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The Determinants
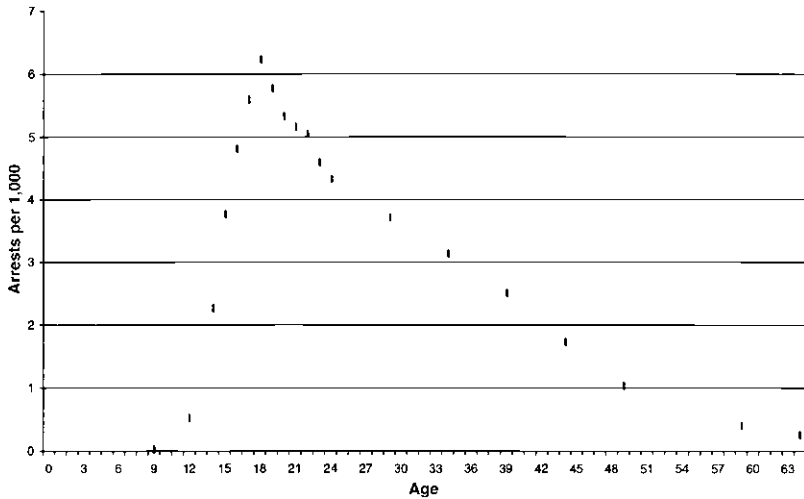# of Juvenile Crime

Steven D. Levitt and Lance Lochner

Criminal involvement in the United States rises sharply with the onset of adolescence, peaking in the late teenage years before dropping steadily thereafter. An eighteen-year-old is five times more likely to be arrested for a property crime than is a thirty-five-year-old; for violent crime the corresponding ratio is two to one. In 1997, those aged fifteen to nineteen constituted roughly 7 percent of the overall population but accounted for over 20 percent of arrests for violent offenses and roughly one-third of all property-crime arrests.

  This essay examines the issue of youth crime. We begin by laying out the basic facts and trends relevant to youth crime over the last thirty years. We then consider both the social costs of youth crime and the personal risks and costs borne by the criminals themselves. After reviewing the various hypotheses as to the determinants of crime identified in the previous literature, we present three new sets of estimates that shed light on the issue. The first set of regressions uses the National Longitudinal Survey of Youth (NLSY) to explore the correlates of crime at the individual level. The second analysis focuses on census-tract-level homicide data for the city of Chicago over a thirty-year period. These data provide a means of better understanding the influence of social factors and local labor market conditions on youth crime. The final data set is a state-level panel covering

Fig. 7.1   Violent arrest rate by age, 1998

fifteen years. The state-level analysis is ideal for examining the effect of the criminal-justice system (and, to a lesser extent, economic factors). We use these three sets of estimates to determine the extent to which observed fluctuations in the correlates of crime can explain the time-series pattern of juvenile crime over the last three decades.

7.1   Youth-Crime Facts and Trends

Figures 7.1–7.3 present snapshots of criminal involvement by age in 1998, as reflected in arrest rates per capita for violent crime, property crime (excluding larceny), and murder.[1] Violent crime rises sharply in adolescence to a peak at age eighteen, before steadily declining thereafter. Property-crime offenses peak at age sixteen and drop off more quickly. The pattern for murders is similar to that of violent crime more generally.

Figures 7.1–7.3 represent a cross section of different cohorts at a fixed point in time. Following a particular cohort through the life cycle yields a generally similar pattern. Wolfgang, Figlio, and Sellin (1972) show a steeply rising and then declining pattern of arrests for their sample of ten thousand boys born in Philadelphia in 1945. Interestingly, for that cohort,

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1. We adopt the standard Uniform Crime Reports definitions throughout the paper. Violent crime includes homicide, rape, robbery, and aggravated assault. Property crime includes burglary, larceny, and auto theft. Violent crime and property crime represent a limited subset of all crime. Fewer than 20 percent of all arrests are covered by these categories. Omitted from these categories are all drug offenses, other assaults, white-collar crimes, vandalism, and public-order offenses. Our focus on violent and property offenses is motivated by both the high social costs associated with such crimes and the lack of available data on other crimes.
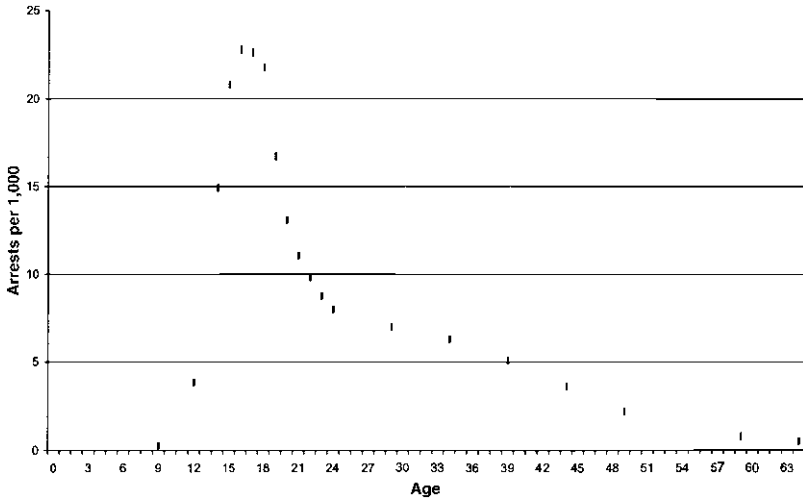
Fig. 7.2   Property arrest rate by age, 1998
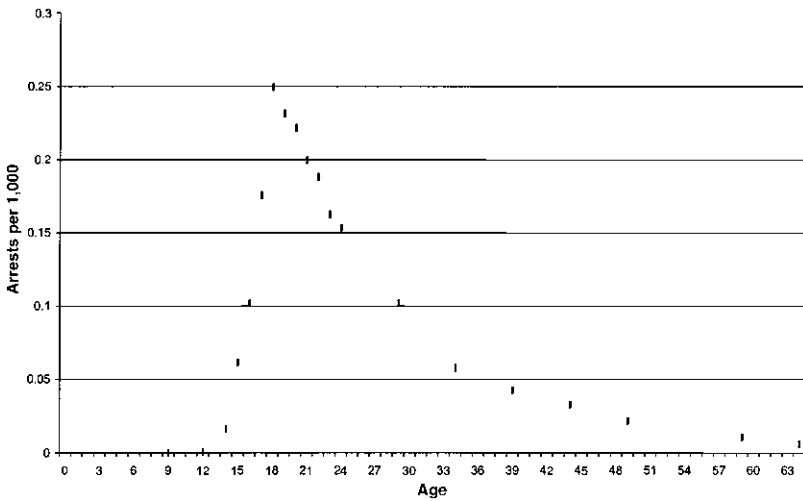
Fig. 7.3   Murder arrest rate by age, 1998

the peak in arrests occurs at age sixteen, earlier than as indicated in the more recent cross-sectional results.

Youth arrest rates vary dramatically by gender and race, as reported in table 7.1.[2] The more serious the offense, the greater the disparity across

2. Arrest rates are the only widely available measure of criminal involvement that is disaggregated by offender characteristics. To the extent that there are differences across groups in the likelihood of arrest conditional on committing a crime (e.g., owing to discrimination in arrests or differences in the mix of crimes), focusing on arrest rates may be misleading.

Table 7.1   **Juvenile Arrest Rates per 1,000 by Sex and Race, 1997**

Crime Category	Male	Female	White	Black
Violent crime arrests	1.9	.4	.8	3.5
Property crime arrests	9.2	3.7	6.2	12.1
Total arrests (excluding traffic offenses)	37.4	14.0	25.2	48.3

Sources: FBI, *Uniform Crime Reports* (various editions); and U.S. Bureau of the Census, *Statistical Abstract of the United States* (annual editions).
Note: Arrest rates per 1,000 individuals under the age of 18.

groups. Males under age eighteen are five times more likely to be arrested for violent crime than are females; for property crime the ratio is less than three to one. Black arrest rates are four times those of whites for violent crime and two times higher for other crimes.

An alternative measure of criminal involvement is self-reported data. Given that many crimes are not reported to the police and that most reported crimes do not lead to an arrest, criminal participation is likely to be much more prevalent than naively implied by arrest data.[3] A special supplement to the NLSY in 1980 asked respondents about self-reported crime activity, including such crimes as theft, fighting, causing injury to someone, use of force to acquire something, and drug dealing. Roughly 40 percent of fifteen- to nineteen-year-old males and 20 percent of fifteen- to nineteen-year-old females report committing at least two different categories of criminal offense in the preceding year.

