The Effect of Growing Up in a High Crime Area on Criminal Behaviour: Evidence from a Random Allocation Experiment

Anna Piil Damm[1] **Christian Dustmann**[2]

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Abstract: This paper addresses the question whether the share of criminal youths in the neighbourhood where individuals grow up affect their probability to become engaged in criminal activity later in life. We address the problem of sorting by making use of a natural experiment where individuals were randomly allocated across spatial areas, carried out between 1986 and 1998 for refugee immigrants to Denmark. Our analysis focuses on the children of these refugees. We estimate the effect of the average crime conviction rates of youth in the municipality and year of assignment on the probability of being convicted of an offence committed later in life. Our main finding is that youth criminality in the area of assignment has a strong positive effect on conviction probabilities for young men, but a negative effect for young women, which is concentrated at a young age. We offer a number of explanations for this.

Keywords: crime charges, crime convictions, social interactions, social experiment
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[1] Department of Economics, Aarhus School of Business, Aarhus Univeristy, Frichshuset, Hermodsvej 22, DK-8230 Aabyhoej. Email: apd@asb.dk.
[2] CReAM, Department of Economics, University College London, Drayton House, 30 Gordon Street, London, WC1H 0AX. Email: c.dustmann@ucl.ac.uk.

1. Introduction

A growing number of studies on crime use economic models for the analysis of criminal behaviour (see e.g. Becker (1968), Levitt and Venkatash (2000) and Lochner (2004)). Empirical analysis supports the view that criminal behaviour is induced by, and reacts to economic incentives and conditions[3]. But criminal behaviour is also importantly influenced by social interactions and social context. One important question in the social science literature is how neighbourhood conditions and neighbourhood crime affect individual crime behaviour.

In this paper, we analyze whether growing up in a neighbourhood with a large share of delinquent youth increases a young person's probability of committing a crime later on in life. Our paper is the first that uses random assignment of a large number of families across many neighbourhoods to estimate the effect of area crime on arrest- and conviction probabilities of their children. The research design we use is based on a random allocation experiment that took place in Denmark over a sustained period. Between 1986 and 1998, refugee immigrants to Denmark were subjected to spatial dispersal across municipalities.[4] Our analysis focuses on the children of these individuals. We estimate the effect of exposure at childhood (and before the age of 15) to the share of youth convicted for a crime in the area and the year of initial assignment, on the probability to be convicted for a crime committed between the ages of 15 and 21. Our sample consists of children who are assigned to an area before the age of 15, and we observe their crime convictions in each year up to the age of 21. This allows us to distinguish the effects of area crime at assignment on crime convictions in different age ranges. We also estimate the effect of average exposure to crime during childhood and adolescence on the same probability, and we investigate some of the possible mechanisms that may underlie the relationship between criminals in the area of assignment, and the likelihood of committing a crime later on in life.

[3] A number of papers show the relationship between crime and punishment (see e.g. Ehrlich, 1973; Levitt, 1997, 1998; Imai and Krishna, 2004).
[4] The Danish random allocation policy is not dissimilar to the Swedish one, See Edin, Frederiksson and Åslund (2003).

The question whether, and in which way the social context affects the crime behaviour of young people has always been of key interest in the social science literature. A large empirical literature illustrates an association between social context and criminal offense.[5] However, most of these studies lack a convincing research design to establish the causality of any measured relationship. One key problem is sorting of individuals into neighbourhoods or groups. To address this requires ideally randomised allocation of individuals across areas. Based on a randomised housing-mobility experiment (Moving To Opportunities MTO, see Katz, Kling and Liebman 2001 and Kling, Liebman and Katz 2007 for details), a number of papers investigate the effect of assignment (Kling, Ludwig and Katz 2005), or of area poverty (Ludwig, Duncan and Hirschfield 2001), on juvenile crime.[6]

Two recent papers address more directly the question whether exposure to crime or criminal peers affects individual criminal activity. Ludwig and Kling (2007) estimate the effect of area crime rates on individual crime behaviour, exploiting the MTO experiment to disentangle the effect of the neighbourhood crime rate from the effect of other neighbourhood characteristics that change with a MTO move. They find no statistically significant evidence for higher violent crime arrest rates for MTO participants in communities with higher crime rates. Bayer, Hjalmarsson and Pozen (2008) analyze the influence juvenile offenders serving time in the same correctional facility have on each other's subsequent criminal behaviour. Their research design is based on variation in the length of time individuals in the same facility overlap. Their findings provide strong evidence for peer effects, which are aggravated if individuals have past experience in the same crime category.

The question posed in our study is similar to that in Ludwig and Kling (2007). However, other than the MTO programme, where treatment families are required to move (adding the difficulty to distinguish the effect of context changes from re-location effects), in our case all families we consider are allocated randomly across 230 different

[5] See e.g. Ingoldsby and Shaw (2002) for an extensive review of the sociologically and psychologically based literature. See Case and Katz (1991) for an early study by economists.

[6] A number of non-experimental papers study the association between economic conditions in the area and crime rates (see e.g. Fougère, Kramarz and Pouget, 2006, for the relationship between unemployment and crime, and Grogger, 1998; Gould, Weinberg and Mustard, 2002, and Machin and Meghir, 2004, for the relationship between wages and crime).

municipalities. Another distinguishing feature of our study is the construction of measures of area crime. We have access to exact crime records for the entire Danish population over a long period, which allows us to compute the share of individuals living in the area of initial assignment, and who is later convicted for a crime committed in the year of assignment. This allows us to relate individual crime behaviour to criminals living in the area, rather than to crimes committed in the area. We believe that this is a more direct measure to study criminal behaviour of youths induced through contagion mechanisms[7]. We further have precise longitudinal information on the crime behaviour of the individuals we consider, as well as their parents, which allows us to distinguish between criminal activity in different age brackets, and heterogeneity in the way youths react to crime exposure.

In our study, the random allocation of families across areas eliminates unobserved effects that lead to correlation between behaviour of the reference group, and individual behaviour. The resulting estimate of the effect of crime rates at assignment could be generated through area characteristics and area infrastructure, correlated with crime rates at assignment as well as affecting individual propensities to become criminal[8], or by social interaction, through individual behaviour being affected by the behaviour, or the exogenous characteristics of the reference group.[9] This overall effect is a causal effect, and it is an important policy parameter. In our case, it answers the question how individual crime behaviour is affected by different crime rates in areas to which individuals have been randomly assigned as children. It does not answer the question how large the effect is that is caused through social interaction alone. In the MTO experiment, with only 2 treatment groups and five sites, it is difficult to disentangle

[7] Research that discusses the mechanisms by which crimogenic conditions in the neighbourhood affect criminal behaviour all point towards the importance of direct or indirect contact to criminals. Such contacts may provide information about returns to crime, or arrest probabilities (see Cook and Goss 1996, Becker and Murphy 2000), or affect the social stigma associated with criminal behaviour (see Kemper 1968). Also, older criminals may constitute (positive or negative) role models for children and young teenagers, either through providing information about the present value of particular actions ("informational role models, see Chung 2000"), or through conformity effects ("moral role models"- see Allen 1995).

[8] For instance high crime areas may be lacking in quality or quantity of local policing, schooling opportunities or other institutions (see Jencks and Mayer, 1990; Levitt, 1997, 2002; Sherman, 2002; Lochner and Moretti, 2004).

[9] Manski (1993) refers to the first social interaction effect as "endogeneous effect", and to the second as "contextual" or "exogenous effect". It is the first that may induce social multiplier effects (see Glaeser, Sacerdote and Scheinkman 1996, 2003). Distinction between these two "social" effects is difficult, and we will not attempt this in this paper.

the effect of specific neighbourhood effects on youth outcomes. In our case, the large number of areas to which individuals have been assigned permits us to condition on a large set of area characteristics that are possibly associated with criminal behaviour and area crime conviction rates alike. This eliminates some of the impact of other neighbourhood characteristics that change with area crime allowing us to draw conclusions about the possible additional effect induced by correlated area characteristics.

Our first main finding is that males assigned as children (and before the age of 15) to areas with high proportions of criminal offenders are more likely to become involved in criminal activity between ages 15-21. The effect we find is robust across different specifications, and quite sizeable: A one standard deviation increase in the share of youth criminals in the municipality of initial assignment increases the probability of being convicted with an offence at the age of 15-21 by 4 percentage points (or 10%). This estimate is similar when we distinguish between crimes committed between the age of 15-17, and 18-21. We also find that for females, assignment to an area with higher youth crime conviction rates reduces individual conviction probabilities: a one standard deviation increase in area crime reduces the probability to be convicted for a crime in the age range 15-21 by 4.8 percentage points. This effect is mainly driven by area crime rates reducing the crime conviction probability while teenagers are in the age range between 15-17. We find zero or small effects of area crime rates at assignment on female conviction rates between ages 18-21. Our results add to growing evidence from quasi-experimental studies that points out gender differences in exposure to social context (see e.g. Kling, Ludwig and Katz 2005 and Kling, Liebman and Katz 2007 who also find that re-location through MTO leads to different responses for boys and girls). We discuss some possible mechanisms that drive these different responses.

Our analysis also attempts to assess the sorting of individuals across areas, and the possible bias that may occur in non-experimental studies. Although all families in our data are assigned to one of 275 municipalities in Denmark, there are no restrictions on re-location after initial assignment. We estimate the effect of the overall average exposure to the share of criminal offenders in the residence municipality, or of other area crime measures after re-location, using the share at assignment as an instrument. The

comparison with OLS results allows us to evaluate the possible sorting bias. Our results indicate that male individuals who have unobservable characteristics associated with having a lower risk of becoming criminal self-select into areas with higher rates of criminal offenders, leading to a downward bias in straightforward regressions – which is perhaps opposite to what is typically assumed. We argue that this is due to these individuals being more mobile, and areas with more legal income- and education opportunities being characterised by higher rates of criminals, and we show evidence for this.

Our analysis also adds to our understanding about which measure of area crime is relevant when estimating possible contagion effects. We show that it makes an important difference whether area crime is measured as crimes committed in the area, or as the share of criminals living in the area, when studying the effects of crime on behaviour. When we use crimes committed in the area (a measure widely used in earlier work), our estimates for males are never statistically significant. We conclude from these results that high crime rates alone may not necessarily affect later crime rates of male youth, unless criminals are also living in the area.

The outline of the paper is as follows. The next section describes the main features of the Danish Spatial Dispersal Policy on Refugees 1986-1998, the data and presents descriptive evidence. The empirical model is set up and discussed in Section III. Section IV reports the results, robustness checks and extensions. Finally, Section V concludes.

II. Background

II.1 The Danish Spatial Dispersal Policy

From 1986, the Danish Government implemented, through the Danish Refugee Council, a two-stage dispersal policy for asylum seekers who had their applications approved ("refugees").[10] The Council allocated refugees proportional to the number of

[10] Until June 2002, Denmark gave asylum to individuals who were defined as refugees not only according to the Geneva Convention, but also to individuals who would not qualify as refugees under the Convention, but who for other reasons should not be required to return to the home country ('de facto' refugees - see Coleman and Wadensjö 1999 for details).

inhabitants to counties, and, within counties, proportional to the number of inhabitants to municipalities.[11]

As soon as a refugee was granted asylum, he/she was offered assistance from the Council in finding housing. After accepting the offer, the council assigned the refugee to one of Denmark's 15 counties.[12] Having been provided with temporary housing, the local office assisted assigned refugees in finding permanent housing in one of the municipalities within the county.[13] Once settled, refugees participated in Danish language courses during an introductory period of 18 months while receiving social assistance. Although individuals were urged to stay in the assigned municipality during the entire introductory period, there were no relocation restrictions. Individuals could move away from the municipality of assignment at any time, if they could find alternative housing elsewhere. Receipt of social benefits was unconditional on residing in the assigned municipality (see Damm 2005 for more details).

Upon receiving asylum, refugees filled in a questionnaire from the Council with a few personal details: the individual's birth date, marital status, number of children, nationality, addresses of potential family relations and friends in Denmark. According to interviews with two former placement officers, the Council used the information about nationality to spatially disperse refugees in ethnic clusters.[14] The information about household composition was used to determine whether to search for housing for a single individual or family in the municipality of assignment. Over time it became increasingly difficult for the Council to find vacant rental housing in the larger and medium-sized towns which led to later arrivals of refugees being more likely to be settled in smaller towns. Hence, the Council's allocation may have been influenced by family size,

[11] At the regional level, Denmark is divided into 15 counties with an average number of inhabitants of 323,788 (in 1993). At the local level, Denmark is divided into 275 municipalities, with an average number of inhabitants of 18,838 (in 1993).

[12] The take-up rate for housing assistance, which implied random dispersal, was extremely high. In an interview, a former placement officer at the Council (former placement officer Bente Bondebjerg, Chief Consultant, Danish Refugee Council, interviewed on March 7 2008) did not recall that any refugee rejected the offer of housing assistance from the Council.

[13] On average, a refugee lived in temporary housing 6-7 months after assignment to a county, but the duration depended on the local housing market situation. Only between 0-4 % had not found permanent housing within the introductory period of 18 months (Annual reports of the Danish Refugee Council 1986-1996 and internal administrative statistics of the Danish Refugee Council 1992-1997).

[14] Interview on June 8 2001 with former placement officers, Bente Bondebjerg and Morten Iversen.

nationality and year of immigration – characteristics on which we condition in our analysis.

The Council's Annual Report (Danish Refugee Council, 1987, p. 30-31) shows that only two years after the introduction of the dispersal policy refugees lived in 243 out of the 275 municipalities. The effect of the dispersal policy on the settlement pattern of refugees is clearly visible from numbers provided by the Danish Refugee Council for 1993 on the geographical distribution of the overall population in Denmark, and of refugee and non-refugee, non-Western immigrants. Of the overall population, 26%, 59% and 15% lived in the capital and suburbs, towns, and rural areas, respectively. This contrasts with 71%, 24% and 5% of non-refugee, non-Western immigrants. On the other hand, the geographical distribution of refugees closely resembles the distribution of the overall population: 33%, 56% and 11% lived in the capital and suburbs, towns, and rural areas respectively.

Given the way the dispersal policy was implemented, there is no reason to believe that allocation of families across municipalities has been in any way in response to youth crime, or correlated to youth crime rates. This is apparent from Table 1, where we report characteristics of individuals that were assigned to a municipality (which is the spatial unit which we will use in our analysis below) with a youth crime rate in the lowest and highest quintiles of the youth crime conviction rate distribution. The characteristics refer to parents. The figures show that there are no significant difference in mean characteristics between the two groups.

