dep. Var.	0.019					
Full Controls	No	Yes			No	Yes
Observations	21653					

Standard errors are clustered at the case manager level. *=5% significance **=1% significance
Models include year indicators.

Table A3: Results by Child Characteristics: Cook County

A. Dependent Variable: Arrested, 2000-2005

	Sex		Allegation/Reporter		Race		Age Group		Predicted P(R|X)	
	Boy	Girl	abuse	neglect	white	Afr. Amer.	age < 10	age 10+	<Median	>Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OLS: FC Placement	0.025	0.036	0.024	0.032	-0.011	0.029	0.034	0.028	0.024	0.032
	(0.010)*	(0.009)**	(0.011)*	(0.009)**	(0.021)	(0.014)*	(0.010)**	(0.009)**	(0.015)	(0.007)**
2SLS: FC Placement	-0.008	0.168	0.167	0.040	-0.142	-0.758	0.080	0.082	0.463	0.065
	(0.153)	(0.133)	(0.209)	(0.106)	(0.642)	(0.999)	(0.132)	(0.156)	(0.843)	(0.090)
Mean of Dep. Var.	0.230	0.206	0.226	0.211	0.204	0.184	0.156	0.248	0.199	0.226
F statistic on instrument	29.673	23.949	11.107	41.739	3.192	1.109	20.433	32.279	1.992	49.511
Observations	10661	10992	9534	12119	2569	5223	7199	14454	6906	14747

B. Dependent Variable: Found Guilty/Withheld, 2000-2005

	Sex		Allegation/Reporter		Race		Age Group		Predicted P(R|X)	
	Boy	Girl	abuse	neglect	white	Afr. Amer.	age < 10	age 10+	<Median	>Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OLS: FC Placement	0.013	0.014	0.002	0.019	0.003	0.022	0.012	0.014	0.003	0.016
	(0.007)	(0.006)*	(0.008)	(0.006)**	(0.017)	(0.011)	(0.006)*	(0.007)*	(0.010)	(0.005)**
2SLS: FC Placement	-0.035	-0.026	-0.014	-0.035	-0.175	0.149	-0.041	-0.028	0.017	-0.031
	(0.098)	(0.072)	(0.130)	(0.062)	(0.436)	(0.609)	(0.077)	(0.085)	(0.432)	(0.056)
Mean of Dep. Var.	0.101	0.074	0.095	0.082	0.089	0.073	0.058	0.102	0.079	0.091
F statistic on instrument	29.673	23.949	11.107	41.739	3.192	1.109	20.433	32.279	1.992	49.511
Observations	10661	10992	9534	12119	2569	5223	7199	14454	6906	14747

B. **Dependent Variable: Sentenced to Prison, 2000-2005**

	Sex		Allegation/Reporter		Race		Age Group		Predicted P(R|X)	
	Boy	Girl	abuse	neglect	white	Afr. Amer.	age < 10	age 10+	<Median	>Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OLS: FC Placement	0.004	-0.000	0.002	0.002	-0.001	0.003	0.000	0.003	-0.000	0.002
	(0.004)	(0.003)	(0.004)	(0.003)	(0.008)	(0.005)	(0.003)	(0.004)	(0.005)	(0.003)
2SLS: FC Placement	0.025	-0.022	0.023	-0.009	0.353	0.508	-0.024	0.014	0.191	-0.013
	(0.058)	(0.033)	(0.083)	(0.029)	(0.379)	(0.635)	(0.046)	(0.044)	(0.248)	(0.029)
Mean of Dep. Var.	0.027	0.012	0.022	0.017	0.022	0.017	0.010	0.023	0.018	0.020
F statistic on instrument	29.673	23.949	11.107	41.739	3.192	1.109	20.433	32.279	1.992	49.511
Observations	10661	10992	9534	12119	2569	5223	7199	14454	6906	14747

Each row and column represents a separate regression estimate. 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. The mean placement rates are 11% in the column(9) and 33% in column (10). * significant at 5%; ** significant at 1%