There have been dramatic fluctuations in overall crime rates in recent decades; youth crime is no exception. Changes in police recording over this period make consistent comparisons difficult (Donohue and Siegelman 1994). The data on homicide rates are likely to be most reliable. Following Blumstein and Rosenfeld (1998) and Cook and Laub (1998), figure 7.4 presents homicide victimization rates per 100,000 for various age groups over the years.[4] Homicide victimization for fourteen- to seventeen-year-olds fluctuated within a relatively narrow range from 1976 to 1987 (between 4.3 and 5.8 per 100,000). Coincident with the onset of the crack epidemic, the homicide rate for that group more than doubled at its peak in 1993. The increases among black youths were especially pronounced, more than tripling from the early 1980s to the peak in 1993. White youth-homicide rates rose "only" 50 percent. Since the peak, homicide rates among youths have fallen 40 percent but are still well above those of the 1970s and 1980s. As was the case with the increase, the decline was great-

3. For example, according to the National Crime Victimization Survey (NCVS), fewer than 50 percent of violent crimes and roughly one-third of property crimes are reported to police. Approximately 50 percent of violent crimes and fewer than 20 percent of property crimes reported to the police lead to an arrest.

4. Offender ages, of course, are known only when the murder is solved. Cook and Laub (1998) demonstrate that the ages of offenders and victims tend to be similar in those instances in which an offender is identified.
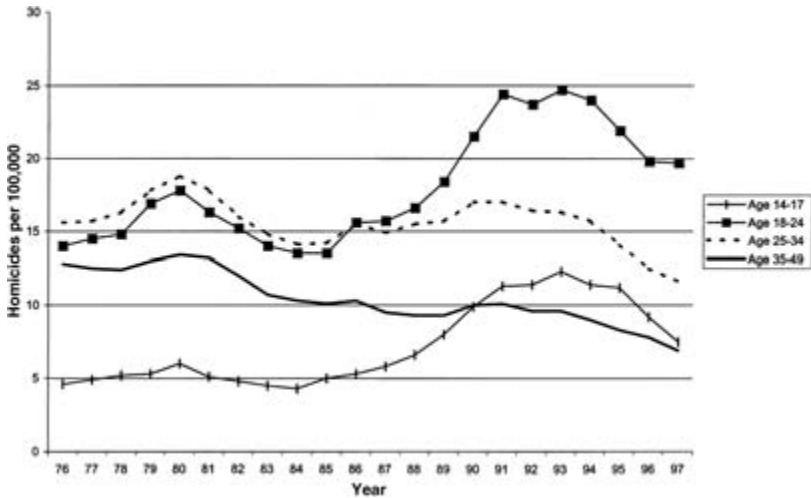
Fig. 7.4   Homicide victimization rates by age, 1976–97

est for black youths. The time series for eighteen- to twenty-four-year-olds is similar but with homicide rates two to three times higher throughout the entire period. In stark contrast, the homicide victimization rate of thirty-five- to forty-nine-year-olds has fallen almost continuously over the last two decades, with 1997 levels less than 60 percent as high as 1976 levels.

Levitt (1998) demonstrates that the differential trends for juveniles and adults are also present for violent crime more generally, although not as pronounced as for homicide. Youth property crime, on the other hand, has not substantially deviated from adult property crime.

7.2   Consequences of Youth-Crime Involvement

The social costs of crime in the United States are enormous. Estimates of the overall costs of crime range from roughly $300 billion in current dollars (Miller, Cohen, and Rossman 1993) to over $1 trillion (Anderson 1999), although estimates at the high end stretch credulity.[5] Teenagers are responsible for 20–30 percent of all crime. If the crimes committed by teenagers are representative of crime more generally, the social cost of youth crime could be between $60 and $300 billion annually.[6] The teenage criminals themselves bear only a small fraction of the social costs that

5. Government expenditures on anticrime measures, police, prisons, and courts total to $100 billion. In reaching the $1 trillion estimate, Anderson (1999) includes the total estimated value of all expenditures on drug trafficking ($160 billion) and, on the basis of a $6 million value of life, obtains over $400 billion in social costs associated with murder.

6. Greenwood (1995) presents evidence that the typical teenage crime is less serious than that of adults, even within relatively narrow crime categories. Consequently, the upper limit of this estimate is likely to overstate the true costs of youth crime.

they generate (e.g., through time incarcerated, forgone future earnings, or increased death probabilities); the overwhelming majority of this $60–$300 billion cost is an externality.

A very different question is the extent to which "crime pays" for the youths who engage in it. In terms of the overall amount of income generated by criminal activity, the values generally appear to be modest. Fagan and Freeman (1999) summarize estimates of the returns to street crime from a wide range of previous studies, with a typical estimate of average annual illegal income of this kind at or below $5,000. The estimated returns to drug selling vary widely depending on one's role in the drug trade. Among independent sellers who act as entrepreneurs, Reuter, MacCoun, and Murphy (1990) report an hourly wage of $30. These individuals, however, are likely to be highly skilled and occupy a relatively privileged position among drug dealers. Average wages derived from the financial records of a drug-selling gang analyzed by Levitt and Venkatesh (in press), however, range only from $6 to $11 per hour over the four years of the study. These numbers may be more representative of the typical drug-trade participant. The street-level sellers who essentially work for an hourly wage (the job held by most teenagers in the gang) earned less than the minimum wage for most of the study.

In order to make a meaningful comparison between the returns to legitimate work and street crime, the risk of incarceration needs to be included. Although the data required to perform a precise evaluation of the risks and rewards of crime are not available, there is sufficient information to generate a well-informed back-of-the-envelope calculation. In what follows, we attempt to determine the expected income from a single crime as well as the expected time spent incarcerated per crime.

The risk-return trade-off appears to be most favorable for property crimes, such as burglary, auto theft, and larceny. Victims of serious property crimes in the National Crime Victimization Survey (NCVS) report a median economic loss of approximately $100. The distribution of losses, however, is quite skewed, with the result that the mean loss (which is not reported and cannot be calculated given the data provided) is substantially higher. On the other hand, an individual criminal is unlikely to reap the full benefit of the stolen property for a number of reasons: juveniles often perform crime in groups, and the spoils of the crime need to be divided among the participants; criminals often sell stolen goods on the black market at significantly discounted prices; and property is often destroyed during a theft (e.g., a few parts are stripped from a stolen automobile, and the remainder of the car is burned to make identification more difficult). Balancing these factors, we estimate that the average return to a criminal per property crime is perhaps $200. Assuming that juvenile and adult arrests for property crime are proportional to rates of offending, juveniles commit approximately 3 million property crimes each year that are re-

ported to the police. Victimization surveys suggest that only 30 percent of such crimes are reported to the police, implying a total of roughly 10 million property crimes annually by juveniles. At any given point in time, roughly seventeen thousand juveniles are incarcerated for serious property offenses, which translates into 6.2 million person-days of incarceration of juveniles for such crimes annually, or roughly 0.6 days of incarceration per property offense on average. For many juveniles, the trade-off between 0.6 days incarcerated and $200 per crime might look attractive. As an aside, it is worth noting that similar calculations for adults yield expected punishments at least five times greater per crime. Focusing solely on prison time served, adults receive an average of 2.6 days behind bars per property crime. If jail time were also included, the estimates would be substantially greater. The differential penalties for juveniles and adults are revisited in section 7.5 below.

The trade-off for robbery—in which the criminal uses violence or the threat of violence—is far less favorable to the criminal. Expected returns from robbery, based on the NCVS, are similar to those from property crime. Victims are much more likely to report robberies to the police, arrests are much more likely to result, and punishments are more severe. As a consequence, we estimate that juveniles serve 12.6 days incarcerated per robbery on average, or more than twenty times more than for the typical property crime. Thus, the returns to robbery appear quite low; working a minimum-wage job eight hours per day for 12.6 days would yield over $550, far more than a robbery is likely to provide, although the robbery income is untaxed.[7]

In contrast to property crime and robbery, for which the risks of injury or death are fairly small, the physical risks associated with drug dealing are immense. Previous studies have reported violent death rates between 2 and 7 percent per person-year (Kennedy, Piehl, and Braga 1996; Levitt and Venkatesh, in press) for those engaged in gang-related drug distribution. Levitt and Venkatesh (in press) report a variety of approaches to measuring the implied value of life for the gang members; none of the estimates are greater than $100,000 per statistical life, which is an order of magnitude lower than the typical estimate obtained for the general population.

7.3 Factors Affecting Criminal Involvement

There is an enormous previous literature on the determinants of criminal involvement. We do not attempt to survey this literature systematically here (for excellent surveys of various aspects of the literature, see Wilson

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7. Our calculations suggest that adults serve approximately sixty days in prison per robbery. The low returns to robbery are consistent with the fact that property crimes such as burglary and auto theft require skill and planning, whereas robbery is often an impulsive act.

and Petersilia [1995]). Rather, we focus our discussion on identifying the handful of factors that are most likely to be both important empirically and testable (at least in a crude manner) given the available data. For purposes of exposition, we adopt a four-part classification scheme: biological; social; criminal justice; and economic. Although this framework is necessarily imperfect, it serves as a useful organizing device for what follows. The four categories are discussed in turn.

7.3.1   Biological Factors

There is little doubt that the single best predictor of crime is gender. In virtually every society for which there are records, the prevalence of violence is greater among males (Wilson and Herrnstein 1985). The pervasiveness of this pattern suggests a biological underpinning.