II.2 Data

Primary Data Sources

Our data comes from three primary sources. First, for the full Danish population (including refugees) we have access to individual crime charge and conviction records from the Central Police Register. Second, we have individual demographic characteristics (age, current residence, id number of parents, country of origin, immigrant status, and date of immigration) from the Administrative Registers. And finally, we have educational attainment data from the Educational Institution Register and Surveys. This information

is available for the period 1980-2003. Individual records from the three registers can be linked via a unique id number.

Crime charges include the date of charge, the start date of committing the offence, and the end date of committing the offence. Crime convictions include the date of conviction, verdict, and the type of offence, and they can be linked to the start date of committing the offence. We link individual records from the Central Police Register to individual records from the Administrative Registers to construct a data set with several measures of neighbourhood crime in each calendar year 1980-2003 for all municipalities in Denmark. The age of criminal responsibility is 15, and crime committed before this age is not registered in the Central Police Register. We thus define youth crime as a crime committed by individuals between 15 and 30 years of age. Our measure of area youth criminality is the share of individuals aged 15-30 living in municipality *j* who have been convicted of a crime committed in a given calendar year. Henceforth, we refer to this share as the youth crime conviction rate of municipality *j* in year *t*. As a second crime measure, we also compute the share of all adult residents in the municipality who have been convicted of a crime committed in a given year. Finally, we compute the number of reported crimes per capita and the number of reported violent crimes per capita for each municipality and each year. These measures correspond to those used by others, e.g. Ludwig and Kling (2007).

We link individual records from the three registers and extract observations for the children of refugees who arrived to Denmark together with at least one parent between 1986 and 1997. This sample contains observations on the children (below age 15 at the time of immigration to Denmark) of all adult refugees who were assigned to a municipality by the Council under the terms of the spatial dispersal policy carried out from 1986 to 1998. We concentrate on individuals from the nine largest refugee-sending countries over the period 1986-1997, which constitute more than 90% of the of the total number of residence permits granted to refugees between 1985 and 1997:[15] Former Yugoslavia, Lebanon, Iran, Iraq, Somalia, Sri Lanka, Vietnam, Afghanistan and Ethiopia. We then define a refugee as an immigrant who meets the following two criteria. First, the

[15] For these groups, the number of non-refugee immigrants relative to the total number of immigrants (after exclusion of immigrants who were married to a resident in Denmark from a non-refugee sending country in the year of immigration) is less than 0.4%.

individual immigrated from one of these countries over the period 1986-1997. Second, at the time of immigration, i.e. the year of receipt of a residence permit, the individual was not married to: 1) an individual from a non-refugee sending country or 2) an immigrant from a refugee-sending country who had immigrated at least one year earlier. We impose the latter criteria in order to limit the refugee sample to refugees who were assigned to a location by the Council after receipt of asylum.

Refugee children are then defined as the subgroup of refugees who are under 15 years of age at the time of immigration, have at least one refugee parent resident in Denmark**,** immigrated at most one year after the refugee parent(s) and are observed in the registers until the age of 21. We exclude children who were less than 6 years old at the time of immigration since very few of them could be followed in the registers until the age of 21, and we exclude children who were older than 14 in the year of assignment. In addition, we exclude refugee children who cannot be followed in the administrative registers until the age of 21, which constitutes 5.48% of all children.[16] This results in a sample of 2,868 individuals, 54.3% of them being male. We observe the criminal activity of all children in our sample between the ages of 15 and 21. Our main measure for criminal activity is at least one conviction in the age range between 15 and 21. As alternative measures, we construct an indicator variable for at least one conviction in the age range 15-17, and at least one conviction in the age range 18-21. We also report results on the number of convictions.

We define the municipality of assignment as the first municipality where the child is observed in the registers. However, 8.2% of the sample relocates to another municipality within the same county within one year after receipt of a residence permit. Some of those may have had only temporary housing arrangements in the first location. To check robustness we use as alternative a sample where we omit this group.

[16] 3035 refugee children arrived to Denmark between age 6 and 14 together with at least one parent. We exclude 78 refugee children that had left Denmark before the age of 21, and 89 refugee children who were not observed in every year between arrival and age 21.

The Sample

Charge and Conviction Rates: In our data convictions are categorised into eight different types of offences: sexual assault, violent crime, crimes against property, other offences against the Penal Code (than the former three categories), offence against the Traffic Act, offence against the Drugs Act, offence against the Arms Act and offence against the Tax Acts or other special acts.[17] Throughout the analysis we omit offences against the Traffic Act. Individuals who are convicted for violation of the Penal Code (the first four categories) or the Drugs Act (6th category) have a criminal record for 2-5 years after the conviction/release from prison depending on the sentence (fine, conditional withdrawal, suspended or unsuspended imprisonment). Individuals who are convicted for violation of other special acts other than the Drugs Act do not get a criminal record.

In Table 2, we display the mean of criminal offence charges (first row) and convictions (second row) of the children of refugees when they are between age 15 and 21. About 28 percent of all refugees who arrived in Denmark as children have been convicted of a criminal offence committed by the age of 21. This compares to about 11 percent for Danish youths. Criminal convictions are much higher for males – 42 percent of all males in our refugee sample have been convicted of an offence committed by the age of 21, compared to 17 percent of male Danes. For women, convictions are also higher in the refugee sample: 12 percent, compared to 4.3 percent for Danish females.[18] Charge (arrest) rates are given in the first row. These are consistently higher than conviction rates, and slightly lower than arrest rates reported by Kling, Ludwig and Katz (2005) for the MTO sample (where 53% of males and 19% of females were at least once arrested).

Splitting up convictions by cause reveals that, perhaps not surprisingly, the largest contributor to crime is property crime, followed by violent crime.[19] Note that the

[17] Other special acts cover e.g. marketing, pharmacy, trade and restaurant laws.
[18] Numbers for Danes are computed from a ten percent random sample of 21 year old Danes observed over the period 1997-2003.
[19] Splitting up property crime further shows that –of those who are convicted at least once for a property crime - 67 percent of males and 86 percent of females are convicted for theft. Males have also convictions for burglary (19 percent), fraud (13 percent), handling of stolen goods (13 percent) robbery (12 percent) and vandalism (9percent). For females, the only other larger category is forgery (6 percent).

categories in Table 2 can overlap as the same individual may be convicted for more than one crime type.

In the lower panels of the Table, we break down overall charge- and conviction probabilities by age range (15-17, 18-21). For males, the sum of the rates in the two age categories 15-17 and 18-21 is considerably higher than the total rate over the age range 15-21, suggesting that 36% of males who are convicted for a crime committed between age 15-17, are also convicted for a crime committed between age 18-21. For females, there seems to be a far smaller overlap, with only 9% of all those who are convicted between age 15-21, being convicted at least once in both age ranges.

Area Crime Rates: The main area crime rate in our analysis is the youth crime conviction rate in the municipality, measured as the proportion of all individuals aged 15-30 in the municipality who commit an offence in a given calendar year (which we relate to the year of assignment of our sample individuals) for which they are later convicted. The mean youth crime conviction rate varies between 1.73 percent and 2.04 percent over the period 1986-1996. In Table 3, we display the correlation between youth crime conviction rates, overall crime conviction rates, and reported crimes per capita and violent crimes per 10,000 inhabitants, across municipalities and over time, between 1986 and 1996. In the last row, we report the mean and standard deviation for each variable. Important here is to note the relatively low correlation between the youth crime conviction rate and reported crimes per capita – the correlation coefficient is 0.55.

Individual Mobility after Assignment: As we discuss above, individuals are free to move out of an area of initial assignment. The degree to which this happens is important for assessing the coefficients we estimate below. In Table 4 we report the relocation rate out of the municipality of initial assignment by calculating the empirical survival rate for every year since assignment. The numbers point at 52 percent of post-reform refugee children still living in the municipality of assignment seven years after assignment. Further, at the age of 21, 47% of individuals in the refugee children sample are still living in the municipality of assignment (see Table A1). The figures are similar for males and females, with females having a slightly lower probability to move out of the area of first assignment starting from about 5 years after assignment.

Individual and Area Characteristics: Summary statistics on characteristics for all individuals in our sample and their parents are given in Table A.1, Part A. In the Table, we distinguish between males and females, and individuals who do, and do not move out of the area of initial assignment until age 21 ("movers" and "stayers").

In Table A.1, Part B, we report area characteristics, drawing distinction between the same groups than in Part A. The first panel of the table reports area characteristics of the initial municipality of residence in the year individuals have been assigned. The second panel reports the same area characteristics, but of the municipality where individuals choose to live at age 21. Finally, the last panel reports the area characteristics at the time of assignment in the area where individuals choose to live at age 21. We will come back to these statistics when we discuss our results. Here we would like to note that area characteristics at initial assignment are almost identical for males and females, suggesting that there are no gender differences in assignment areas. This is of course to be expected given the design of our experiment.

III. Empirical Methodology

In the first part of our analysis we estimate the effect of the share of youth convicted for a crime in the area of initial assignment in the year of assignment, on the probability that the children of assigned refugees are convicted for a crime committed in the age range 15-21, as well as 15-17, and 18-21. Our basic specification is as follows:

$$(1) \qquad y_{ijt}^{15-21} = a + bCR_{ijt} + X_{it}c + A_{ijt}d + T_t + \varepsilon_{ijt}$$

where subscript *i* refers to individuals, subscript *j* to municipalities of initial assignment, and subscript *t* to the year of assignment. The variable y_{ijt}^{15-21} is an indicator that takes the value 1 if individual *i* assigned to location *j* in year *t* is convicted of a crime committed in the age range 15-21 (alternatively, we use convictions in the age range 15-17, and 18-21). The variable CR_{jt} denotes the youth crime conviction rate in municipality *j* in the assignment year *t*. To check the sensitivity of our results to other crime measures, we use

alternatively overall rates of committed crimes, committed violent crimes, and overall crime conviction rates.

The vector X_{it} denotes individual background characteristics in the year of assignment to account for differences between individuals in pre-assignment characteristics. Variables in X_{it} include dummies for the country of origin and the gender and age of the individual, a dummy for living with a single parent, dummies for number of siblings (six categories: 0, 1, 2, 3, 4, ≥5), dummies for educational attainment of father and mother (four categories: 0-9 years, 10-12 years, more than 12 years, unknown), and dummies for age of father and mother in the year of assignment (eight categories: <25, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, >55). The dummy variables T_t denote year of assignment, and ε_{ijt} is an error term. Summary statistics for all personal attributes in X and T are shown in Table A.1, Part A.

The key parameter of interest is b. Unconditional on other area background characteristics this parameter measures the differences in individual conviction probabilities due to differences in the share of convicted offenders in the area at assignment and associated differences in other area characteristics.[20] This is in itself an interesting and important parameter. However, it may be an over- or underestimate of the effect on later convictions that works only through exposure to criminals in the area of initial assignment. If, for instance, areas with higher crime conviction rates have positively associated characteristics (like social deprivation, poverty, crime prevention measures etc) that, at the same time, affect convictions of individuals randomised into these areas conditional on crime conviction rates, then the estimate of b is an over- or underestimate of the effects of crime conviction rates on criminal behaviour.

Although we will not be able to identify the "pure" social effect of area crime conviction rates on conviction probabilities, conditioning on a fairly large set of area characteristics on municipality level allows us to assess magnitude and direction of the impact of associated differences in neighbourhood characteristics. In our regressions, area characteristics for each individual are measured for the year in which the individual has

[20] Kling, Liebman and Katz (2007) point out that this interpretation implies a linearity assumption between a scalar index of neighbourhood quality and the outcome, and proportionality between the crime conviction rate and this index.

been assigned to a particular municipality. In (1), we summarise area characteristics in the vector A_{jt}.

Summary statistics of area characteristics included in our regression are reported in Table A.1, Part B. The correlation coefficients between area characteristics, and various measures of area crime are reported in Table A.2. We define three sets of area variables. First, socio-economic conditions in the area, which we measure by the log of the number of inhabitants, the labour force participation rate, the log of the average gross income and the Gini coefficient. The "size" of the municipality is likely to be related to criminal activity, as discussed in previous papers, as it may directly impact on returns to crime and arrest probabilities, as well as opportunity (see e.g. Glaeser, Sacerdote and Scheinkman 1996 for discussion). The labour force participation rate is an indicator for opportunity in the legal sector. The log of the average wage and the Gini coefficient are indicators for area wealth and inequality. The correlation coefficients in Table A.2 point at youth crime conviction rates being positively correlated with municipality size and inequality, and negatively correlated with labour force participation. Perhaps surprising is the positive (although small) correlation with mean gross income; this may be explained with income being higher in metropolitan areas, where crime rates are also higher.

Second, we condition on school resources. Our measure here is the mean number of teacher hours per pupil. More school resources may lead to crime reduction. For instance, Lochner and Moretti (2004), exploiting changes in state compulsory school attendance laws over time to estimate the effects of schooling on crime, find that schooling significantly reduces the probability of incarceration and arrest. Mean teacher hours per pupil are positively correlated with crime rates – which may be due to authorities reacting to higher crime rates by allocating more school resources.

Finally, we condition on variables that reflect the efficiency and presence of police services in the area. Levitt (1997), exploiting electoral cycles in police hiring to estimate the effect of police on crime, finds that the size of the police force reduces violent and property crime. We condition on the crime detection rate, computed as the number of charges relative to the number of reported crimes and the number of police officers per 1000 inhabitants. Both are positively correlated with area crime. One explanation for the positive correlation between youth crime conviction rates and the two

measures of police presence and efficiency could be that in areas with more police resources, more criminals are convicted for crimes. Kling, Ludwig and Katz (2005) point out that better policing may deter criminal behavior, but also increase arrest probabilities. Another explanation is that more police resources are allocated to areas with higher crime rates.

IV Results

IV.1 Unconditional Raw effects

In Figures 1a and 1b we present the relationship between youth conviction rates across areas of initial assignment and the probability that assigned youths have at least one conviction for a crime committed between the age of 15 and 21, for males and females. We distinguish between municipalities in the 1st and 2nd, and the 5th quintiles of the distribution of area youth crime conviction rates, where the distribution is computed over all assignment years and all municipalities. The difference between the 1st /2nd and 5th quintile is about **XX - Anna** standard deviations of the youth crime conviction rate in the municipality of assignment of individuals in our sample.