Table A4: Arrests by Type of Offense for Children from Cook County

Dependent Variable: Arrested for Offense Listed, 2000-2005

Offense:	Drug	Property	Violent	Other
	(1)	(2)	(3)	(4)
OLS: FC Placement	0.006	0.022	0.017	0.013
	(0.004)	(0.005)**	(0.004)**	(0.005)**
2SLS: FC Placement	0.029	-0.004	0.026	-0.037
	(0.052)	(0.065)	(0.061)	(0.073)
CM Placement Differential	0.007	-0.001	0.007	-0.010
	(0.013)	(0.017)	(0.015)	(0.019)
Mean of Dep. Var.	0.065	0.085	0.079	0.100
Observations	21838			

Each row and column represents a separate regression estimate.
Standard errors clustered at the case manager level are reported.
Models include the full set of controls. * significant at 5%; ** significant at 1%

Figure A1A: FC Placement & Predicted FC Placement vs. CM Removal Differential: Outside Cook County

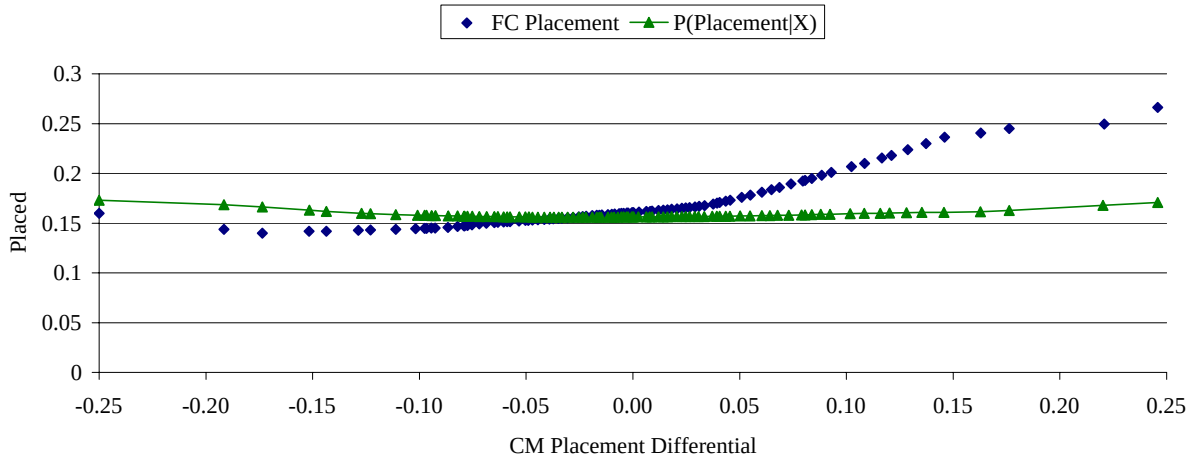
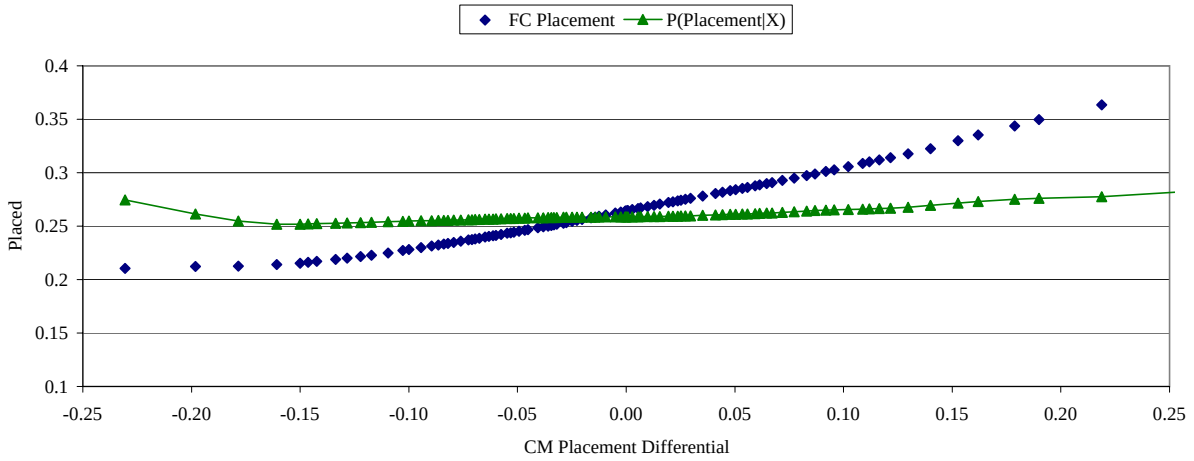


Figure A1B: FC Placement & Predicted FC Placement vs. CM Removal Differential: Cook County



Local linear regressions evaluated at each percentile of the placment differential.
P(R|X) is the predicted probability of placment from a probit using the observable child characteristics.