The consistency of the age profile of crime across time and place (first documented by Quetelet in nineteenth-century France and later noted by Blumstein et al. [1986]) also suggests an important biological component, although social, economic (Grogger 1998; Lochner 1999), and criminal-justice (Levitt 1998) factors may also provide a partial explanation for the postadolescent drop in crime in the United States.

Wilson and Herrnstein (1985) also argue that low intelligence and high discount rates are predictors of crime. To the extent that these traits are partially determined by heredity, they represent an additional biological component of crime, which may interact with other social and economic factors.

7.3.2   Social Factors

Without question, social factors exert an enormous influence on crime. There are a number of channels through which social factors might affect crime. Perhaps the most important of these is the quality of parenting. Research has demonstrated a strong link between erratic/harsh discipline, lack of adequate supervision, and rejection by the mother and later criminal involvement (Daag 1991; Sampson and Laub 1993). As Donohue and Siegelman (1994) note, the interventions that have been most successful in reducing crime have been those aimed early in life and requiring the parents' involvement (e.g., the Perry Preschool project). Empirically, the number of female-headed households is often one of the strongest predictors of city crime rates (Glaeser, Sacerdote, and Scheinkman 1996). Donohue and Levitt (1999) provide indirect evidence in support of the importance of parental factors in reducing crime rates. Their results suggest that crime is 10–15 percent lower as a consequence of legalized abortion. Levine et al. (1996) demonstrate that legalized abortion disproportionately reduces the fertility rates of teenagers and single women. Gruber, Levine, and Staiger (1999) show that children on the margin for abortion are much more likely to have been born into households on welfare, to be low birth weight, and to die in infancy.

Outside the family, the degree of "social control" exerted by a community is hypothesized to reduce crime (e.g., Hirschi 1969; Sampson 1985). For example, a willingness of other adults in a neighborhood to discipline youths, positive role models, and limited amounts of unsupervised youth activity are hypothesized to reduce crime (Wilson 1987). Positive peer-group interactions have also been shown to be important predictors of criminal activity (Case and Katz 1991).

7.3.3 Criminal-Justice System

The economic model of crime (Becker 1968) is based on the idea that crime can be deterred through punishment. While there is strong evidence that increased levels of policing (Corman and Mocan, in press; Levitt 1997; Marvell and Moody 1996) and imprisonment (Spelman 1994; Marvell and Moody 1994; Levitt 1996) reduce the *overall* level of crime, there has been surprisingly little work analyzing the response of youth crime to sanctions. Levitt (1998) presents results suggesting that increases in punishment affect juveniles as strongly as adults and also finds sharp behavioral changes concurrent with the passage from the juvenile to the adult justice systems in states where there are big differences in the relative punitiveness of the two systems.

There is a larger body of research focused on the efficacy of different criminal-justice strategies. Kennedy, Piehl, and Braga (1996) document a particularly successful antigang program implemented in Boston. Greenwood (1995) surveys the literature on various approaches to treating youths in custody (e.g., drug-abuse treatment, boot camps, etc.). The most noteworthy of these studies is a metastudy analysis conducted by Lipsey (1991), who concludes that various treatment interventions appear to be associated with reduced recidivism, although the gains are often modest—perhaps a 10 percent reduction in recidivism relative to control groups.

7.3.4 Economic Factors

Economic factors influence crime by affecting the attractiveness of alternatives to crime. Grogger (1998) argues that increased labor market attachment with age can explain a substantial fraction of the age-crime profile. Lochner (1999) expands on this, arguing that differential skill requirements across different types of crime can explain why some crimes peak earlier and decline more quickly with age than others. The fact that many criminals are employed in the legitimate sector (Freeman 1992, 1995) suggests that there may be substitution on the margin between criminal and noncriminal activities.

On the other hand, there is little evidence that public job-training programs have a lasting effect on criminal involvement (Donohue and Siegelman 1994), although this is not surprising given the minimal effects on earnings and employment typically observed for these programs. Further-

more, most empirical analyses of the link between crime and macroeconomic variables such as the unemployment rate or low-skilled wages have found no effect on violent crime and relatively weak effects on property crime (e.g., Levitt 1997; Machin and Meghir 2000).[8]

An alternative manner in which economic factors may affect crime is via income inequality. "Strain theory" argues that increased inequality generates frustration among lower-class youths, leading to increased crime (e.g., Cloward and Ohlin 1960). Although the U.S. evidence on the link between income inequality and crime is mixed, international comparisons have repeatedly found a strong link between income inequality and crime rates (Soares 1999).

7.4   Individual-Level Correlates of Youth Crime

Studying youth crime at the individual level poses a number of challenges. The most severe limitation of such an exercise is the reliance on self-reported data on criminal involvement (e.g., Grogger 1998; Lochner 1999; Mocan and Rees 1999).[9] Comparisons between crime self-reports and official arrest data generally find a strong correspondence between the two (e.g., Farrington 1973). There do, however, appear to be important discrepancies between official data and self-reports by race. Blacks are greatly overrepresented in official data but not in self-reports, although much of this racial discrepancy can be reconciled by using self-report measures that carefully account for the frequency of criminal activity among the most active offenders (Elliott and Ageton 1980; Farrington 1973; Hindelang, Hirschi, and Weis 1979).

The available crime data in recent micro data sets is generally limited.[10] The data set most frequently used to study individual-level youth-crime involvement is the NLSY. The major advantage of the NLSY is its abundance of measures of neighborhood, family, and individual background, including tests of cognitive ability. While individuals in the NLSY have been surveyed annually since 1979 (biannually since 1994), only the 1980 supplement contains self-reported information on criminal involvement. Thus, only cross-sectional comparisons from 1980 data can be used in determining criminal participation. However, we exploit the panel struc-

8. Ruhm (1996) finds murder to be strongly procyclic. Gould, Weinberg, and Mustard (1997) find that the wage rates of unskilled laborers, rather than their unemployment rates, better predict cross-sectional variation in crime rates.

9. A few individual-level studies have used official arrest records (e.g., Tauchen, Witte, and Griesinger 1994). Arrest data are also problematic because they reflect only the small subset of criminal activities that lead to arrest. For example, fewer than one in ten burglary victimizations yield an arrest.

10. Two older data sets—Glueck and Glueck (1950), which follows individuals born in the 1920s and 1930s, and Wolfgang, Figlio, and Sellin (1972), which follows a sample born in Philadelphia in 1945—contain much more detailed information. For the purposes of this paper, however, the experiences of these earlier cohorts are of only indirect relevance.

ture of the NLSY to explore the correlation between youth crime and outcomes later in life.

Another micro data set useful for studying crime, the National Longitudinal Study of Adolescent Health (NLSAH), has recently become available. The greatest advantage of the NLSAH is its large sample size (over twenty thousand adolescents interviewed) and an extensive set of questions on criminal activity. Relative to the NLSY, however, it has a more limited set of demographic and family variables and no measure of cognitive ability. Furthermore, geographic identifiers are not available, although individuals can be matched to characteristics of their county of residence. Mocan and Rees (1999) use these data to analyze the correlates of youth crime.

In this paper, we present new results using the NLSY. We also discuss the similarities of and differences between our NLSY-based findings and those of Mocan and Rees (1999).

The NLSY includes a wide range of questions relevant to criminal activity, including theft, drug sales, use of force, causing injury to someone, causing property damage, hitting someone, and fighting. For the purposes of this paper, we focus on property crimes that are likely to be economically motivated and crimes of violence. Individuals who either steal something worth more than $50 or sell hard drugs are categorized as property criminals, and individuals who either injure someone or use force to get something are categorized as violent criminals. A number of less serious criminal actions are reported in the NLSY, actions that we categorize as minor property and minor violent crimes. An individual is classified as a minor property criminal if he steals something worth less than $50 or causes property damage, while he is classified a minor violent criminal if he reports hitting someone or fighting. Our sample includes the random cross-sectional samples in the NLSY, supplemented with the oversamples of blacks and Hispanics (using the appropriate population weights in all calculations).