Figure 1a shows a sizeable difference in the mean conviction rate for male individuals who were assigned to areas in the lowest two quintiles, and the highest quintile of youth conviction rates. Assignment to an area with low crime conviction rates leads to substantially lower probabilities of later convictions already at age 15. By age 21, young men who as children (and before the age of 15) have been assigned to an area in the 5th quintile of the crime conviction rates are about 7 percentage points more likely to have a conviction than men who have been assigned to an area with conviction rates in the lowest two quintiles. For females (Figure 1b), there are smaller differences between assignment to high- and low crime conviction areas, and they point in the opposite direction: by age 21, those who were assigned to an area with high conviction rates have lower probabilities of convictions.

In Figures 2a and 2b, we illustrate the relationship between convictions at age 15-21 and the share of convicted criminals in the assignment municipality at assignment

in a different way. The figures plot (for males and females) the rate of convictions of refugee children between the age of 15 and 21 against the mean youth crime rate of each assignment municipality, averaged over the years of assignment of individuals, weighted by the proportion of refugee children assigned in a given year. The solid line is the linear regression relationship between these aggregates.[21] For men, the line shows a clear upward slope. A one standard deviation increase in the youth crime conviction rate (.68) increases the probability to be convicted between age 15 and 21 by (.68*.038=) 2.6 percentage points. For females, on the other hand, it shows a slight downward gradient. These results suggest a positive effect of area conviction rates at assignment date on later conviction probabilities for males, while the relationship for females is smaller, and point in the opposite direction.

IV.2 Main Estimation Results

We now turn to results from estimating Equation (1). As we discuss in Section II.1, although the parents of the individuals we consider here were randomised into municipalities, considerations about family size and nationality may have been taken into account by local councils to determine where appropriate housing could be found. Further, the year of assignment determined partly the degree of urbanisation of the assignment municipality. We now condition on these characteristics. In addition, to take account of random differences in pre-assignment characteristics, we condition on other parental background characteristics. Finally, we also report results where we condition on a set of neighbourhood characteristics at assignment to account for neighbourhood characteristics that may be associated with crime and individual conviction probabilities alike.

We present our main results in Table 5. In the first row, we report results where the dependent variable is an indicator variable for a conviction for a crime committed in

[21] This corresponds to regressing average convictions by area and year of assignment on average crime rates by area *j* and year *t* of assignment: $\bar{y}_{jt}^{15-21} = \alpha + \beta \overline{CR}_{jt} + e_{jt}$.

the age range between 15-21; in rows two and three, we distinguish between convictions for crimes in the age range 15-17, and 18-21 respectively. As our sample refers to youth assigned to an area between the age of 6 and before the age of 15, with the average age at assignment being 11 years (see Table A1), convictions for crimes committed at age 15 or later are – on average – convictions for crimes committed 4 years post-randomisation.

In the upper panel of the Table we display results for males, and in the lower panel results for females. The coefficients are normalised by the standard deviation of area youth crime conviction rates across all assignment areas and assignment years. Specification 1 conditions on year of entry fixed effects and country of origin fixed effects. Specification 2 conditions additionally on age at entry dummies and family background characteristics (dummy for single parent, number of siblings, father's and mother's educational attainment and age), all measured at the time of assignment. Specification 3 includes area characteristics measuring the socio-economic context of the neighbourhood, in particular the labour force participation, the log of the number of inhabitants, the log of average log gross income, and the Gini coefficient in the assignment year**.** Specification 4 includes in addition as a measure of school resources, the mean number of teacher hours per pupil. Specification 5 includes measures of police efficiency and presence: the crime detection rate and the number of police officers per inhabitants. The standard errors take account of clustering of the observations by municipality of assignment and assignment year.

The results for males in the upper panel in the table point at a positive effect of the share of convicted criminals in the area of first assignment at assignment date on conviction probabilities later on. The estimate of a standard deviation increase in the area crime rate on the probability on the conviction probability increases slightly from 2.1 percentage points (conditioning only on origin and year of entry dummies, column 1) to 2.8 percentage points when we introduce age at entry and family background characteristics, and the coefficient is significant at a 5 percent level. Given the overall conviction rate of 42% for male refugee youths (the likelihood to be ever convicted for a crime committed between ages 15-21), a one standard deviation higher youth crime rate increases the probability of a crime conviction by around 6 percent. Conditioning on socio-economic area characteristics in addition leads to an increase in the coefficient

estimate to 3.8 percentage points, or 9 percent, suggesting that the set of included area characteristics is related to the overall area crime rate at assignment and the individual propensity to become criminal in an opposite way. It is not clear which particular area characteristics drive this, though. No clear pattern is visible, and none of the variables is individually significantly different from zero, conditional on area crime. The coefficient estimate increases slightly when we condition on school resources in addition, and – as in column 5 - on police efficiency and police presence.

When distinguishing between convictions in the age range 15-17 (row 2) and 18-21 (row 3), no systematic difference in coefficient estimates is visible. Given the way we have constructed our sample, results for the second age group (18-21) measure crime conviction rates at least 4 years and, on average, 8 years after assignment. Estimates are similar to those reported in the first row. Thus, exposure to a higher share of criminals convicted for crimes committed in the year and area of initial assignment leads to a higher likelihood for males to be convicted for a crime in both age ranges.

For females, results are reported in the lower panel of Table 5. The estimates are opposite to what we find for males: Crime convictions in the age range 15-21 are negatively affected by the share of convicted criminals in the area and year of assignment. Unconditional on area characteristics, an increase in area conviction rates by 1 standard deviation decreases conviction probabilities by 2.4 percentage points, or 20 percent. Conditioning on area characteristics increases this coefficient in magnitude; in particular area policing seems important. The estimates in the last column suggest a decrease in conviction probabilities by 4.8 percentage points for each standard deviation increase in initial crime conviction rates. As we discuss above, heterogeneity in policing may on the one hand be positively related to area crime conviction rates (either because better policing leads to more convictions, or because areas with more criminals attract more police resources). On the other hand, it may lead to higher or lower conviction rates of individuals assigned to areas, as better quality of local policing may lead to more arrests, or to fewer arrests through deterrence. The correlation between policing measures and crime rates is positive, as we report in table A2; the partial correlation conditional on other included area characteristics is likewise positive. Further, the number of police

officers per 1000 inhabitants at assignment has a positive effect on convictions for females, which explains the increase in the coefficient of area crime in absolute terms.

The effect of area crime on female conviction rates is largest for the age group between 15 and 17. When we distinguish between convictions in the age range 15-17, and 18-21, it seems that the overall estimates are mainly driven by a negative effect of area conviction rates on convictions of girls for crimes committed in the first age bracket. Except for the last specification (which conditions on area policing) all estimates for the age bracket 18-21 are smaller and not statistically significant, though with a negative sign throughout. As we show in Table 2, the proportion of females who are convicted for crimes committed in both age brackets is low, which is different for boys.

The large gender differential in the response to crime conviction rates in the area of initial assignment suggests that the way girls react to neighbourhood crime is fundamentally different from boys. We will investigate this gender difference in more detail below.

IV.3 Effect of overall exposure to crime on conviction probabilities and re-location choices

The parameter estimates we present in Table 5 answer the question how assignment of individuals to areas with different youth crime rates affect their probability of conviction for a criminal offense committed between ages 15-21. Although in our experiment individuals are randomly dispersed initially across municipalities, there are no restrictions on leaving the area of initial assignment. The numbers in Table 4 show that about 1 in 3 assignees leave the area of initial assignment within the first four years after assignment.

Crime rates in areas after re-location may differ from those in the initial assignment area. The effect of the average youth conviction rate in both the assignment area, and the area(s) to which individuals (or their families) have chosen to migrate after initial assignment, on the individual conviction probability may thus be smaller or larger than the assignment effects we report in Table 6. Further, individual moves away from

the initial assignment area are likely to be non-random, and OLS estimation will lead to biased parameter estimates if individuals' mobility choice is related to crime rates in areas as well as their own propensity to commit criminal acts. Using initial assignment area conviction rates as instruments for the overall exposure effect allows us to estimate the effect of average exposure, or of crime rates measured at various stages after re-location. Comparison of these results with OLS estimates will help to shed some light on the direction of bias one may encounter through non-random sorting in non-experimental studies.

We construct for each individual the average exposure to youth crime in areas of residence after assignment, and up to the age of 15. We do that by computing the weighted average youth crime rate from the age of initial assignment until the age of 15, where the duration of residence are the weights, summing to 1 for each individual. We then instrument this variable with the youth crime conviction rate at assignment in the area of assignment.

In Table 6 we display our estimates; again, we distinguish between convictions for crimes committed between 15 and 21, and in the two age groups 15-17, and 18-21. In the first row, and as a point of reference, we show the initial estimates from specification 5 in Table 5. In the next row we present OLS estimates for the same specification, but where we condition on the weighted average crime rate of individuals in the areas where they live after initial assignment (but before the age of 15). For males, the point estimates are smaller than the estimates of crime rates at initial assignment. For females, estimates decrease also in absolute size, and remain negative. In the third row we report the first stage results, obtained by regressing the average youth crime rates in the municipalities of residence until the age of 15 on the youth crime rate in the area of initial assignment. The youth crime rate in the area of initial assignment is a strong predictor for the average youth crime rates in the municipalities of residence until age 15. The partial correlation between the average youth crime rate and the youth crime rate in the area of initial assignment is 0.17 for men and 0.16 for women.

The estimates in the last row are the IV estimates, which are equivalent to the indirect least squares estimates, formed by the ratio of the estimates in the first row and the first stage estimates. The point estimates for males suggest that a one standard

deviation increase in area conviction rates over the period of exposure (and up to the age of 15) leads to an increase in the probability to be convicted in the age range between 15-21 by 6 percentage points. The estimate for ages 18-21 is basically identical, while the estimate for ages 15-17 is slightly smaller. For females, the IV estimates decrease relative to the OLS estimate, and are all statistically significant.

We first note that the coefficient estimates in the last row are larger for both males and females in absolute size than those in the first row. Let $\hat{\beta}_{IV} = \hat{b}_{OLS} \frac{Var(CR)}{Var(CR) + Cov(CR, \Delta)}$, where $\hat{b}_{OLS}$ and $\hat{\beta}_{IV}$ are the assignment effect and average exposure effect in the first and the last row of the Table. Further, $Var(CR)$ and $Cov(CR, \Delta)$ are the variance of the initial assignment area crime rate, and the co-variance between the initial assignment area crime rate, and the difference between the assignment area crime rate, and the average crime rate up to age 15. In our case, $Cov(CR, \Delta) < 0$, which means that the estimate in the last row weights the assignment estimate upwards: the causal effect of crime exposure up to age 15 is larger than the effect of crime at the first assignment area, through changes induced by mobility as well as changes in crime rates over time. The reason is that the difference in crime rates in assignment areas and average crime rates across residence areas is negatively correlated with the crime rate in the area of initial assignment. Consistent with that, we find in our data that the correlation coefficient between the change in area crime rates, and the crime rate in the initial area is equal to -0.5, suggesting that families assigned to low crime areas move to relatively higher crime areas than families allocated to higher crime areas.

Further, the IV estimates are larger in absolute magnitude than the OLS estimates for both boys and for girls, and for all age categories. For boys, this suggests that those who are less likely to commit a crime select themselves into areas with higher crime conviction rates. This selection may seem at first view surprising. But areas with higher crime rates are at the same time be areas that offer more opportunity, both in terms of further education as well as future careers. For instance, Glaeser and Sacerdote (1999) find that cities create both positive and negative agglomeration economies. The increase in the estimates from OLS to IV for boys may thus be explained by those who have a low

crime propensity to moving to areas with more educational or labour market opportunities, which are at the same time areas with higher shares of convicted criminals.

This interpretation is compatible with the numbers in Table A.1, part B, where we report the municipality of assignment characteristics (first panel) and the municipality of residence characteristics at age 21, measured at assignment date, for different groups: all individuals, males, females, and individuals who move, and who do not move out of the area of initial assignment until age 21. At assignment date, the youth crime conviction rate is smaller in the municipality of assignment than in the municipality of residency at age 21 (2.29, compared to 2.53). At the same time the number of educational institutions for qualifying education is larger at assignment date in current residence areas than in assignment areas (7.4, as compared to 11.1), suggesting that individuals move to areas with more opportunity but – at the same time – higher crime rates.[22]

Are those who move more likely to obtain higher education later on? To investigate that we regress an indicator variable as to whether the individual is enrolled in higher education by the age of 21 on parental background characteristics at assignment, municipality of assignment characteristics and an indicator variable for having moved away from the municipality of assignment by age 21. The latter variable is highly significant, with a point estimate of 0.09, supporting the hypothesis that moving away from the assignment area is associated with obtaining higher education.

When we compare the characteristics of areas to which individuals were assigned, and where individuals live when they are 21 (evaluated at the assignment date), we see the same pattern for females than for males: Females who move tend to go to areas with more educational institutions, and higher youth crime conviction rates. Also, the difference in youth crime conviction rates between males and females in assignment- and re-location area for those who move within the first years of assignment (and before turning 15) are not different for females than for males: for both males and females, re-locations are – on average – consistently into areas with higher youth crime conviction rates.

[22] When we compare the crime conviction rate in the area of origin and destination, we find that families that move away from the area of initial assignment move consistently to areas with higher crime conviction rates. On average, the increase in crime conviction rates in areas of origin and destination for those who move during the first three years after assignment is above 10 percent.

However, the selection with respect to crime propensity seems to be different across gender: The larger negative IV estimates suggest that girls who are more (less) likely to commit crime move to areas with higher (lower) crime conviction rates. To investigate that, we compare the crime rates for those who move out of the assignment area before age 21, and those who stay until at least age 21, by gender. Men who move have a 3.2 % lower probability to be convicted for a crime between age 15 and 21, while women who move have a 39.5% higher probability to be convicted. If we run regressions of the probability to be convicted between age 15-21 on all variables included in specification 5 in Table 5 (including the crime conviction rate in the area of initial assignment), and a dummy variable for moving, the estimate for males is -0.031 (0.026), and for females 0.045 (0.015). [23]

There are two interpretations for this finding. First, families with boys and girls moving away from the area of initial assignment are differently selected in terms of crime propensities of their off-springs. Secondly, the move itself may create disruptions for females that enhance their probabilities for later convictions.