Figure A2A: Arrested vs. P(Placement|Z):
Outside Cook County

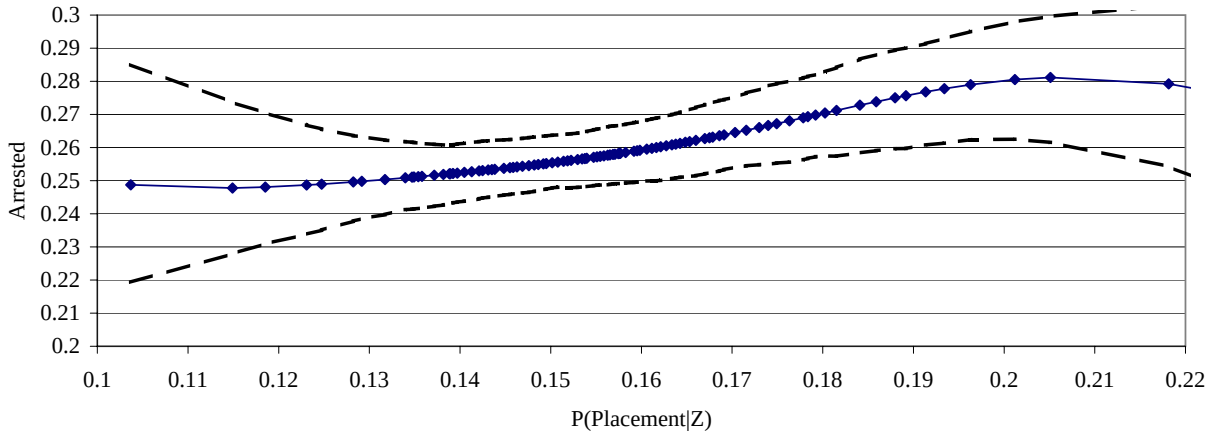
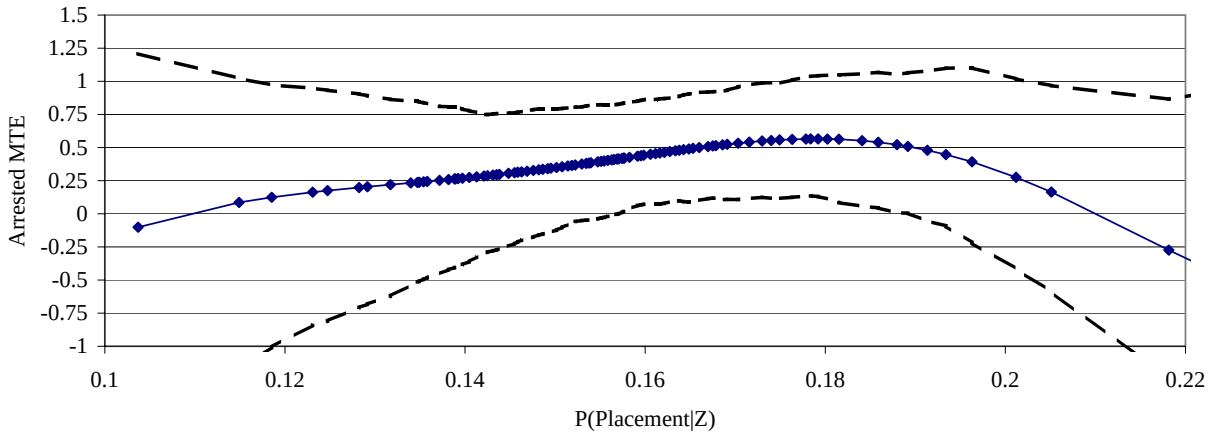


Figure A2B: Arrested Marginal Treatment Effects:
Outside Cook County



Estimates for each percentile of P(Placement|Z): the predicted placement from a probit modle that includes only the CM placement differential. Figure A2B is the estimated first derivative of Figure A2A. Dashed lines report 5-95% bootstrapped confidence intervals.