Table 7.2 reports our measures of criminal involvement by gender and age. Seventy-four percent of all males aged fifteen to nineteen do not report a (major) violent or property crime as defined above. While our measures reveal higher participation in violent crimes than in property crimes (20 vs. 11 percent among all young males), this does not imply that overall violent-crime rates among youths are higher than property crime rates. The ratio of property crime to violent crime rates will depend on both the severity of measured crimes and the number of types of crimes included in each category. Participation in less severe property and violent crimes is much more prevalent, as seen in the final two columns of the table. Drug dealing is also common among male youths with an average participation rate of 17 percent. Property crime peaks at age sixteen among males. Violent-crime participation rates are fairly stable across the late teenage years for males. Comparing crime rates for males and females, we observe

Table 7.2   Criminal Status by Age and Sex, 1980 NLSY (%)

Age	Noncriminals	Property Criminals[a]	Violent Criminals[b]	Violent & Property Criminals[c]	Sell Marijuana or Hard Drugs	Minor Property Criminals[d]	Minor Violent Criminals[e]
A. Males							
15	72.2	9.6	21.8	27.8	11.5	48.1	71.8
16	73.0	13.5	19.3	27.0	15.6	49.1	68.6
17	74.7	10.8	19.5	25.3	18.1	42.9	67.9
18	75.7	10.7	19.8	24.3	19.7	45.9	60.6
19	76.3	10.5	18.5	23.7	18.0	41.9	55.7
All	74.4	11.2	19.7	25.6	16.8	45.6	64.7
B. Females							
15	89.7	3.0	8.4	10.3	4.6	21.0	38.1
16	90.0	2.9	7.9	10.0	9.5	25.5	39.5
17	89.7	3.6	7.4	10.3	10.3	21.3	37.3
18	88.6	4.5	7.9	11.4	11.1	23.4	34.4
19	92.4	2.3	5.8	7.6	8.9	21.4	29.3
All	90.1	3.3	7.4	9.9	9.1	22.6	35.6

[a]Property criminals include individuals who either steal something worth more than $50 or sell hard drugs.
[b]Violent criminals include individuals who either injure someone or use force to get something.
[c]Violent and property criminals include individuals who commit a property crime as defined in n. a above and a violent crime as defined in n. b above.
[d]Minor property criminals include individuals who reported stealing something worth less than $50 or causing property damage.
[e]Minor violent criminals include individuals who reported hitting someone or fighting.

similar age patterns but substantially lower levels among females (especially among more substantial property crimes).

Youth engaged in one criminal activity are also likely to be engaged in a wide variety of others. Table 7.3 reports correlations in criminal involvement for the self-report measures available in the NLSY. The upper-right triangle of the table reports correlations for males and the lower left for females. All correlations are positive (statistically significant in all but one case for females). The first three entries correspond to the property-crime and violent-crime measures used throughout this section. Not surprisingly, there is a high correlation within such broad crime classifications as property, violent, or drug crimes. But there is also a high degree of correlation between crimes of different natures. While causing property damage may often represent minor delinquency among youths, it is highly correlated with more serious crimes like theft, use of force, and injuring someone.

Table 7.4 presents summary statistics for a wide range of variables, shown separately by gender for each major crime category. Individuals who commit multiple types of offenses are included in all relevant columns. Violent criminals are more likely to be black than is the average noncriminal. When compared with noncriminals, both violent and property criminals are of lower average ability (as measured by their percentile rank for the Armed Forces Qualifying Test [AFQT]) and less likely to have graduated from high school (if age eighteen or older). They are also likely to live in a standard metropolitan statistical area (SMSA) and live in a worse family environment—families with lower income, a teenage mother, less-educated parents, a nonworking adult male in the home, or a broken home (at least one natural parent absent) at age fourteen. Male and female property criminals are likely to live in states with fewer juvenile criminals in prison per crime committed. These patterns suggest an important role for ability, education, and a positive family environment in determining adolescent criminal behavior for both males and females.

To explore individual determinants of criminal behavior further, tables 7.5 and 7.6 report regression results for male and female criminal participation. For each crime category, we report two specifications. The first specification limits the covariates to those that are likely to be exogenous and available for nearly all respondents. The second specification includes some potentially less exogenous covariates (like high school graduation) and variables that are missing for a substantial fraction of the sample (such as parents' education and family income). We report OLS estimates for linear-probability models, although probits evaluated at the sample means yield similar conclusions.

Among male adolescents aged fifteen to nineteen, blacks and Hispanics report less involvement in property crime after controlling for other factors. Violent-crime rates are not substantially different for blacks and whites, however. Living in a broken home at age fourteen raises the

Table 7.3 Correlations in Criminal Behavior (Males and Females Aged 15–19 in the 1980 NLSY)

Males (correlations reported in the upper right half of the table); Females (correlations reported in the lower left).

	A, Property Crimes[a]	B, Violent Crimes[b]	C, Property & Violent Crimes[c]	D, Steal Something Worth More Than $50	E, Steal Something Worth Less Than $50	F, Shoplifting	G, Sell Hard Drugs	H, Sell Marijuana	I, Cause Property Damage	J, Injure Someone	K, Use Force to Get Something	L, Hit Someone	M, Fight
Females:													
A		.260	.600	.888	.345	.256	.547	.353	.276	.236	.248	.165	.194
B	.132		.855	.236	.198	.211	.179	.232	.279	.853	.608	.315	.333
C	.560	.855		.532	.301	.262	.328	.315	.322	.730	.520	.324	.344
D	.702	.129	.394		.342	.253	.214	.254	.274	.232	.216	.173	.193
E	.155	.098	.138	.280		.360	.158	.303	.380	.172	.165	.169	.186
F	.175	.115	.175	.125	.103		.120	.287	.405	.198	.155	.227	.272
G	.716	.069	.401	.028	.192	.127		.352	.128	.135	.231	.078	.096
H	.291	.152	.275	.097	.270	.263	.320		.300	.208	.199	.177	.197
I	.093	.151	.153	.104	.065	.247	.041	.182		.261	.203	.277	.282
J	.107	.881	.753	.080	.085	.124	.080	.151	.132		.254	.313	.313
K	.127	.535	.457	.193	.130	.033	.001	.043	.125	.156		.155	.171
L	.098	.318	.304	.078		.161	.066	.218	.215	.287	.175		.319
M	.072	.229	.220	.089	.076	.154	.017	.100	.177	.214	.137	.319	

Note: Correlations for males are reported in the upper right half of the table, correlations for females in the lower left.

[a] Property crimes include either stealing something worth more than $50 or selling hard drugs.

[b] Violent crimes include either injuring someone or using force to get something.

[c] Property and violent crimes include individuals who commit a property crime as defined in n. a above and a violent crime as defined in n. b above.

Table 7.4 NLSY Summary Statistics by Sex and Criminal Status, Ages 15–19

Variable	Males				Females			
	Noncriminals	Property Criminals[a]	Violent Criminals[b]	Violent & Property Criminals[c]	Noncriminals	Property Criminals[a]	Violent Criminals[b]	Violent & Property Criminals[c]
Age (in months)	211.020	210.340	209.957	209.757*	211.271	210.225	209.495*	209.835
	(.337)	(.817)	(.618)	(.552)	(.309)	(1.441)	(.956)	(.835)
Black	.138	.149	.179**	.161	.136	.110	.238**	.206**
	(.007)	(.018)	(.015)	(.013)	(.006)	(.030)	(.026)	(.022)
Hispanic	.069	.062	.060	.061	.065	.065	.059	.058
	(.005)	(.012)	(.009)	(.008)	(.005)	(.024)	(.014)	(.012)
AFQT	48.091	36.173**	38.180**	38.539**	46.276	41.934*	34.042**	36.777**
	(.612)	(1.311)	(1.055)	(.923)	(.510)	(2.450)	(1.464)	(1.325)
Teenage mother	.187	.236**	.245**	.235**	.206	.233	.294**	.269**
	(.008)	(.022)	(.017)	(.015)	(.008)	(.041)	(.028)	(.024)
Living in SMSA	.706	.774**	.750**	.756**	.731	.853**	.726	.759
	(.009)	(.022)	(.017)	(.015)	(.008)	(.035)	(.027)	(.023)
Intact family when age 14	.760	.655**	.653**	.668**	.743	.542**	.617**	.585**
	(.009)	(.024)	(.018)	(.016)	(.008)	(.048)	(.029)	(.026)
Local unemployment rate	7.078	7.131	7.007	7.061	6.977	7.090	6.918	6.912
	(.047)	(.130)	(.092)	(.083)	(.042)	(.240)	(.141)	(.127)
High school graduate (ages 18+)	.592	.334**	.375**	.406**	.681	.346**	.402**	.374**
	(.016)	(.038)	(.029)	(.026)	(.013)	(.075)	(.048)	(.041)
Family income	23.558	20.884**	21.810**	21.800**	22.616	20.522	19.311**	19.511**
	(.346)	(.779)	(.602)	(.545)	(.312)	(1.810)	(1.007)	(.884)

(*continued*)

Table 7.4   (continued)

Variable	Males				Females			
	Noncriminals	Property Criminals[a]	Violent Criminals[b]	Violent & Property Criminals[c]	Noncriminals	Property Criminals[a]	Violent Criminals[b]	Violent & Property Criminals[c]
Highest grade completed (father)	12.067	11.562**	11.580**	11.649**	11.839	11.860	11.277**	11.481*
	(.079)	(.185)	(.146)	(.127)	(.072)	(.339)	(.221)	(.195)
Highest grade completed (mother)	11.670	11.362**	11.505	11.531	11.625	11.782	10.912**	11.154**
	(.060)	(.134)	(.098)	(.088)	(.053)	(.230)	(.147)	(.132)
Adult female working when age 14	.543	.526	.573	.552	.563	.579	.537	.561
	(.010)	(.026)	(.019)	(.017)	(.009)	(.048)	(.030)	(.027)
Adult male working when age 14	.941	.896**	.933	.925	.935	.908	.858**	.885**
	(.005)	(.018)	(.011)	(.010)	(.005)	(.034)	(.025)	(.021)
Juvenile punishment rate	.374	.335**	.362	.350*	.368	.298**	.400	.378
	(.007)	(.014)	(.013)	(.011)	(.006)	(.025)	(.022)	(.018)
Sample size	2,380	381	676	851	2,841	109	278	352

[a]Property criminals include individuals who either steal something worth more than $50 or sell hard drugs.
[b]Violent criminals include individuals who either injure someone or use force to get something.
[c]Violent and property criminals include individuals who commit a property crime as defined in n. a above and a violent crime as defined in n. b above.
*Statistically different from noncriminals at the 10 percent level.
**Statistically different from noncriminals at the 5 percent level.