These results add evidence to previous work based on the MTO experiment that selection processes may work differently than usually believed (see Kling, Liebman and Katz 2007). Our results for males suggest that non-experimental studies relating individual youth propensities to area crime may underestimate possible contagion effects due to sorting, dominated by youth who look for opportunities in areas with higher crime rates. To investigate this further, we have estimated other specifications that correspond to typical non-experimental studies based on cross-sectional data. For instance, we regress conviction probabilities between 15 and 18, or 18 and 21, on the crime conviction rate in the municipality of residence at 15, or in the municipality of residence at age 21. In all specifications, the IV estimates are larger in absolute magnitude than the OLS estimates; furthermore, selection points in the same direction as in the results reported above.

[23] Kling, Liebman and Katz (2007), comparing OLS estimates based on the control group only, and IV estimates using site-treatment interactions as instruments for neighbourhood poverty, also find opposite selection processes for adults and families with female teenagers and male teenagers. While families with females likely to have adverse outcomes move to low poverty neighbourhoods, families with male teenagers likely to have beneficial outcomes move to low poverty areas. They conclude that identifying the direction of bias in non-experimental studies of neighbourhood effects can be more complex than usually assumed.

IV.4 Local Area Crime Measures

Next, we investigate how sensitive our results are to alternative measures of area crime. The measure of area crime we use above is the share of individuals who are living in the area of initial assignment, and who committed at least one crime in the year of assignment for which they are later convicted. An alternative are measures of crimes committed in the area. For instance, Ludwig and Kling (2007) use the number of violent crimes reported to police per 10,000 residents for the police beat in which families have lived since random assignment. As we discuss above, if crime behaviour of young people is affected by exposure to criminal behaviour in the immediate environment, via contagion mechanisms or contextual effects, then a measure of committed crimes in the area may only imperfectly reflect this, as criminals may live in other areas than where they commit crimes. This is supported by the low correlation coefficients between youth crime conviction rates and area crime rates (reported crimes per capita), as reported in Table 3.

To investigate the sensitivity of our results to measures of area crime, we re-estimate specification 5 in Table 5. We report results in Table 7. Again, we distinguish between a crime committed in the age ranges 15-21, 15-17, and 18-21. As a point of reference, we report the respective estimates from specification 5 in Table 5 in the first row. In the second row, we condition on the number of *reported* crimes per capita. For both males and females, the coefficient estimate becomes small and insignificant. In the third row, we condition on the number of violent crimes reported per 10,000 inhabitants – which is the measure used by Ludwig and Kling (2007). For males, the estimate remains smaller than in the specification in the first row, and none of the estimates is statistically significant. For females, the estimates retain their negative sign; for the age group 15-17, the estimate is slightly smaller than the effect of the youth crime conviction rate in the first row, and significant at the 10 percent level.

In the fourth and fifth row, we report results where we use the overall area crime conviction rate (row 4) as well as the overall crime conviction rate, but conditional on the youth crime conviction rate, as regressors. For males, the coefficient of the overall conviction rate decreases in magnitude, and is significant at the 10 percent level for the age group 18-21. For females, both the overall coefficient and the coefficient for the age

group between 15 and 17 increase in magnitude, and estimates are significant at the 1 percent level. When conditioning on the youth crime rate in addition, the conditional effect is imprecisely estimated, but similar in magnitude than the estimate for the overall crime conviction rate.

One conclusion we draw from these results is that the choice of the measure of area crime is important to detect possible contagion effects. For instance, based on our results using the number of reported crimes (or violent crimes) per capita as a measure for area crime, we would have concluded – as did Ludwig and Kling (2007) – that there is no evidence that children allocated to areas with higher crime rates are more likely to be convicted for a crime later on in life. The results also suggest that the crime propensity of young males in our data is affected by the concentration of youth criminals in the area of initial assignment, which speaks in favour for mechanisms that are based on social interaction with criminals as the reason for higher crime conviction probabilities later in life. Further, we would like to note that for females, and in particular when we consider the age range between 15-17, all measures of crime result in a negative coefficient estimate, which is sizeable in most cases, and significant at least at the 10 percent level in four of the five specifications. We will come back to this in section **X**.

IV.5 Alternative Assignment Definitions and Crime Charge Rates

Next, we provide a number of robustness checks and alternative estimates using different measures of criminal behaviour. As we discuss in Section II, 8.2 percent of our sample re-locates within the first year of assignment within the county of assignment. These re-locations could be random and initiated by the refugee council, as the first location may be temporary housing; they could also be re-locations chosen by the individuals' parents. In the results we report in Table 5, we have assigned individuals the first location as assignment municipality. As a point of reference, we report these results for the age bracket 15-21 in the first row of Table 8. In the second row of the Table, we report estimates from an alternative specifications where we exclude the 8.2 percent of

the sample that moves within the first year of assignment, and within the county. The estimates we obtain (row 2) are very similar to those in the first row.

The measure we use for criminal behaviour is an indicator variable measuring whether the individual committed a crime between the ages of 15-21 for which he or she was later convicted. We believe that this measure is more appropriate than charges or arrests, as there may be more unsubstantiated charges in areas with higher youth crime rates, thus leading to a spurious correlation between crime charges and area crime conviction rates. However, an alternative and more widely used measure would be the charge (or arrest) probability. In the fourth row of Table 8, we report the results for this alternative specification. Again, the results for both females and males are similar to those in the first row.

In the last row, we use the number of convictions as a dependent variable. For males, repeated convictions are common: 18% of the sample has – by the age of 21 – one conviction only, while 8.8% have 2 convictions, and 14% more than two convictions. For females, the majority of those who have convictions have just one conviction (8.5%, compared to 1.8% with more than one conviction. When we use the number of convictions as dependent variable, the coefficient estimates for males more than double in magnitude, suggesting that the area crime conviction rate at assignment has a larger effect on the number of convictions for individuals who get involved in crime than on the probability to be convicted by age 21. For females, estimates are similar, though slightly smaller, than those in the first row.

IV.6 Crime-Specific Convictions

So far, we have not distinguished between convictions for different types of crime. In table 9, we report results where we distinguish between convictions in the main crime categories we distinguish in our data (see Table 2), using specification 5 in Table 5. We report results for males in the first panel, and for females in the second panel. The first row in each panel shows results for convictions in any category.

For males, the largest estimate of an increase in the share of convicted criminals in the assignment area is on convictions for property crime. The estimates are very

similar than those for overall convictions. This is not surprising, given that 76% of all males convicted for a crime have a conviction for a property crime. An increase in the share of convicted youth criminals in the area of assignment at the time of assignment has also an effect on drug related offences, in particular for the age category 18-21. Although the estimate is smaller in magnitude, the percent effect is larger than for property crime: A one standard deviation increase in the share of youth criminals leads to a 2.4 percentage point increase in drug related offences, or to a 40% increase in convictions for drug related offenses. There is no evidence that youth crime conviction rates in the assignment area affect convictions for violent crimes – which is the second largest crime category for males, after property crimes (see Table 2).

For females, the only effect youth crime conviction rates in the area of assignment have is on property crimes. Again, this is not surprising, as 83% of all female convictions are convictions for a property crime. The coefficient estimates are mainly driven by convictions in the age range between 15 and 17.

IV.7 Further Extensions

We have estimated other specifications to investigate more closely the different mechanisms that may determine the way area youth crime conviction rates affect individual crime behaviour. In this section, we report some of these findings.

Adult Crime and Intergenerational Transmission: One important question is whether adults in our sample are equally responsive to crime conviction rates in the area than youth. If that was the case, then one possible mechanism through which crime propensities of children could be affected by area conviction rates at assignment is through the parent. To investigate this, we regress the conviction rates of the parents of our refugee children 7 years after assignment on the youth crime conviction rate in the area of initial assignment, the number of reported crimes per capita, and the overall crime conviction rate in the assignment area (using the same specification as in column 5 in Table 5). We report results in Table A3 in the Appendix. In all cases, the estimates are very small and never statistically significant, pointing at no effect of local area crime conviction rates on crime rates of assigned refugee parents. We conclude that

intergenerational mechanisms do not explain the effects of area crime on criminal convictions of young people in our sample.[24] Further, the finding that parents (whose average age at assignment is 37 for fathers and 36 for mothers**)** seem not to respond to area crime rates suggests that the effects we find for males are due to contagion, and this mechanism is particularly effective at a young and formative age.

Parental Education: One important question is whether there is heterogeneity in responses to area crime conviction rates according to parental background. We estimate specifications 5 in Table 5, interacting the area youth crime conviction rate with indicator variables whether the mother, the father, or both mother and father have obtained at least an intermediate level of education. For all age ranges, and for males and females, the point estimates suggest that youth crime conviction rates in the area of assignment have a smaller effect on conviction rates of youth in households where the father and/or the mother have at least a medium level of education. However, none of these estimates is significantly different from zero.

Gender-Specific Crime Rates: Another question we have investigated is whether conviction probabilities of young males and females are affected by male criminals in the area, or by males and females alike. We re-estimate our model distinguishing between male and female conviction rates in the area of initial assignment, based on specification 5 in Table 5. For males, conviction probabilities are affected only by male area of assignment conviction rates: The point estimate (standard error) on the male area conviction rates is 0.051 (0.023) – very similar to the overall conviction rate - while the point estimate of the female area conviction rates is negative and insignificant (-0.015 (0.023)). For females, the youth crime conviction rates of both males and females seem to affect conviction probabilities, with estimates being -0.025 (0.016) and -0.032 (0.015); both estimates are significantly different from zero, with a slightly larger point estimate of the coefficient for female youth conviction rates.

[24] We do find a strong association between parental crime convictions and those of their parents, but unchanged effects of the municipality of assignment crime rate on criminal activity. While boys' conviction probabilities relate strongly to the father's criminal convictions, girls react to both father and mother, but stronger to mothers. See also recent work by Hjalmarsson and Lindquist (2007) on associations between criminal activity of fathers and their children.

Non-linear Effects: To investigate whether the effect of the area conviction rate is nonlinear, we estimate models where we add a squared term of the area youth crime conviction rate at assignment. We report results in Table A4 in the Appendix. As before, area crime conviction rates have mean zero and standard deviation one, so that the non-linear effect is evaluated around the mean of the conviction rate. For females, the squared term is very small in magnitude, and with a large standard error, suggesting that the effect of area crime conviction rates is linear. For males, the squared term is negative and significant. The findings indicate that the effect of youth crime conviction rates in the area decreases with increasing area crime conviction rates. In areas with youth crime conviction rates one standard error below the mean, the effect of a one standard error increase in the crime conviction rate increases from 4.7 percentage points to 6.6 percentage points.

IV.8 Explaining Gender Differences

Our findings show that the share of convicted youth criminals in the area of assignment has a positive and significant effect on crime conviction probabilities of males, while the effect for females is negative. Before we suggest some explanations for this gender differential, we would like to note that our results are in line with an increasing number of studies with an experimental research design that point at gender differences in response to social context. For instance, based on a natural experiment where students were randomly assigned roommates, Kremer and Levy (2003) report that being assigned to a roommate who drank prior to college has a strong effect on males' academic performance, but there is no evidence of an effect on females' performance. Based on the MTO experiment, Leventhal and Brooks-Gunn (2003) find some evidence that mental health for boys, but not for girls, was improved by moving to better neighbourhoods. Kling and Liebman (2004) find differences between males and females in estimated neighbourhood effects for mental and physical health, education and substance use. Katz, Kling and Liebman (2001) finds that MTO re-allocation led to a decline in behaviour problems among boys in both the Experimental and Section 8 Comparison groups, but had no noticeable impact on girls. Kling, Liebman and Katz

(2007) conclude that female and male youth in the MTO treatment group responded to similar new neighbourhood environments in different ways along various dimensions.

Kling, Ludwig, and Katz (2005) find large gender differences in their study of assignment effects to the MTO experimental group on youth crime arrests. While assignment to treatment decreases the violent crime arrests for both males and females in the immediate period after random assignment, several years later, property arrests become higher for males in the experimental group. Closest to our study is perhaps the work by Ludwig and Kling (2007). Their findings for females are not dissimilar to ours (their Table 4, first panel): their IV point estimates of beat violent crime rates on female arrest probabilities are negative and significant when they condition on tract minority share, poverty or both.[25]

What are the possible reasons for the different response of females and males to local crime conviction rates? A large literature in criminology points at evidence that males and females react differently to detrimental neighbourhood conditions. Mears et al. (1998) point out that boys may be differentially exposed to, and affected by, the same crimogenic conditions. Building on earlier work by Sutherland (1947) and Gilligan (1982), they argue that males, given the same choice, are more likely than females to have delinquent friends (see also Johnson (1979) and Morash (1986) among others, who argue that males are more likely to have friends that support delinquent behaviour). In line with this, Kling, Ludwig and Katz (2007) point at research by Clampet-Lundquist et al. (2006) which – based on interviews with youth from the MTO experiment – points at male youth having experienced more negative peer effects, as they spent their free time in closer proximity to illegal activity than females. Further, so Mears et al. (1998), once exposed, the same negative peer influence is reduced or even counteracted by females, due to stronger negative moral evaluations.[26] Hence, these theories suggest that females are less affected by, or even counteract, exposure to a criminal context.

[25] The differential response of boys versus girls to criminogenic conditions is also documented in the social science literature (see e.g. Mears, Ploeger and Warr 1998 for a review of existing work). Piquero, Gover, MacDonald and Piquero (2005) find a positive association between male delinquency and delinquent peers, but a negative relationship for females.

[26] Moffitt, Caspi, Rutter and Silva (2001) (among others) provide empirical evidence for males being more likely to have delinquent peers. Huesmann and Guerra (1997) find significant gender difference in normative beliefs, with females having more favourable normative beliefs than males about aggression and antisocial behaviour.

Criminals in the area may also affect individual crime behaviour through role models.[27] Focussing on a definition of role models as being a means of providing information about the present value of current actions, Chung (2000) develops a social learning model to show how individual behaviour changes if other individuals succeed in particular tasks. In a negative role model, on the other hand, the observation of failure may change the belief about the individual's own failure, and thus induce behaviour that aims at avoidance. Males and females may interpret the same criminal peer context in different ways. For instance, Stark (1987) points out that criminals in the neighbourhood may serve as role models that encourage deviant behaviour. But females may perceive this in opposite ways: As pointed out by Steffensmeier and Allen (1996), crime is stigmatizing for females, and its potential cost to life chances is much greater than for males. Also, according to the same authors, females are restricted to lucrative crimes, and the range of "career" paths and access to them. Thus, female criminals who are convicted for criminal behaviour may have a negative role model effect, inducing avoidance rather than encouraging similar behaviour. In line with that explanation is our finding that for females a main driver for the negative effect on female crime conviction rates is the crime conviction rate of females – see our discussion above.