Table 7.5   OLS Estimates (S.E.s) of Criminal Participation (males aged 15–19 in the 1980 NLSY)

Variable	Property Crimes[a]		Violent Crimes[b]		Violent & Property Crimes[c]	
Intercept	.1650**	.1992**	.3392**	.2699**	.4198**	.3474**
	(.0345)	(.0765)	(.0437)	(.0943)	(.0480)	(.1044)
Age 16	.0421**	.0454*	-.0134	-.0394	.0065	-.0118
	(.0180)	(.0241)	(.0227)	(.0297)	(.0250)	(.0329)
Age 17	.0267	.0313	-.0113	-.0187	-.0042	-.0075
	(.0186)	(.0247)	(.0235)	(.0304)	(.0259)	(.0337)
Age 18	.0223	.0668**	-.0031	.0539	-.0085	.0673*
	(.0186)	(.0269)	(.0235)	(.0333)	(.0259)	(.0367)
Age 19	.0113	.0993**	-.0295	.1096**	-.0324	.1352**
	(.0189)	(.0321)	(.0239)	(.0396)	(.0263)	(.0438)
Black	-.0418**	-.0429	-.0125	.0081	-.0466*	-.0318
	(.0180)	(.0293)	(.0227)	(.0361)	(.0251)	(.0399)
Hispanic	-.0575**	-.0390	-.0691**	-.0496	-.0970**	-.0676
	(.0232)	(.0350)	(.0294)	(.0432)	(.0324)	(.0478)
Intact family when age 14	-.0279**	-.0467*	-.0679**	-.0865**	-.0700**	-.0728**
	(.0135)	(.0255)	(.0169)	(.0315)	(.0187)	(.0347)
Teenage mother	.0092	.0199	.0382**	.0330	.0314	.0447*
	(.0143)	(.0193)	(.0180)	(.0238)	(.0198)	(.0263)
South	-.0602**	-.0447*	-.0340	.0226	-.0698**	-.0230
	(.0180)	(.0249)	(.0227)	(.0307)	(.0250)	(.0340)
Northeast	-.0454**	-.0329	-.0282	.0303	-.0366	.0213
	(.0187)	(.0256)	(.0237)	(.0317)	(.0260)	(.0349)

(*continued*)

Table 7.5   (continued)

Variable	Property Crimes[a]	Violent Crimes[b]	Violent & Property Crimes[c]
North Central	-.0537** (.0176)	-.0159 (.0223)	-.0397 (.0245)
Living in SMSA	.0406** (.0139)	.0328* (.0176)	.0548** (.0193)
Local unemployment rate	.0036 (.0027)	-.0016 (.0035)	.0011 (.0038)
AFQT	-.0013** (.0002)	-.0017** (.0003)	-.0023** (.0003)
Math test score	-.0028** (.0009)	-.0068** (.0011)	-.0077** (.0012)
English test score	-.0011 (.0013)	.0036** (.0016)	.0016 (.0018)
Mechanical-information test score	.0023** (.0009)	.0025** (.0011)	.0042** (.0013)
High school graduate (age 18+)	-.0934** (.0262)	-.1704** (.0324)	-.1876** (.0357)
Family income $10,000–$25,000	.0139 (.0247)	.0216 (.0304)	.0282 (.0337)
Family income $25,000–$50,000	.0094 (.0263)	.0001 (.0325)	-.0077 (.0359)

	(1)	(2)	(3)
Family income $50,000–$75,000	-.0382 (.0385)	-.0298 (.0477)	-.0361 (.0525)
Family income > $75,000	.0503 (.0748)	-.0457 (.0927)	.0216 (.1021)
Highest grade completed (mother)	.0018 (.0040)	-.0008 (.0049)	.0027 (.0054)
Highest grade completed (father)	.0010 (.0030)	-.0008 (.0037)	.0000 (.0041)
Adult female working when age 14	.0027 (.0152)	-.0002 (.0187)	-.0042 (.0207)
Adult male working when age 14	-.1483** (.0342)	-.0386 (.0418)	-.1286** (.0464)
Juvenile punishment rate	-.0166 (.0279)	-.0201 (.0344)	-.0189 (.0380)
Sample size	3,045	1,707	3,050
R^2	.0252	.0614	.0707

[a] Property crimes include either stealing something worth more than $50 or selling hard drugs.

[b] Violent crimes include either injuring someone or using force to get something.

[c] Property and violent crimes include individuals who commit a property crime as defined in n. a above and a violent crime as defined in n. b above.

*Statistically significant at the 10 percent level.

**Statistically significant at the 5 percent level.

Table 7.6   OLS Estimates (S.E.s) of Criminal Participation (females aged 15–19 in the 1980 NLSY)

Variable	Property Crimes[a]		Violent Crimes[b]		Violent & Property Crimes[c]	
Intercept	.0409**	.0191	.1590**	.1780**	.1925**	.1882**
	(.0198)	(.0390)	(.0294)	(.0593)	(.0335)	(.0675)
Age 16	-.0043	-.0137	-.0091	-.0027	-.0086	-.0134
	(.0105)	(.0130)	(.0155)	(.0198)	(.0177)	(.0225)
Age 17	.0072	.0005	-.0118	-.0174	-.0007	-.0187
	(.0106)	(.0133)	(.0157)	(.0202)	(.0179)	(.0230)
Age 18	.0149	.0257*	-.0039	.0041	.0134	.0227
	(.0106)	(.0155)	(.0157)	(.0235)	(.0179)	(.0268)
Age 19	-.0024	.0087	-.0237	-.0013	-.0210	-.0012
	(.0106)	(.0177)	(.0157)	(.0270)	(.0179)	(.0307)
Black	-.0216**	-.0180	.0241	.0429*	.0054	.0225
	(.0101)	(.0149)	(.0150)	(.0227)	(.0172)	(.0259)
Hispanic	-.0039	.0057	-.0242	-.0166	-.0311	-.0133
	(.0136)	(.0178)	(.0201)	(.0270)	(.0230)	(.0308)
Intact family when age 14	-.0392**	-.0155	-.0230**	.0235	-.0606**	.0003
	(.0076)	(.0135)	(.0112)	(.0205)	(.0128)	(.0233)
Teenage mother	-.0037	-.0149	.0190	.0345**	.0114	.0200
	(.0079)	(.0099)	(.0116)	(.0151)	(.0133)	(.0172)
South	-.0012	.0009	-.0064	-.0153	-.0036	-.0112
	(.0101)	(.0124)	(.0149)	(.0189)	(.0170)	(.0216)
Northeast	-.0095	-.0241*	-.0260	-.0332	-.0358*	-.0542**
	(.0110)	(.0138)	(.0162)	(.0210)	(.0185)	(.0238)
North Central	.0113	.0104	-.0007	.0142	.0022	.0156
	(.0103)	(.0124)	(.0153)	(.0189)	(.0174)	(.0215)
Living in SMSA	.0223**	.0142	.0013	-.0077	.0192	.0075
	(.0079)	(.0100)	(.0117)	(.0152)	(.0134)	(.0173)
Local unemployment rate	.0012	-.0008	-.0025	-.0009	-.0020	-.0023
	(.0016)	(.0019)	(.0023)	(.0029)	(.0027)	(.0033)
AFQT	-.0001		-.0009**		-.0009**	
	(.0001)		(.0002)		(.0002)	

Math test score		−.0002 (.0005)		.0000 (.0008)	−.0004 (.0009)
English test score		−.0017** (.0007)		−.0037** (.0011)	−.0041** (.0012)
Mechanical-information test score		.0018** (.0007)		.0013 (.0010)	.0023** (.0011)
High school graduate (age 18+)		−.0178 (.0141)		−.0245 (.0215)	−.0354 (.0245)
Family income $10,000–$25,000		.0012 (.0127)		.0234 (.0192)	.0191 (.0219)
Family income $25,000–$50,000		−.0154 (.0136)		.0328 (.0207)	.0130 (.0236)
Family income $50,000–$75,000		−.0184 (.0208)		.0240 (.0317)	.0058 (.0361)
Family income > $75,000		.0114 (.0308)		.0927** (.0469)	.0556 (.0533)
Highest grade completed (mother)		.0039* (.0020)		−.0058* (.0031)	−.0028 (.0035)
Highest grade completed (father)		.0002 (.0015)		.0056** (.0023)	.0056** (.0026)
Adult female working when age 14		.0063 (.0079)		−.0159 (.0120)	−.0081 (.0137)
Adult male working when age 14		−.0035 (.0171)		−.0458* (.0260)	−.0322 (.0296)
Juvenile punishment rate		−.0210 (.0144)		.0144 (.0218)	−.0027 (.0249)
Sample size	3,086	1,699	3,098	1,705	3,080 / 1,697
R^2	.0160	.0268	.0204	.0338	.0242 / .0281

[a]Property criminals include either stealing something worth more than $50 or selling hard drugs.