A further explanation for our findings may be that girls are "shielded" from delinquent peers through parental intervention. Sociological and criminological studies stress the importance of parental care and supervision (see Hirschi 1969 and Nye 1958) and point out that parenting is a most salient force (Ingoldsby and Shaw 2002, Dishion and McMahon 1998). Nye (1958) and Seydlitz (1991) illustrate gender differences in parental supervision, with parental controls having a greater effect on females than on males. These authors point out that daughters are more likely to subdue to parental control than sons, and that parents are less tolerant of peer relationships of their daughters

[27] Role models may affect behaviour through influencing preferences, or by providing information about the present value of current decisions (see Allen 1995 for a discussion). Role models may be positive or negative. Lockwood, Jordan and Kunda (2002) and Lockwood, Marshall and Sadler (2005) show that groups of individuals divided along cultural or ethnic lines may be inspired by positive or negative role models.

than their sons.[28] Thus, there may be increased parental control over girls in areas and neighbourhoods where the fraction of criminal offenders is higher.

Is there evidence in our data that supports this explanation? The finding that conviction rates for girls react more negative to crime conviction rates in the area of assignment in the age bracket 15-17 than in the age range 18-21 is compatible with that explanation. More than 80 percent of families in our sample are nuclear families, with both father and mother present (see Table A1). Further, by the age of 17, only 8 percent of girls have moved out of the parental home. This number increases to 27 percent by the age of 18, and to 70 percent by the age 21. Thus, parental control is likely to be markedly higher when individuals are in the first age bracket.

Another piece of evidence that is compatible with stronger parental control over females in areas with higher crime rates is given by our estimates in Table 7. We argue above that, if social contagion mechanisms lead to an effect of area crime at assignment on later conviction probabilities, then the appropriate area crime measure is the share of criminals who actually live in the area of assignment. In line with that, only the share of convicted youth criminals living in the area of assignment at assignment has a significant effect on male conviction probabilities. On the other hand, for girls, we find that all crime measures have a negative point estimate, and four out of five estimates are significant at least at the 10% level. For instance, unconditional and conditional on the youth crime rate, the overall crime conviction rate has a significant negative effect on conviction probabilities. These results disappear for convictions for crimes committed between ages 18-21. Thus, the findings are consistent with a mechanisms where parental supervision over girls reacts to any indication of crime in the area - not just the share of youth criminals, but also the share of older criminals, or of committed violent crimes.

[28] See also Cernkovich and Giordano (1987), Carter and Wojtkiewicz (2000) and Claes, Lacourse, Bouchard and Perucchini (2003) for similar arguments. Cernkovich and Giordano (1987) find significant gender differences in parental supervision. Claes et al (2003), in a cross-country qualitative study for Canada, Italy and France, find that irrespective of country, girls reported having more parental supervision than boys.

V Conclusions

This paper analyses the effect of exposure of children and teenagers to criminal youths in the neighbourhood on criminal behaviour between ages 18 and 21. Based on a unique experiment that randomises a large number of families across different municipalities in Denmark, we address the question whether exposure of youths to crime leads to higher conviction probabilities of the children in these families later on in life. Our findings provide strong evidence for conviction probabilities of male youth being upwardly affected by local area conviction rates upon assignment. For girls, we find opposite results: being assigned to an area with a high share of criminal offenders reduces conviction rates in the age range between 15 and 17. It has no, or only a slightly negative effect in the age range between 18 and 21.

We also show that our results are sensitive to the measure of area crime: When we use the rate of reported crimes per capita or reported violent crimes per 10,000 inhabitants in the area instead if the share of convicted criminals, we do not detect significant effects for males. This speaks for the importance of using the appropriate measure of neighbourhood crime, and may explain why some previous studies do not find effects of area crime on criminal behaviour for men. It also suggests that contagion is an important mechanism in explaining higher conviction probabilities for male youths.

Our analysis further points at post-assignment sorting that leads to a downward bias of average exposure to area crime before the age of 15 (or of area crime measured at 15 or 21 in the area of residence) on conviction probabilities for male youth. This is opposite of what would is typically assumed in non-experimental studies. We explain this with low crime propensity males being more mobile; the reason that these individuals move to areas with higher crime conviction rates is that these areas offer at the same time more educational and economic opportunities. We find the same for females: those who move, move to areas with higher crime conviction rates, but more educational opportunities, and are more likely to obtain higher educational degrees. However, comparison of OLS and IV results suggest that – other than males - females who move are more prone to commit crimes at a later age. This could either be due to opposite selection of males and females who move on crime propensities, or the move itself

creates conditions that lead higher crime conviction probabilities for females. Moving may, for instance, compromise parental control over daughters.

We find no evidence that crime conviction probabilities for boys are indirectly related to area crime, through increased criminality of parents. Although there is a strong intergenerational correlation in crime conviction probabilities, crime conviction rates of male and female parents are not at all affected by any area crime measure at assignment. This further suggests that contagion effects as we find for boys are only generated when assignment takes place at a young age.

The differences in our results for males and females add to a list of findings that establish a differential response of females and males to the same environmental circumstances. While the far lower crime rates of females are well known in the literature, the different orthogonal response to criminal context is new. We discuss a number of possible explanations for these findings: young females may be less vulnerable to delinquent peers than young males, or females may react in opposite ways to convicted criminals, induced for instance by negative role models. Another hypothesis is that parental supervision is tightened as a reaction to criminal activity in the immediate environment - in particular in the age range between 15-17 when girls are still subdued to parental supervision.

References

Allen, Anita L. (1995), "The Role Model Argument and Faculty Diversity", in S.M. Cahn, ed., *The Affirmative Action Debate,* New York: Routledge, pp. 121-134.

Annual reports of the Danish Refugee Council 1986-1996 ANNA

internal administrative statistics of the Danish Refugee Council 1992-1997 ANNA

Bayer, Patrick, Randi Hjalmarsson and David Pozen (2007), "Building Criminal Capital behind Bars: Peer Effects in Juvenile Corrections", NBER WP 12932.

Becker, Gary S. (1968), "Crime and Punishment: An Economic Approach", *Journal of Political Economy*, Vol. 76, pp. 169-217.

Becker, Gary S. and Kevin M. Murphy (2000), *Social Economics*, Chicago: University of Chicago Press.

Carter, Rebecca S. and Roger A. Wojtkiewicz (2000), "Parental involvement with adolescents' education: Do daughters or sons get more help?" *Adolescence*, Vol. 35(137), pp. 29-44.

Case, Anne C. and Lawrence F. Katz (1991), "The Company you keep: The Effects of Family and Neighborhood on Disadvantaged Youths", NBER WP 3705.

Cernkovich, Stephen A. and Peggy Giordano (1987), "Family relationships and delinquency", *Criminology*, Vol. 25(2), pp. 295-321.

Chung, Kim-Sau (2000), "Role Models and Arguments for Affirmative Action", *American Economic Review*, Vol. 90, pp. 640-648.

Claes, Michel, Eric Lacourse, Céline Bouchard and Paula Perucchini (2003), "Parental practices in late adolescence, a comparison of three countries: Canada, France and Italy", *Journal of Adolescence*, Vol. 26(4), pp. 387-399.

Clampet_Lundquist, S., K. Edin, J.R. Kling, and G.J. Duncan (2006): "Moving At-Risk Youth Out of High-Risk Neighborhoods: Why do Girls Fare Better than Boys?" Working Paper, Industrial Relations Section, Princeton University.

Coleman, David and Eskil Wadensjö (1999), *Indvandringen til Danmark. Internationale og nationale perspektiver*, Viborg: Spektrum.

Cook, Philip J. and Kristin A. Goss (1996), "A Selective Review of the Social Contagion Literature", WP, Sanford Institute of Policy Studies, Duke University.

Damm, A.P. (2005), "The Danish Dispersal Policy on Refugee Immigrants 1986-1998: A Natural Experiment?", Aarhus School of Business, Department of Economics WP 05-3.

Danish Refugee Council (Dansk Flygtningehjælp) (1986-1996), Annual Reports 1986-1996.

Dishion, Thomas and Robert McMahon (1998), "Parental Monitoring and the Prevention of Child and Adolescent Problem Behavior: A Conceptual and Empirical Formulation", *Clinical Child and Family Psychology Review*, Vol. 1(1), pp. 61-75.

Edin, Per-Anders, Peter Fredriksson, and Olof Aslund (2003): ``Ethnic Enclaves and the Economic Success of Immigrants -- Evidence from A Natural Experiment'', *Quarterly Journal of Economics*, 118(1), 329--357

Ehrlich, Issac (1973), "Participation in Illegitimate Activities: A Theoretical and Empirical Investigation", *Journal of Political Economy*, Vol. 81(3), pp. 521-65.

Fougère, Denis, Francis Kramarz and Julien Pouget (2006), "Youth Unemployment and Crime in France", IZA Discussion Paper No. 2009.

Gilligan, Carol (1982), *In a Different Voice: Psychological Theory of Women's Development*, Cambridge, MA: Harvard University Press.

Glaeser, Edward L. and Bruce Sacerdote (1999), "Why Is There More Crime in Cities?", *Journal of Political Economy*, Vol. 107, pp. S225-S258.

Glaeser, Edward L., Bruce Sacerdote and José A. Sheinkman (1996), "Crime and Social Interactions", *Quarterly Journal of Economics*, Vol. 111, pp. 507-548.

Glaeser, Edward L., Bruce Sacerdote and José A. Scheinkman (2003), "The Social Multiplier", *Journal of the European Economic Association*, Vol. 1(2-3), pp. 345-353.

Gould, Eric, Bruce Weinberg and David B. Mustard (2002), "Crime Rates and Local Labor Market Opportunities in the United States: 1977-1997", *Review of Economics and Statistics*, Vol. 84(1), pp. 45-61.

Grogger, Jeffrey (1998), "Market Wages and Youth Crime", *Journal of Labor Economics*, Vol. 16(4), pp. 756-791.

Hirschi, Travis (1969), Causes of Delinquency". Berkeley: University of California Press.

Hjalmarsson, Randi and Matthew Lindquist (2007), "Like Godfather, Like Son: Explaining the Intergenerational Nature of Crime", mimeo, Stockholm University

Huesmann, L.Rowell and Nancy G. Guerra (1997), "Children's normative beliefs about aggression and aggressive behaviour", *Journal of Personality and Social Psychology*, Vol. 72, pp. 408-419.

Imai, Susumu and Kala Krishna (2004), "Employment, Dynamic Deterrence and Crime", *International Economic Review*, Vol. 45(3), pp. 845-872.

Ingoldsby, Erin M. and Daniel S. Shaw (2002), "Neighborhood Contextual Factors and Early-Starting Antisocial Pathways", *Clinical Child and Family Psychology Review*, Vol. 5, pp. 21-55.

Jencks, Christopher and Susan E. Mayer (1990), "The social consequences of growing up in a poor neighbourhood", in L. E. Lynn and M. F.H. McGeary, eds., *Inner-city poverty in the United States* (pp. 111–186), Washington, DC: National Academy Press.

Johnson, Richard (1979). Juvenile Delinquency and its Origin. Cambridge: Cambridge University Press.

Katz, Lawrence F., Jeffrey R. Kling and Jeffrey B. Liebman (2001), "Moving to Opportunity in Boston: Early Results of a Randomized Mobility Experiment", *Quarterly Journal of Economics*, Vol. 116(2), pp. 607-654.

Kemper. T.D. (1968). "Reference Groups, Socialization, and Achievement." *American Sociological Review* 33, 57-78.

Kling, Jeffrey R. and Jeffrey B. Liebman (2004). "Experimental Analysis of neighborhood Effects on Youth", Princeton IRS WP No 483, April

Kling, Jeffrey R., Jeffrey B. Liebman and Lawrence F. Katz (2007), "Experimental Analysis of Neighborhood Effects", *Econometrica*, Vol. 75, pp. 83-119.

Kling, Jeffrey R., Jens Ludwig and Lawrence F. Katz (2005), "Neighborhood Effects on Crime for Female and Male Youth: Evidence from a Randomized Housing Voucher Experiment", *Quarterly Journal of Economics,* Vol. 120(1), pp. 87-131.

Kommunernes Landsforening, Dansk Flygtningehjælp, Amtsrådsforeningen i Danmark and Socialministeriet (1987), Flygninge i Danmark – Integrationsarbejdet, Maj 1987.

Kremer, Michael and Dan M. Levy (2003), "Peer Effects and Alcohol Use among College Students", NBER WP 9876.

Larson, Calvin J. (1984), *Crime, Justice, and Society*, Bayside, N.Y.: General Hall.

Leventhal, Tama and Jeanne Brooks-Gunn (2003), "Moving to Opportunity: an Experimental Study of Neighborhood Effects on Mental Health", *American Journal of Public Health*, Vol. 93(9), pp. 1576-1582.

Levitt, Steven D. (1997), "Using Electoral Cycles in Police Hiring to Estimate the Effect of Police on Crime", *American Economic Review*, Vol. 87(3), pp. 270-90.

Levitt, Steven D. (1998) "Juvenile Crime and Punishment", *Journal of Political Economy*, Vol. 106, pp. 1156-1185.

Levitt, Steven D. (2002) "Using Electoral Cycles in Police Hiring to Estimate the Effect of Police on Crime: Reply", *American Economic Review*, Vol. 92(4), pp.1244-1250.

Levitt, Steven D. and Lance Lochner (2001), "The Determinants of Juvenile Crime", in: Jonathan Gruber, ed., NBER volume on *Risky Behavior by Youths: An Economic Analysis,* The University of Chicago Press, Chicago, pp. 327-373.

Levitt, Steven D. and Sudhir Alladi Venkatesh (2000), "An Economic Analysis of a Drug-Selling Gang's Finances", *Quarterly Journal of Economics*, Vol. 115(3), pp. 755-789.

Lochner, Lance (2004), "Education, Work, and Crime: a Human Capital Approach," *International Economic Review*, Vol. 45(3), pp. 811-843.

Lochner, Lance and Enrico Moretti (2004), "The Effect of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports," *American Economic Review*, Vol. 94(1), pp. 155-189.

Lockwood, Penelope, Christian H. Jordan, Ziva Kunda (2002), "Motivation by positive and negative role models: Regulatory focus determines who will best inspire us", *Journal of Personality and Social Psychology*, Vol. 83(4), pp. 854-864.