[b]Violent crimes include either injuring someone or using force to get something.

[c]Property and violent crimes include individuals who commit a property crime as defined in n. a above and a violent crime as defined in n. b above.

*Statistically significant at the 10 percent level.

**Statistically significant at the 5 percent level.

probability of involvement in property crime by 3–5 percent and the rate of participation in violent crime by 7–9 percent. Being born to a teenage mother has small and generally insignificant effects on adolescent crime after controlling for other factors. Having a working adult male in the family substantially reduces involvement in property crime but has little effect on violent crime. Parents' education and family income have, perhaps surprisingly, no effect on either property- or violent-crime rates. Geographically, youths from the West (the omitted category) and living in an SMSA are significantly more likely to be engaged in crime. Higher local unemployment rates also appear to raise participation rates for property crimes. A measure of state-level punitiveness of the juvenile justice system (Levitt 1998) does not reduce participation in either crime type. Despite our focus on the most severe self-reported offenses, most of these crimes are nonetheless fairly minor and unlikely to bring about substantial punishments in any state. Education substantially reduces the probability that an adolescent male participates in crime, as evinced by the coefficient on high school graduation (interacted with a dummy for those at least age eighteen). High school graduates are 9 percent less likely to engage in property crime and 17 percent less likely to commit a violent crime. These results are consistent with those of Lochner (1999), who finds an important effect of high school graduation on older cohorts in the NLSY.

Measures of ability are also important determinants of criminal involvement. A one-quartile increase in an individual's AFQT score reduces his probability of committing a property or violent crime by about 3–4 percent. The AFQT score represents a weighted average of test scores related to verbal and math abilities. However, youths surveyed in the NLSY took a much larger battery of skill and ability tests (including mathematics, verbal skills, general science, speed and accuracy in coding and numerical operations, and mechanical knowledge). Our more general specifications include separate measures of test scores for math (mathematics knowledge and arithmetic reasoning tests), English (paragraph comprehension and word knowledge), and mechanical information (auto and shop information and electronics information). While male youths with higher mathematics test scores were less likely to participate in violent or property crime, youths with higher scores on the mechanical-information tests had higher criminal participation rates. Test scores on English were less important, but they did show positive correlation with violent criminal behavior. These findings are consistent with an environment in which math skills are relatively more important in the labor market while mechanical knowledge (and its associated abilities) may improve one's chances in the criminal world.[11]

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11. Using AFQT percentiles rather than the individual test measures yields statistically significant negative effects of AFQT on both property and violent crime even after controlling for the larger set of covariates.

Table 7.6 reports analogous regression results for females. The findings are generally consistent with those for young males, especially for more important determinants such as living in an SMSA and an intact family at age fourteen. The most striking difference between males and females can be seen in the effects of high school graduation. While graduation substantially reduces crime among males, it has no effect on female crime rates. A working adult male in the home also has no effect on property crime among females, while it had an important influence on male property crime. Most variables, including AFQT, have less effect on female crime rates. Two exceptions are family income and parents' education. Females from families with incomes greater than $75,000 are significantly more likely to commit a violent crime. Those with more-educated mothers committed fewer violent crimes but more property crimes, although the magnitude of these effects is quite small. A more-educated father was also positively correlated with violent crime rates among female teenagers. Higher English test scores resulted in lower participation rates among females, and, as with males, higher mechanical-information scores actually increased criminal participation.

A few important conclusions can be drawn from these linear-probability regressions. First, family background matters. Adolescents raised in families where both parents are present are much less likely to engage in crime. Mother's age and parents' education have ambiguous effects on criminal involvement, but a working adult male in the home substantially lowers property-crime rates among adolescent males and reduces involvement in violent crime among teenage women. Second, ability and education are also important determinants of criminal involvement. While math appears to be a more important factor in reducing crime among males, English helps reduce crime among females. High scores on mechanical-knowledge tests are associated with higher crime rates among all youths. High school graduation substantially reduces crime among male adolescents, while it has little effect on female crime rates. Finally, the local environment also affects criminal participation. Youths living in an SMSA are more involved in crime, and property-crime rates are higher among males living in areas with high unemployment rates.

Given these conclusions, it is worth noting that none of the regressions can explain more than 7 percent of the variation in criminal participation. Among females, the R^2 values are all less than 0.04. Explaining individual differences in criminal participation is difficult, even with an abundance of family-background, geographic, and ability measures.

We have focused on some of the more severe property and violent crimes reported in the NLSY. For the most part, the results are robust to other measures of criminal involvement, which should not be surprising given the high correlations across crimes evident in table 7.3 above. Regression results for adolescent male participation in drug crimes (marijuana or hard-drug dealing), minor property crimes (stealing something worth less

than $50 or causing property damage), and minor violent crimes (hitting someone or fighting) are shown in table 7.7. Living in an SMSA and high math scores are also important determinants of all three of these crime categories. The AFQT and an intact family are negatively correlated with drug crimes and minor violent crimes. High school graduation and lower local unemployment rates reduce drug dealing. Family income and juvenile punishment rates have little effect on any of the crime categories that we examine. A few differences between the more severe crimes reported in table 7.5 above and minor property and violent crimes are worth noting, however. Blacks and Hispanics report substantially less involvement in minor crimes than whites after controlling for other factors, while there was little difference across races for the more severe measures. For minor property crimes, father's education and a working adult female in the home raise participation. A teenage mother also substantially raises minor-property-and violent-crime rates. In general, determinants of drug crimes closely match those for the more severe property crimes reported in table 7.5. Minor violent crimes respond much like more severe violent and property crimes to most variables. Only regressions for minor property crimes reveal notable differences from those reported above. Ability and high school graduation appear to be more important predictors of severe violent and property crimes than of minor property crimes. Adolescent males with a young mother or a mother who is working (and less likely to be at home) are more likely to engage in minor property crimes but not more severe crimes. For adolescent females, similar regressions yield few covariates that are statistically significant, as with the more severe property and violent crimes in table 7.6 above.[12]

The effects of background, locality, and ability on criminal participation do not disappear with age. As seen in table 7.8, identical regressions for the oldest male cohorts in the NLSY (aged twenty to twenty-three at the time of the crime survey in 1980) show remarkably similar effects of race, family composition, AFQT and math test scores, and high school graduation. For older cohorts, a teenage mother is more positively correlated with violent-crime rates, while living in an SMSA is less associated with violent and property crime. Higher family income lowers crime rates among older cohorts, while it has little effect on the younger males. Finally, an analogous measure of the punitiveness of the criminal-justice system for adults (from Levitt 1998) substantially reduces adult participation in both property and violent crimes. Results for women mirror those for the younger females reported above, except that adult punishment reduces violent crime rates among older women. In general, these findings are consistent

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12. Glaeser and Sacerdote (1999) explore the determinants of minor thefts (less than $50) in the full NLSY sample (ages fifteen to twenty-three) in their study of crime in cities. For the most part, their findings are consistent with our results for minor property crimes.

Table 7.7   OLS Estimates (S.E.s) of Criminal Participation for Minor Crimes (males aged 15–19 in the 1980 NLSY)

Variable	Drug Crimes[a]	Minor Property Crimes[b]		Minor Violent Crimes[c]	
Intercept	.1504**	.4788**	.11132**	.7587**	.8699**
	(.0410)	(.0554)	(.1234)	(.0523)	(.1170)
Age 16	.0488**	.0101	−.0017	−.0275	−.0265
	(.0213)	(.0288)	(.0390)	(.0272)	(.0370)
Age 17	.0864**	−.0541*	−.0467	−.0260	−.0163
	(.0220)	(.0298)	(.0400)	(.0281)	(.0379)
Age 18	.0993**	−.0153	−.0140*	−.0856**	−.1187*
	(.0220)	(.0298)	(.0436)	(.0282)	(.0414)
Age 19	.0636**	−.0857**	−.0497	−.1574**	−.1773**
	(.0224)	(.0303)	(.0520)	(.0286)	(.0492)
Black	−.0839**	−.1008**	−.0428	−.1149**	−.1146**
	(.0214)	(.0287)	(.0473)	(.0272)	(.0450)
Hispanic	−.1173**	−.0291	.0365	−.1016**	−.0977*
	(.0276)	(.0372)	(.0567)	(.0351)	(.0537)
Intact family when age 14	−.0618**	−.0179	−.0373	−.0397*	−.0831**
	(.0160)	(.0215)	(.0412)	(.0203)	(.0393)
Teenage mother	−.0208	.0622**	.0840**	.0499**	.0858**
	(.0169)	(.0228)	(.0312)	(.0216)	(.0297)
South	−.0744**	−.1106**	−.0885**	.0207	.0516
	(.0213)	(.0288)	(.0402)	(.0272)	(.0381)
Northeast	−.0211	−.0262	.0191	−.0283	.0205
	(.0222)	(.0300)	(.0415)	(.0283)	(.0394)
North Central	−.0456**	−.0266	.0135	−.0248	−.0014
	(.0209)	(.0283)	(.0373)	(.0267)	(.0354)

(*continued*)

Table 7.7 (continued)

Variable	Drug Crimes[a]		Minor Property Crimes[b]		Minor Violent Crimes[c]	
Living in SMSA	.0820**	.0899**	.0498**	.0683**	.0828**	.0343
	(.0165)	(.0222)	(.0223)	(.0308)	(.0211)	(.0292)
Local unemployment	.0089**	.0151**	.0021	.0069	.0086**	.0044
rate	(.0032)	(.0042)	(.0044)	(.0058)	(.0042)	(.0055)
AFQT	−.0013**		.0004		−.0027**	
	(.0003)		(.0003)		(.0003)	
Math test score		−.0062**		−.0064**		−.0095**
		(.0011)		(.0015)		(.0014)
English test score		.0021		.0059**		.0062**
		(.0016)		(.0021)		(.0020)
Mechanical-		.0014		.0038**		.0008
information test		(.0011)		(.0015)		(.0014)
score						
High school graduate		−.0995**		−.0636		−.0173
(age 18+)		(.0307)		(.0424)		(.0402)
Family income		−.0567**		.0176		.0003
$10,000–$25,000		(.0288)		(.0398)		(.0379)
Family income		−.0237		−.0213		−.0180
$25,000–$50,000		(.0307)		(.0426)		(.0404)

	(1)	(2)	(3)
Family income $50,000–$75,000	-.0245 (.0449)	.0017 (.0624)	.0494 (.0593)
Family income > $75,000	-.0641 (.0873)	.0965 (.1214)	-.1834 (.1154)
Highest grade completed (mother)	.0001 (.0046)	-.0019 (.0064)	.0022 (.0061)
Highest grade completed (father)	.0071** (.0035)	.0114** (.0048)	-.0096** (.0046)
Adult female working when age 14	.0442** (.0177)	.0590** (.0245)	-.0099 (.0233)
Adult male working when age 14	.0071 (.0403)	-.0283 (.0547)	.0157 (.0519)
Juvenile punishment rate	.0132 (.0325)	.0308 (.0450)	-.05672 (.0428)
Sample size	3,034	3,072	3,087
R^2	.0383	.0261	.0535
Sample size	1,690	1,705	1,709
R^2	.0758	.0498	.0812

[a]Drug crimes include selling marijuana or hard drugs.
[b]Minor property crimes include stealing something worth less than $50 or causing property damage.
[c]Minor violent crimes include hitting someone or fighting.
*Statistically significant at the 10 percent level.
**Statistically significant at the 5 percent level.

Table 7.8   OLS Estimates (S.E.s) of Criminal Participation (men aged 20–23 in the 1980 NLSY)

Variable	Property Crimes[a]		Violent Crimes[b]		Violent & Property Crimes[c]	
Intercept	.3058**	.3404**	.2508**	.3913**	.4186**	.4939**
	(.0473)	(.0987)	(.0579)	(.1282)	(.0654)	(.1417)
Age 21	−.0270	−.0116	−.0075	−.0214	−.0492*	−.0578*
	(.0192)	(.0229)	(.0234)	(.0297)	(.0264)	(.0329)
Age 22	−.0166	−.0486**	−.0210	−.0389	−.0415	−.0853**
	(.0194)	(.0234)	(.0238)	(.0302)	(.0268)	(.0335)
Age 23	−.0280	−.0456	−.0509	−.0342	−.0736*	−.0869
	(.0315)	(.0359)	(.0387)	(.0466)	(.0435)	(.0515)
Black	−.0493*	−.0660	−.0116	.0155	−.0469	.0069
	(.0268)	(.0402)	(.0328)	(.0524)	(.0370)	(.0578)
Hispanic	−.0509	−.0505	−.0698	−.1158*	−.1013**	−.1143*
	(.0357)	(.0470)	(.0436)	(.0607)	(.0492)	(.0674)
Intact family when age 14	−.0817**	−.0523	−.0709**	−.1121**	−.1229**	−.1048**
	(.0204)	(.0369)	(.0250)	(.0480)	(.0282)	(.0530)
Teenage mother	.0073	.0010	.0341	.0679**	.0204	.0490
	(.0206)	(.0250)	(.0252)	(.0322)	(.0285)	(.0359)
South	−.0652**	−.0026	.0065	.0295	−.0273	.0218
	(.0244)	(.0340)	(.0299)	(.0441)	(.0337)	(.0488)
Northeast	−.0216	−.0001	.0128	−.0309	−.0133	−.0305
	(.0260)	(.0322)	(.0318)	(.0418)	(.0359)	(.0462)
North Central	−.0395	.0132	−.0438	−.0350	−.0608*	−.0131
	(.0243)	(.0312)	(.0298)	(.0405)	(.0336)	(.0447)
Living in SMSA	−.0045	−.0042	−.0118	−.0196	.0219	.0210
	(.0190)	(.0231)	(.0233)	(.0299)	(.0263)	(.0331)
Local unemployment rate	−.0027	.0008	.0086*	.0117**	.0086	.0140**
	(.0038)	(.0044)	(.0047)	(.0057)	(.0053)	(.0064)
AFQT	−.0011**		−.0012**		−.0019**	
	(.0003)		(.0003)		(.0004)	

	(1)	(2)	(3)	(4)	(5)
Math test score		−.0036**		−.0045**	−.0064**
		(.0011)		(.0015)	(.0016)
English test score		.0019		.0022	.0023
		(.0017)		(.0022)	(.0024)
Mechanical-information test score		−.0001		.0016	.0027
		(.0012)		(.0015)	(.0017)
High school graduate		−.0617**		−.0454	−.0666
		(.0292)		(.0380)	(.0419)
Family income $10,000–$25,000		−.0464*		−.0319	−.0626*
		(.0246)		(.0319)	(.0353)
Family income $25,000–$50,000		−.0621**		−.0334	−.0778**
		(.0260)		(.0336)	(.0372)
Family income $50,000–$75,000		−.0474		−.0800	−.0857
		(.0400)		(.0514)	(.0574)
Family income > $75,000		−.1179**		−.0800	−.1474*
		(.0582)		(.0757)	(.0836)
Highest grade completed (mother)		−.0041		−.0036	−.0048
		(.0049)		(.0064)	(.0070)
Highest grade completed (father)		.0055		.0031	.0039
		(.0034)		(.0044)	(.0048)
Adult female working when age 14		.0341*		.0238	.0487*
		(.0184)		(.0238)	(.0264)
Adult male working when age 14		−.0148		−.0607	−.0761
		(.0504)		(.0656)	(.0724)
Adult punishment rate		−.1574*		−.1958*	−.2539**
		(.0869)		(.1130)	(.1247)
Sample size	1,477	903	1,489	907	903
R^2	.0292	.0565	.0297	.0632	.0780

[a] Property crimes include either stealing something worth more than $50 or selling hard drugs.

[b] Violent crimes include either injuring someone or using force to get something.

[c] Property and violent crimes include individuals who commit a property crime as defined in n. a above and a violent crime as defined in n. b above.

* Statistically significant at the 10 percent level.

** Statistically significant at the 5 percent level.

with those of Lochner (1999), who explores the effects of education and the juvenile justice system on self-reported criminal behavior among older cohorts of the NLSY.

Given the low level of explanatory power of the regressions, it is perhaps not surprising that the coefficients obtained in these regressions are unable effectively to account for the observed time-series patterns of juvenile crime. For instance, between 1978 and 1993, juvenile arrest rates for violent crime rose 79 percent. Over that same time period, the fraction of children in single-parent families rose approximately 8 percentage points, the fraction of children with teenage mothers fell about 2 percentage points, high school graduation rates rose 2 percentage points, and the fraction of the population living in SMSAs rose 5 percentage points. Using the coefficients from the violent-crime regression in table 7.5 above, the changes in children in single-parent families, teenage mothers, high school graduates, and living in SMSAs imply (respectively) a 3.5, −0.3, −1.7, and 1.0 percent change in male juvenile violent-crime participation over the period 1978–93.[13] Combined, these factors imply a 2.5 percent increase in violent crime, compared to an observed increase in juvenile violent-crime arrests of 79 percent. Thus, these variables are able to account for only a minuscule fraction of the observed crime increase. Similarly, these variables cannot explain the sharp reductions in crime observed since 1993. It is important to note, however, that our estimates are for participation, not intensity of criminal activity, an alternative margin on which these demographic factors could also be operating.