Lockwood, Penelope, Tara C. Marshall and Pamela Sadler (2005) "Promoting Success or Preventing Failure: Cultural Differences in Motivation by Positive and Negative Role Models", *Personality and Social Psychology Bulletin*, Vol. 31(3), pp. 379-392.

Ludwig, J., G.J. Duncan, and P. Hirschfield (2001), "Urban Poverty and Juvenile Crime: Evidence from a Randomized Experiment", *Quarterly Journal of Economics*, Vol. 116, pp. 655-679

Ludwig, Jens and Jeffrey R. Kling (2007), "Is Crime Contagious?", *Journal of Law and Economics*, Vol. 50, pp. 491-518.

Machin, Stephen and Costas Meghir (2004), "Crime and Economic Incentives", *Journal of Human Resources,* Vol. 39(4), pp. 958-979.

Manski, Charles F. (1993), "Identification of Endogenous Social Effects: The Reflection Problem", *Review of Economic Studies*, Vol. 60(3), pp. 531-542.

Mears, Daniel P, Matthew Ploeger, and Mark Warr (1998), ”Explaining the Gender Gap in Delinquency: Peer Influence and Moral Evaluations of Behavior”, *Journal of Research in Crime and Delinquency*, Vol. 35, pp. 251-266.

Moffitt, Terrie E, Avshalom Caspi, Michael Rutter and Phil A. Silva (2001), *Sex Differences in Antisocial Behaviour*, Cambridge, England: Cambridge University Press.

Morash, Merry (1986). “Gender, Peer Group Experiences, and Seriousness of Delinquency”. Journal of Research in Crime and Delinquency 23: 43-67

Nye, F. Ivan (1958), *Family Relationships and Delinquent Behavior*, New York: Wiley.

Oreopoulos, Philip (2003), “The Long-Run Consequences of Growing up in a Poor Neighborhood”, *Quarterly Journal of Economics*, Vol. 118, pp. 1533–1575. **(Not mentioned in text)**

Piquero, Nicole L., Angela R. Gover, John M. McDonald and Alex R. Piquero (2005) The Influence of Delinquent Peers on Delinquency: Does Gender Matter? *Youth and Society*, vol. 36(3), pp. 251-275.

Rutter, Michael (1985) “Family and School Influences on Cognitive Development”, *Journal of Child Psychology and Psychiatry*, Vol. 26(3), pp. 349-368.

Stark, Rodney (1987), “Deviant Places: A Theory of the Ecology of Crime”, *Criminology*, Volume 25, No 4

Steffensmeier, Darrel and Emilie Allan (1996), “Gender and Crime: Toward a Gendered Theory of Female Offending”, *Annu. Rev. Sociol.* 22:459–87

Sacerdote, Bruce (2001), “Peer Effects with Random Assignment: Results for Dartmouth Roommates”, *Quarterly Journal of Economics*, Vol. 116(2), pp. 681-704. **(Not mentioned in text)**

Seydlitz, R. (1991) “The effects of age and gender on parental control and delinquency”, *Youth and Society*, Vol. 23, pp. 175-201.

Sherman, Lawrence W (2002), “Fair and Effective Policing”, in: Wilson, James Q and Joan Petersilia, eds., *Crime: Public Policies for Crime Control*, Oakland, California: Institute for Contemporary Studies Press, pp. 383-412.

Sutherland, Edwin H. (1947), *Criminology*, 4th edition, Philadelphia: Lippincott.

Wilson, William J. (1987), *The Truly Disadvantaged: The Inner City, the Underclass, and Public Policy*, Chicago: University of Chicago Press. **(Not mentioned in text)**

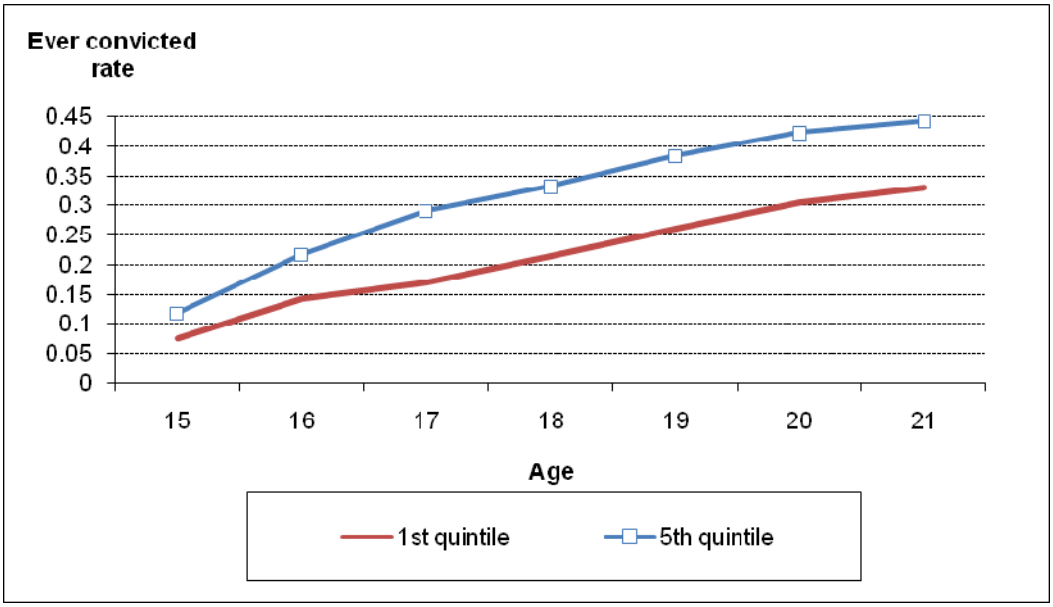

Fig. 1a: Proportion of male refugee children who have been convicted of a criminal offence.
Note: The quintiles refer to the cumulative distribution function of the youth crime rate in the municipality of assignment.

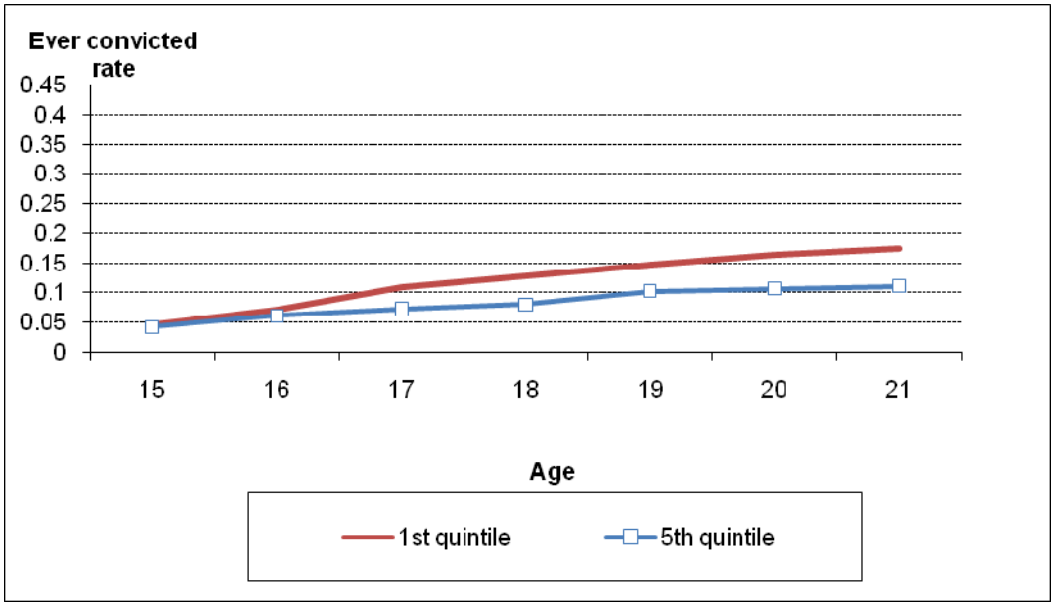

Fig. 1b: Proportion of female refugee children who have been convicted of a criminal offence.
Note: The quintiles refer to the cumulative distribution function of the youth crime rate in the municipality of assignment.

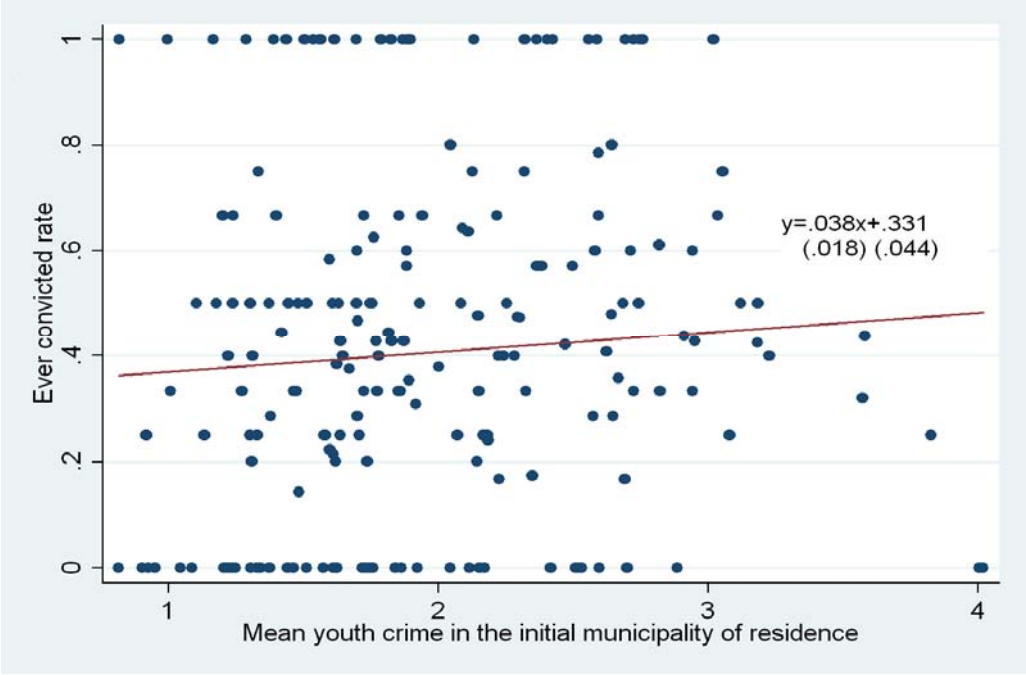

Fig. 2a: The share of male refugee children who have been convicted of a criminal offence between age 15-21. By the mean youth crime rate in the initial municipality of residence in the year of entry.

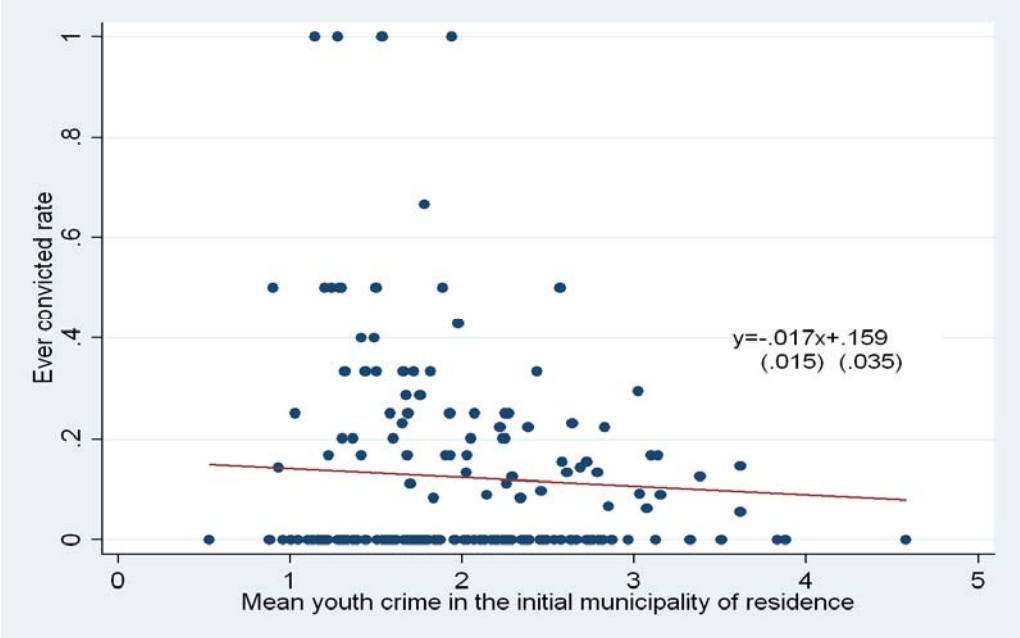

Fig. 2b: The share of female refugee children who have been convicted of a criminal offence between age 15-21. By the mean youth crime rate in the initial municipality of residence in the year of entry.

Table 1
Location assignment of refugees (parents) and personal characteristics:
Mean (standard deviation) of personal attributes in the year of entry of parents of refugee children

	Youth crime conviction rate in the initial municipality of assignment		t-test of difference in means
	1st quintile	5th quintile	
	1	2	3
Years of education :			
0-9 years	.207 (.405)	.187 (.390)	.92
10-12 years	.430 (.495)	.402 (.491)	1.00
More than 12 years	.177 (.382)	.202 (.402)	1.13
Unknown	.187 (.390)	.209 (.407)	1.04
Female	.503 (.500)	.538 (.499)	1.26
Age	39.68 (6.07)	39.83 (6.94)	.41
Number of children	2.56 (1.64)	2.58 (1.61)	.19
Married	.942 (.234)	.930 (.256)	.91
Number of observations	638	654	

Note: Mean (standard deviation) youth crime conviction rate (of 15-30 year olds) in the initial municipality of assignment: 2.25 (.69).

Table 2
Summary statistics: Mean (standard deviation) of indicators for having been charged or convicted of an offence committed in different age ranges. Refugee children.

Age range		Refugee children		
		All	Men	Women
15-21	Charged with a criminal offence	.331 (.470)	.489 (.500)	.144 (.351)
	Convicted of a criminal offence	.281 (.449)	.417 (.493)	.119 (.324)
	Convicted of a sexual offence	.003 (.053)	.005 (.072)	0
	Convicted of a violent crime	.079 (.270)	.143 (.350)	.003 (.055)
	Convicted of a property offence	.214 (.411)	.311 (.463)	.100 (.300)
	Convicted of another Penal Code offence	.024 (.152)	.042 (.200)	.002 (.048)
	Convicted of a drugs offence	.036 (.185)	.060 (.238)	.006 (.078)
	Convicted of a arms offence	.027 (.162)	.048 (.214)	.002 (.039)
	Convicted of a tax or other Special Acts offence	.024 (.154)	.043 (.203)	.002 (.048)
15-17	Charged with a criminal offence	.206 (.405)	.308 (.462)	.086 (.281)
	Convicted of a criminal offence	.178 (.382)	.265 (.442)	.073 (.261)
18-21	Charged with a criminal offence	.242 (.428)	.385 (.487)	.072 (.258)
	Convicted of a criminal offence	.191 (.393)	.303 (.460)	.057 (.232)
	Number of observations	2,868	1,557	1,311

Note: Charge and conviction rates calculated using the Central Police Register. Sample: Children of refugees to Denmark who immigrated at age 6-14 in the period 1986- 1993.

Table 3
Correlation between selected municipality characteristics in the period 1986-1996

	Youth crime conviction rate	Overall crime conviction rate	Reported crimes per capita	Reported violent crimes per 10,000 inhabitants	Ln(inhabitants)	Mean (std. dev.)
Youth crime conviction rate	1					1.91 (.68)
Overall crime conviction rate	.90	1				0.72 (0.25)
Reported crimes per capita	.55	.64	1			7.14 (3.22)
Reported violent crimes per 10,000 inhabitants	.47	.51	.65	1		17.25 (10.00)
Ln(inhabitants)	.38	.53	.62	.37	1	9.40 (0.79)

Note: The youth crime conviction rate is calculated using the Central Police Register for the full population of 15-30 year old individuals in Denmark in the period 1986-1996. The overall crime conviction rate is calculated using the Central Police Register for the full population in Denmark in the period 1986-1996. The number of reported offences against the Penal code and the number of reported violent offences against the Penal Code come from ”Statistiske Efterretninger om Social Sikring og Retsvæsen”, Statistics Denmark (1986-1996). The source of the number of inhabitants is BEF1A/Statistikbanken/Statistics Denmark.

Table 4
Kaplan-Meier empirical survivor function for residence in the municipality of assignment of 21 year old refugee children.

Years since assignment	Kaplan-Meier survival rate		
	All	Men	Women
0	1	1	1
1	0.76	.75	.76
2	0.71	.70	.71
3	0.66	.66	.66
4	0.61	.61	.60
5	0.56	.57	.55
6	0.51	.52	.50
7	0.48	.49	.44
8	0.45	.46	.40
9	0.42	.44	.37
10	0.39	.42	.34
11	0.37	.40	.31
12	0.35	.38	.29
13	0.33	.36	.28
14	0.32	.34	.27

Note: Table entries measure the number of years of residence in the municipality of initial assignment for individuals who are 21 years of age, and who were assigned to an area between age 6 and 14.

Table A.1
Summary statistics: Mean (standard deviation) of personal attributes in the year of entry of refugee children. Part A.

	All	Men	Women	Stayers	Movers
Woman	.457 (.498)			.428 (.495)	.483 (.500)
Age at entry	11.02 (2.59)	11.02 (2.59)	11.00 (2.58)	11.21 (2.53)	10.85 (2.63)
Single parent	.189 (.392)	.188 (.390)	.191 (.394)	.176 (.381)	.201 (.401)
Nuclear family	.806 (.395)	.809 (.393)	.802 (.398)	.822 (.383)	.792 (.406)
Number of siblings	2.63 (1.90)	2.64 (1.92)	2.60 (1.87)	2.62 (1.87)	2.63 (1.93)
Educational attainment by age 21:					
I(Less than 9 years of education)	.053 (.225)	.064 (.245)	.040 (.197)	.050 (.218)	.056 (.231)
I(9 years of education)	.205 (.404)	.222 (.415)	.185 (.389)	.202 (.402)	.208 (.406)
I(10 years of education)	.475 (.500)	.484 (.500)	.465 (.499)	.521 (.500)	.435 (.496)
I(11 years of education)	.131 (.338)	.126 (.332)	.138 (.345)	.111 (.314)	.149 (.357)
I(12 or more years of education)	.135 (.342)	.105 (.306)	.172 (.377)	.116 (.321)	.152 (.359)
Father's years of education:					
0-9 years	.127 (.333)	.127 (.333)	.128 (.334)	.122 (.327)	.132 (.339)
10-12 years	.347 (.476)	.356 (.479)	.337 (.473)	.339 (.474)	.354 (.479)
More than 12 years	.178 (.383)	.173 (.379)	.183 (.387)	.183 (.387)	.174 (.379)
Unknown	.347 (.476)	.344 (.475)	.351 (.477)	.356 (.479)	.339 (.474)
Mother's years of education:					
0-9 years	.263 (.440)	.267 (.443)	.258 (.438)	.276 (.447)	.251 (.434)
10-12 years	.341 (.474)	.345 (.476)	.336 (.473)	.343 (.475)	.339 (.474)
More than 12 years	.115 (.320)	.114 (.318)	.117 (.322)	.115 (.319)	.116 (.320)
Unknown	.281 (.449)	.274 (.446)	.288 (.453)	.266 (.442)	.293 (.455)
Father's age	37.67 (14.98)	37.75 (14.63)	37.59 (15.40)	38.23 (15.38)	37.18 (14.61)
Mother's age	36.68 (8.86)	36.46 (8.91)	36.93 (8.79)	37.34 (8.82)	36.10 (8.85)
Country of origin:					
Iraq	.098 (.298)	.091 (.287)	.107 (.310)	.079 (.270)	.115 (.319)
Iran	.131 (.337)	.132 (.339)	.129 (.335)	.107 (.309)	.152 (.359)
Vietnam	.092 (.289)	.088 (.283)	.096 (.295)	.125 (.331)	.062 (.241)
Sri Lanka	.074 (.262)	.067 (.251)	.082 (.275)	.084 (.278)	.066 (.247)
Lebanon (no citizenship)	.329 (.470)	.345 (.475)	.310 (.463)	.321 (.467)	.337 (.473)
Ethiopia	.002 (.046)	.002 (.044)	.002 (.048)	.003 (.055)	.001 (.036)
Afghanistan	.025 (.155)	.024 (.152)	.026 (.159)	.027 (.162)	.023 (.150)
Somalia	.048 (.213)	.055 (.227)	.040 (.195)	.051 (.219)	.045 (.208)
Bosnia-Herzegovina	.175 (.380)	.166 (.373)	.185 (.388)	.180 (.384)	.170 (.376)
Serbia-Montenegro	.000 (.019)	.001 (.025)	0 (0)	0 (0)	.001 (.026)
Croatia	.002 (.042)	.001 (.025)	.003 (.055)	.002 (.039)	.002 (.044)
Macedonia	.001 (.037)	.002 (.044)	.001 (.028)	.003 (.055)	0 (0)
Slovenia	.000 (.019)	0 (0)	.001 (.028)	.001 (.027)	0 (0)
Yugoslavia	.023 (.149)	.027 (.162)	.018 (.131)	.019 (.135)	.026 (.156)
Year of entry:					
1986	.120 (.325)	.125 (.330)	.114 (.318)	.110 (.313)	.128 (.335)
1987	.153 (.360)	.158 (.365)	.147 (.354)	.142 (.350)	.162 (.369)
1988	.084 (.278)	.085 (.279)	.084 (.277)	.081 (.273)	.087 (.282)
1989	.111 (.314)	.112 (.316)	.110 (.312)	.088 (.284)	.131 (.338)
1990	.086 (.281)	.080 (.272)	.094 (.291)	.084 (.277)	.089 (.285)
1991	.085 (.279)	.078 (.269)	.093 (.291)	.105 (.307)	.067 (.251)
1992	.077 (.266)	.075 (.264)	.079 (.269)	.090 (.286)	.065 (.248)
1993	.040 (.195)	.042 (.200)	.037 (.190)	.054 (.226)	.028 (.164)
1994	.017 (.131)	.018 (.133)	.017 (.128)	.019 (.135)	.016 (.127)
1995	.194 (.396)	.190 (.393)	.200 (.400)	.201 (.401)	.188 (.391)
1996	.032 (.176)	.037 (.189)	.026 (.159)	.026 (.160)	.037 (.190)

Table A.1
Summary statistics: Mean (standard deviation) of personal attributes in the year of entry of refugee children. Part B.

	All	Men	Women	Stayers	Movers
Initial municipality of residence characteristics in the year of entry:					
Youth crime conviction rate (%)	2.29 (.68)	2.27 (.67)	2.32 (.69)	2.40 (.59)	2.19 (.74)
Log(inhabitants)	10.61 (1.28)	10.58 (1.28)	10.64 (1.29)	11.12 (1.14)	10.16 (1.23)
Unemployment rate (%)	10.06 (2.89)	10.05 (2.69)	10.08 (2.92)	10.64 (2.71)	9.55 (2.95)
Labour force participation (%)	79.47 (3.18)	79.48 (3.15)	79.46 (3.22)	78.64 (2.80)	80.20 (3.32)
Log(average gross income)	12.18 (.09)	12.18 (.10)	12.18 (.09)	12.17 (.08)	12.18 (.10)
Number of educational institutions for qualifying educations	7.41 (9.17)	7.19 (8.96)	7.67 (9.40)	10.14 (9.32)	5.01 (8.32)
Gini coefficient	.27 (.03)	.27 (.02)	.27 (.03)	.27 (.021)	.26 (.03)
School resources	2.45 (.28)	2.45 (.28)	2.45 (.28)	2.45 (.29)	2.45 (.27)
Crime detection rate (%)	20.77 (3.77)	20.86 (3.84)	20.67 (3.67)	21.03 (3.67)	20.54 (3.84)
Number of police officers per 1000 inhabitants	1.46 (.79)	1.45 (.77)	1.49 (.81)	1.50 (.75)	1.44 (.81)
Overall crime conviction rate (%)	.95 (.32)	.94 (.32)	.97 (.32)	1.03 (.28)	.88 (.34)
Number of reported crimes per capita (%)	10.25 (4.12)	10.19 (3.98)	10.32 (4.27)	11.40 (3.70)	9.24 (4.20)
Current characteristics of the municipality of residence at age 21:					
Youth crime conviction rate (%)	2.09 (.54)	2.08 (.53)	2.10 (.54)	2.02 (.50)	2.15 (.56)
Log(inhabitants)	11.25 (1.21)	11.22 (1.19)	11.29 (1.22)	11.16 (1.16)	11.33 (1.24)
Unemployment rate (%)	6.68 (2.33)	6.68 (2.38)	6.68 (2.27)	6.78 (2.31)	6.60 (2.35)
Labour force participation (%)	76.16 (2.92)	76.25 (2.97)	76.06 (2.86)	76.03 (2.96)	76.29 (2.88)
Log(average gross income)	12.26 (.09)	12.26 (.09)	12.25 (.08)	12.25 (.08)	12.26 (.09)
Number of educational institutions for qualifying educations	11.10 (10.68)	10.74 (10.42)	11.52 (10.96)	10.14 (9.32)	11.94 (11.69)
Characteristics of the municipality of residence at age 21 in the year of entry:					
Youth crime conviction rate (%)	2.53 (.68)	2.50 (.67)	2.57 (.70)	2.40 (.59)	2.65 (.74)
Log(inhabitants)	11.21 (1.19)	11.18 (1.18)	11.25 (1.21)	11.12 (1.14)	11.29 (1.23)
Unemployment rate (%)	10.33 (2.82)	10.24 (2.82)	10.44 (2.80)	10.64 (2.71)	10.07 (2.87)
Labour force participation (%)	78.82 (3.01)	78.87 (3.00)	78.77 (3.02)	78.64 (2.80)	78.98 (3.17)
Log(average gross income)	12.18 (.09)	12.18 (.09)	12.17 (.08)	12.17 (.08)	12.18 (.09)
Number of educational institutions for qualifying educations	11.10 (10.68)	10.74 (10.43)	11.52 (10.96)	10.14 (9.32)	11.94 (11.69)
Number of observations	2,868	1,557	1,311	1,341	1,527

Note: Individual demographic characteristics: Danish Administrative Registers. Individual educational attainment data: Educational Institution Register. The youth crime conviction rate is calculated on basis of the Central Police Register for the full population of 15-30 year olds in Denmark. The overall crime conviction rate is calculated on basis of the Central Police Register for the full population in Denmark. The number of reported crimes is the number of reported offences against the Penal code which stem from ”Statistiske Efterretninger om Social Sikring og Retsvæsen”, Statistics Denmark (1986-1996). The Gini coefficient is calculated on basis of the Central Tax Register. School resources are measured as the weekly number of teacher hours per pupil which is reported in “Folkeskolen i de enkelte kommuner”, Ministry of Education (1989/90, 1990/1991, 1991/1992). The crime detection rate stem from ”Statistiske Efterretninger om Social Sikring og Retsvæsen”, Statistics Denmark (1986-1996). The number of police officers is calculated as the sum of the number of detectives and street officers (from the Annual Police Reports, Rigspolitichefen 1986-1999). The remaining municipality characteristics are from Statistikbanken/Statistics Denmark: Number of inhabitants: BEF1A, the unemployment rate: AARD, the labour force participation rate: RAS1 combined with BEF1A, the average gross income: IF221 combined with BEF1A and the number of educational institutions for qualifying educations: the Integrated Pupil Register.

Table 5
Coefficient estimates from linear regression of an indicator for having been convicted of an offence committed in a given age range on the youth crime conviction rate of 15-30 year olds in the initial municipality of assignment in year *t*.

		(1)	(2)	(3)	(4)	(5)
Men	Dependent variable: conviction 15-21	.021	.028	.038	.041	.040
		(.011)*	(.011)**	(.016)**	(.016)**	(.018)**
	Dependent variable: conviction 15-17	.025	.032	.027	.020	.028
		(.010)**	(.011)***	(.014)**	(.014)**	(.016)*
	Dependent variable: conviction 18-21	.020	.026	.038	.037	.039
		(.011)*	(.011)**	(.015)**	(.015)**	(.016)**
Women	Dependent variable: conviction 15-21	-.024	-.024	-.031	-.038	-.048
		(.010)**	(.010)**	(.012)**	(.012)**	(.014)**
	Dependent variable: conviction 15-17	-.016	-.015	-.019	-.023	-.029
		(.008)**	(.008)*	(.010)*	(.010)**	(.011)***
	Dependent variable: conviction 18-21	-.005	-.005	-.006	-.011	-.016
		(.007)	(.007)	(.009)	(.009)	(.010)*
Controls	Country of origin fixed effects	Yes	Yes	Yes	Yes	Yes
	Year of entry fixed effects	Yes	Yes	Yes	Yes	Yes
	Age at entry fixed effects	No	Yes	Yes	Yes	Yes
	Family background	No	Yes	Yes	Yes	Yes
	Municipality of assignment Characteristics:					
	Socio-economic	No	No	Yes	Yes	Yes
	School resources	No	No	No	Yes	Yes
	Policing	No	No	No	No	Yes

Note: Robust standard errors clustered by the initial municipality of assignment and year of entry are reported in parentheses. Values of family background and initial municipality of assignment characteristics refer to the year of assignment. Mean (standard deviation) of the youth crime conviction rate (of 15-30 year olds) in the initial municipality and year of assignment (in percentages) prior to standardization as deviations from the mean relative to the standard deviation: 2.29 (.68). Socioeconomic municipality characteristics are log of number of inhabitants, the labour force participation, the log of the average gross income and the Gini coefficient. School resources are measured as the mean number of teacher hours per pupil. Policing is measured by crime detection rate and the number of police officers per capita. One, two and three asterisks denote significance at a 10, 5 and 1 percent significance level, respectively.

Table 6
IV estimates of one standard deviation increase in the average youth crime conviction rate in the municipalities of assignment until age 15.

	Men			Women		
	Dependent variable: Indicator for having been convicted of a crime committed in the age range					
	15-21	15-17	18-21	15-21	15-17	18-21
	(1)	(2)	(3)	(4)	(5)	(6)
Youth crime conviction rate in initial municipality of assignment	.040 (.018)**	.028 (.016)*	.039 (.016)**	-.048 (.014)***	-.029 (.011)***	-.016 (.010)*
Average youth crime conviction rate in the municipalities of assignment until age 15	.023 (.018)	.008 (.016)	.028 (.017)*	-.022 (.013)*	-.012 (.011)	-.008 (.009)
The effect of conviction rate in initial municipality of assignment on average youth crime conviction rate in the municipalities of residence until age 15	.668 (.038)***	.668 (.038)***	.668 (.038)***	.624 (.041)***	.624 (.041)***	.624 (.041)***
IV estimate of the effect of average youth crime conviction rate in the municipalities of residence until age 15.	.060 (.027)**	.042 (.024)*	.059 (.025)**	-.077 (.022)***	-.046 (.018)***	-.026 (.015)*

Note: Robust standard errors clustered by the initial municipality of assignment and year of entry are reported in parentheses. Controls: Indicators for country of origin, year of entry and age at entry, parental background and initial municipality of residence characteristics (log of number of inhabitants, labour force participation rate, the log of the average gross income, Gini coefficient, mean number of teacher hours per pupil, crime detection rate and number of police officers per capita). Values of family background and initial municipality of residence characteristics refer to the year of assignment. Mean (standard deviation) of the youth crime conviction rate of 15-30 year olds in the initial municipality and year of assignment (in percentages) prior to standardization as deviations from the mean relative to the standard deviation: 2.29 (.68). The average youth crime conviction rate of 15-30 year olds in the municipalities of residence until age 15 is constructed as the mean of the annual youth crime conviction rate of 15-30 year olds in the municipalities of residence since the year of assignment, and until age 15. The average youth crime conviction rate of 15-30 year olds in the municipalities of residence until age 15 has mean (standard deviation) 2.25 (.60), but we normalize it by subtracting the mean and dividing by the standard deviation of the youth crime conviction rate of 15-30 year olds in the initial municipality of residence. One, two and three asterisks denote significance at a 10, 5 and 1 percent significance level, respectively.

Table 7
The effect of one standard deviation in selected crime rates in the municipality of assignment in year *t* on the probability of having been convicted of a crime committed in a given age range.

	Men			Women		
	Dependent variable: Indicator for having been convicted of a crime committed in the age range					
	15-21	15-17	18-21	15-21	15-17	18-21
	(1)	(2)	(3)	(4)	(5)	(6)
Youth crime conviction rate of 15-30 year olds in the initial municipality of assignment	040 (.018)**	.028 (.016)*	.039 (.016)**	-.048 (.014)***	-.029 (.011)***	-.016 (.010)*
Number of reported crimes per capita in the initial municipality of assignment	.005 (.024)	-.006 (.021)	-.004 (.022)	-.022 (.018)	-.019 (.015)	-.006 (.011)
Number of reported violent crimes per 10,000 inhabitants in the initial municipality of assignment	.029 (.018)	.022 (.015)	.013 (.016)	-.009 (.014)	-.020 (.011)*	.010 (.010)
Overall crime conviction rate in the initial municipality of assignment	.034 (.021)	.018 (.020)	.033 (.019)*	-.056 (.018)***	-.042 (.015)***	-.011 (.012)
Overall crime conviction rate in the initial municipality of assignment | youth crime conviction rate in the initial municipality of assignment	-.019 (.046)	-.044 (.039)	-.037 (.042)	-.016 (.036)	-.049 (.028)*	.027 (.024)

Note. Robust standard errors clustered by the initial municipality of assignment and year of assignment are reported in parentheses. Controls: As Specification 5, Table 5. Family background and initial municipality of residence characteristics refer to the year of assignment. Mean (standard deviation) of the youth crime conviction rate of 15-30 year olds (in percentages) prior to standardization as deviations from the mean relative to the standard deviation: 2.29 (.68). Mean (standard deviation) of the number of reported crimes per capita (in percentages) prior to standardization as deviations from the mean relative to the standard deviation: 10.25 (4.12). Mean (standard deviation) of the number of reported violent crimes per 10,000 inhabitants prior to standardization as deviations from the mean relative to the standard deviation: 21.79 (9.09). Mean (standard deviation) of the overall crime conviction rate (in percentages) prior to standardization as deviations from the mean relative to the standard deviation: .95 (.32). One, two and three asterisks denote significance at a 10, 5 and 1 percent significance level, respectively.

Table 8
Coefficient estimates from linear regression of an indicator for having been convicted of an offence committed in a given age range on the youth crime conviction rate of 15-30 year olds in the initial municipality of residence in year *t*.

		(1)	(2)	(3)	(4)	(5)
Men	Dependent variable: conviction 15-21	.021	.028	.038	.041	.040
		(.011)*	(.011)**	(.016)**	(.016)**	(.018)**
	Exclusion of refugee children who	.022	.031	.041	.045	.044
	moved first year within county	(.011)*	(.012)***	(.017)**	(.017)***	(.019)**
	Dependent variable: Charged 15-21	.026	.031	.036	.032	.028
		(.011)**	(.012)***	(.018)**	(.018)*	(.019)
	Dependent Variable: Number of	.078	.105	.114	.109	.112
	Convictions 15-21	(.033)**	(.035)***	(.045)**	(.048)**	(.051)**
Women	Using as dependent variable conviction	-.024	-.024	-.031	-.038	-.048
	15-21	(.010)**	(.010)**	(.012)**	(.012)**	(.014)**
	Exclusion of refugee children who	-.023	-.023	-.029	-.036	-.046
	moved first year within county	(.010)**	(.010)**	(.013)**	(.013)***	(.014)***
	Using as dep. var. charged 15-21	-.030	-.030	-.035	-.042	-.052
		(.010)***	(.010)***	(.013)***	(.013)***	(.014)***
	Dependent Variable: Number of	-.013	-.012	-.022	-.032	-.041
	Convictions 15-21	(.014)	(.015)	(.018)	(.018)*	(.017)**
Controls	Country of origin fixed effects	Yes	Yes	Yes	Yes	Yes
	Year of entry fixed effects	Yes	Yes	Yes	Yes	Yes
	Age at entry fixed effects	No	Yes	Yes	Yes	Yes
	Family background	No	Yes	Yes	Yes	Yes
	Municipality of assignment Characteristics:					
	Socio-economic	No	No	Yes	Yes	Yes
	School resources	No	No	No	Yes	Yes
	Policing	No	No	No	No	Yes

Note: Robust standard errors clustered by the initial municipality of assignment and year of entry are reported in parentheses. Family background and initial municipality of assignment characteristics refer to the year of assignment. Mean (standard deviation) of the youth crime conviction rate (of 15-30 year olds) in the initial municipality and year of assignment (in percentages) prior to standardization as deviations from the mean relative to the standard deviation: 2.29 (.68). Mean (standard deviation) of the youth crime conviction rate (of 15-30 year olds) in the municipality and year of assignment (in percentages) prior to standardization as deviations from the mean relative to the standard deviation: 2.32 (.67). The number of crimes is categorised into 7 categories: 0, 1, 2, 3, 4, 5-9, ≥10. Socioeconomic municipality characteristics are log of number of inhabitants, the labour force participation, the log of the average gross income and the Gini coefficient. School resources are measured as the mean number of teacher hours per pupil. Policing is measured by crime detection rate and the number of police officers per capita. One, two and three asterisks denote significance at a 10, 5 and 1 percent significance level, respectively.

Table 9

Coefficient estimates from linear regression of the overall and type-specific number of convictions of an offence committed in a given age range on the youth crime conviction rate of 15-30 year olds in the initial municipality of residence in year *t*.

	Type of offence	Conviction 15-21 (1)	Conviction 15-17 (2)	Conviction 18-21 (3)
Men	All	.040	.028	.040
		(.018)**	(.016)*	(.016)**
	Sexual assault	-.005	-.001	-.004
		(.004)	(.001)	(.004)
	Violence	.007	.003	.007
		(.012)	(.008)	(.011)
	Property crime	.046	.028	.034
		(.017)***	(.014)**	(.015)**
	Drugs Act offence	.023	-.003	.024
		(.010)**	(.002)	(.009)***
	Weapons Act offence	-.004	-.006	.001
		(.008)	(.005)	(.006)
Women	All	-.048	-.028	-.016
		(.014)***	(.011)***	(.010)*
	Sexual assault	-	-	-
	Violence	-.001	-.000	-.000
		(.002)	(.000)	(.002)
	Property crime	-.038	-.022	-.014
		(.012)***	(.010)**	(.009)
	Drugs Act offence	-.000	.001	.001
		(.002)	(.002)	(.002)
	Weapons Act offence	.001	-.000	.001
		(.001)	(.000)	(.001)

Note: Robust standard errors clustered by the initial municipality of assignment and year of entry are reported in parentheses. Controls: As Specification 5, Table 5. Values of family background and initial municipality of assignment characteristics refer to the year of assignment. Mean (standard deviation) of the youth crime conviction rate (of 15-30 year olds) in the initial municipality and year of assignment (in percentages) prior to standardization as deviations from the mean relative to the standard deviation: 2.29 (.68). One, two and three asterisks denote significance at a 10, 5 and 1 percent significance level, respectively.

Table A.2
Correlation between selected municipality characteristics in the period 1986-1996.

	Youth crime conviction rate of 15-30 year olds	Over-all crime conviction rate	Reported crimes per capita	ln(inhabitants)	Labour force participation	Mean gross income	Gini coeffi-cient	Mean teacher hours per pupil	Crime detection rate	Police officers per capita
Youth crime conviction rate of 15-30 year olds	1									
Overall crime conviction rate	.89	1								
Reported crimes per capita	.60	.74	1							
ln(inhabitants)	.38	.55	.73	1						
Labour force participation	-.35	-.31	-.29	-.17	1					
Mean gross income	.11	.14	.21	.27	.50	1				
Gini coefficient	.19	.16	.25	.23	-.51	.21	1			
Mean teacher hours per pupil	.44	.46	.43	.34	-.05	.37	.12	1		
Crime detection rate	.16	.16	.14	.18	-.28	-.24	.11	-.03	1	
Police officers per capita	.32	.36	.29	.20	-.28	.12	.17	.29	.05	1

Table A3
The effect of one standard deviation in selected crime rates in the initial municipality of residence in year t on the probability of having been convicted of a crime committed within the first 7 years after immigration. Refugee parents.

	Men 1	Women 2
Youth crime conviction rate of 15-30 year olds in the initial municipality of residence	009 (.016)	.005 (.012)
Number of reported crimes per capita in the initial municipality of residence	-.008 (.019)	-.002 (.015)
Overall crime conviction rate in the initial municipality of residence	-.002 (.021)	.010 (.015)
Number of observations	1,446	1,584

Note: Robust standard errors clustered by the initial municipality and year of assignment (736 cells) are reported in parentheses. Share of individuals who have been convicted in year t+7: Men: 18.6%, women: 11.9%. Controls: Indicators for country of origin, year of entry and age at entry, educational background and municipality of assignment characteristics (log of number of inhabitants, labour force participation rate, the log of the average gross income, gini coefficient, mean number of teacher hours per pupil, crime detection rate and number of police officers per capita). Values of explanatory variables refer to year t, where t refers to the year of entry. Mean (standard deviation) of the youth crime conviction rate of 15-30 year olds (in percentages) prior to standardization as deviations from the mean relative to the standard deviation: 2.24 (.69). Mean (standard deviation) of the overall crime conviction rate (in percentages) prior to standardization as deviations from the mean relative to the standard deviation: .93 (.32). Mean (standard deviation) of the number of reported crimes per capita (in percentages) prior to standardization as deviations from the mean relative to the standard deviation: 10.05 (4.20). One, two and three asterisks denote significance at a 10, 5 and 1 percent significance level, respectively.

Table A4
Coefficient estimates from linear regression of an indicator for having been convicted of a criminal offence committed at the age of 15-21 on the youth crime conviction rate of 15-30 year olds in the initial municipality of residence in year *t* and its squared value.

	Men		Women	
	1	2	3	4
Youth crime conviction rate in the initial municipality of residence in year *t*	.040 (.018)**	.047 (.018)***	-.048 (.014)***	-.050 (.014)***
Youth crime conviction rate in the initial municipality of residence in year *t*, squared		-.029 (.011)***		.004 (.008)
R-squared	.111	.115	.070	.071
Number of observations	1,557		1,311	

Note: YCCR: the youth crime conviction rate in the initial municipality of residence in year *t*, where t refers to the year of entry. Robust standard errors clustered by the initial municipality of residence and year of entry (738 cells) are reported in parentheses. Controls: As Specification 5, Table 5. Values of family background and initial municipality of residence characteristics refer to year *t*. Mean (standard deviation) of the youth crime conviction rate of 15-30 year olds (in percentages) prior to standardization as deviations from the mean relative to the standard deviation: 2.29 (.68). One, two and three asterisks denote significance at a 10, 5 and 1 percent significance level, respectively.