As noted earlier, Mocan and Rees (1999) have undertaken an analysis similar to that discussed above but using NLSAH data. While they do not include measures of cognitive ability, family-income variables, high school graduation, or teenage mother in their specifications, they do include a number of variables that we do not, such as religion and a number of county-level variables (per capita welfare spending, racial composition, presidential voting, and per capita police spending). It is nonetheless useful to compare and contrast their results with ours. For the crime category theft, Mocan and Rees (1999) find statistically significantly higher rates among males who report no religion or have a parent on welfare. (Controlling for religious attachment does not change our results and yields a negative correlation between attachment and criminal participation.) Those who live in rural counties have lower crime rates. Broken families are associated with lower theft rates. Male assault rates (the category that corresponds most closely with our violent-crime measure) are higher for blacks, those whose fathers have low education attainment or who live in broken

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13. These estimates are obtained by multiplying the OLS coefficient times the overall change in the variable and then dividing by the baseline violent-crime participation rate for males (0.197). In other words, the 3.5 percent change due to more children in single-parent families represents an increase from 0.197 to 0.204 in violent-crime participation.

families, or those residing in counties with high per capita welfare spending and high voting rates for Ross Perot in the 1996 presidential election. High rates of arrests per violent crime in the county reduce assaults, as does being Catholic or born-again Christian. Thus, while some differences emerge in the two sets of results, there is also a substantial degree of consistency across the samples.

The most recent cohorts of the National Longitudinal Surveys (NLSY97) began following a new cohort of youths aged twelve to sixteen in 1997. Unlike the original NLSY, this new survey will include repeated observations on criminal activity as well as new questions on gang activity. To date, however, only the results from the 1997 survey have been released. Because the new cohorts are currently so young, self-reported criminal activity is generally low and concentrated in very minor offenses. Preliminary analyses of these data yield results that are consistent with the results presented above. In particular, the presence of both parents is an important factor in reducing crime, as are higher mathematics achievement scores (AFQT scores are not yet available).

7.4.1 Outcomes at Age Thirty

One of the main advantages of the NLSY is its long panel structure. All respondents have been surveyed annually since 1979 (biannually since 1994), so we can examine how later outcomes in life are correlated with criminal participation during late teenage years. Table 7.9 reports education outcomes, labor market outcomes, and family measures at age thirty on the basis of criminal participation status in 1980. The first column reports the average outcome for the entire sample. For each criminal category, we report the raw difference in each outcome as well as the remaining difference after controlling for race, AFQT, whether the youth lived with both natural parents at age fourteen, and the youth's highest grade completed (highest grade completed was not controlled for when examining education measures, for obvious reasons). Since we do not have an instrumental variable for criminal participation (punishment measures were not sufficiently correlated with participation to yield reliable instrumental-variables estimates), our results are merely suggestive and should not be interpreted causally without further study. Despite this caveat, the results are interesting and informing.

Raw differences in education attainment are substantial regardless of the measure. Even after controlling for other factors, differences in education attainment between noncriminals and property criminals are large and statistically significant. Wage rates and income levels at age thirty are virtually identical across adolescent criminal backgrounds after controlling for background and ability. Hours worked are slightly lower among those reporting property crimes during adolescence but not among violent youth offenders. Unemployment rates are about 2 percent higher among

Table 7.9   Outcomes at Age 30 by Youth Criminal Status in 1980

		Property Crimes		Violent Crimes		Both Crimes	
Outcome at age 30	Outcome Mean	Raw Difference	Difference after Controlling for background[a]	Raw Difference	Difference after Controlling for background[a]	Raw Difference	Difference after Controlling for background[a]
		A. Males Aged 15–19					
Highest grade completed[b]	13.1347	−1.6263*	−.8571*	−.7553*	−.1515	−1.1193*	−.3896*
	(.0499)	(.2169)	(.1633)	(.1764)	(.1321)	(.1587)	(.1206)
High school graduate[b]	.7957	−.2468*	−.1625*	−.1010*	−.0374	−.1513*	−.0745*
	(.0078)	(.0330)	(.0296)	(.0269)	(.0240)	(.0243)	(.0219)
College graduate[b]	.2462	−.2136*	−.1112*	−.1148*	−.0319	−.1712*	−.0720*
	(.0083)	(.0357)	(.0297)	(.0287)	(.0237)	(.0259)	(.0218)
Log wage rate	2.5364	−.0730	.0142	−.0871*	−.0027	−.0760*	.0130
	(.0122)	(.0423)	(.0396)	(.0331)	(.0309)	(.0299)	(.0281)
Log wage income	10.1212	−.1154	−.0244	−.1216*	−.0201	−.1252*	−.0246
	(.0174)	(.0534)	(.0501)	(.0418)	(.0392)	(.0377)	(.0356)
Hours worked	2000.96	−126.63*	−117.38*	−33.59	−6.21	−85.67*	−66.16
	(17.18)	(48.56)	(48.68)	(38.11)	(38.13)	(34.70)	(34.62)
Unemployed	.0431	.0150	.0063	.0246*	.0186	.0265*	.0202*
	(.0039)	(.0141)	(.0142)	(.0112)	(.0112)	(.0101)	(.0101)
Married (not separated)	.5439	−.0066	−.0006	−.0025	.0190	−.0114	.0046
	(.0096)	(.0365)	(.0366)	(.0286)	(.0286)	(.0258)	(.0260)
Never married	.3257	.0061	.0327	.0028	.0044	.0167	.0286
	(.0090)	(.0342)	(.0342)	(.0268)	(.0268)	(.0242)	(.0244)
Divorced	.0915	.0106	−.0129	.0028	−.0119	.0020	−.0169
	(.0055)	(.0208)	(.0209)	(.0162)	(.0163)	(.0147)	(.0148)
Number of children	1.0098	.2512*	.0967	.2625*	.1401*	.2010*	.0627
	(.0218)	(.0798)	(.0764)	(.0624)	(.0597)	(.0564)	(.0544)

B. Females Aged 15–19

Highest grade completed[b]	13.2442	−1.3158*	−1.0148*	−.8992*	−.3087	−1.0020*	−.5024*
	(.0489)	(.3762)	(.3028)	(.2555)	(.2083)	(.2244)	(.1828)
High school graduate[b]	.8391	−.1777*	−.1428*	−.0678*	−.0155	−.0829*	−.0357
	(.0075)	(.0536)	(.0498)	(.0364)	(.0342)	(.0320)	(.0300)
College graduate[b]	.2483	−.1853*	−.1399*	−.1231*	−.0283	−.1519*	−.0725*
	(.0089)	(.0641)	(.0548)	(.0436)	(.0377)	(.0383)	(.0330)
Log wage rate	2.3275	.0702	.1346	−.0124	.1026*	−.0139	.0950*
	(.0140)	(.0829)	(.0766)	(.0550)	(.0511)	(.0487)	(.0453)
Log wage income	9.6756	−.0015	.0883	−.0805	.0706	−.0942	.0473
	(.0224)	(.1220)	(.1144)	(.0808)	(.0763)	(.0716)	(.0677)
Hours worked	1459.45	−139.87	−95.91	−98.19	−54.31	−122.11*	−79.57
	(18.55)	(93.08)	(91.79)	(61.75)	(61.28)	(54.63)	(54.31)
Unemployed	.0378	.0685*	.0688*	.0532*	.0466*	.0508*	.0461*
	(.0036)	(.0240)	(.0240)	(.0161)	(.0162)	(.0141)	(.0142)
Married (not separated)	.6046	−.0052	−.0145	−.0739	−.0405	−.0425	−.0166
	(.0093)	(.0667)	(.0659)	(.0442)	(.0439)	(.0391)	(.0390)
Never married	.2138	−.0573	−.0191	.0358	.0320	−.0036	.0026
	(.0078)	(.0563)	(.0552)	(.0373)	(.0368)	(.0331)	(.0327)
Divorced	.1267	.1046*	.0799	.0514	.0330	.0683*	.0464
	(.0063)	(.0452)	(.0447)	(.0299)	(.0298)	(.0265)	(.0265)
Number of children	1.3434	−.1010	−.2458	.2111*	.0274	.1666	−.0195
	(.0235)	(.1504)	(.1398)	(.0994)	(.0932)	(.0882)	(.0828)

thirty-year-old males (and 5 percent higher for women) reporting both property and violent crimes during their teenage years. No differences in marriage or divorce patterns by age thirty had emerged for youth criminals and noncriminals after controlling for background factors; however, men who reported violent criminal behavior during adolescence had significantly more children by age thirty. Women who engaged in crime during their youth did not report having more children.

On the basis of these correlations, it would be difficult to argue that criminal participation among most youths has severe consequences later in life. There is little correlation between youth crime and adult marriage or divorce decisions. Only a small negative correlation between adult work and youth crime exists, which might easily be explained by unobserved heterogeneity. While youth crime has a strong negative correlation with education attainment, neither variable is exogenous. As discussed in Lochner (1999), individuals likely to commit many crimes have little need for education, and individuals who receive little education are likely to find crime an attractive alternative to work. Causality runs both ways. For most adolescent offenders, the consequences of youth crime are likely to be small ten years later unless their involvement is so great that it leads to repeated arrest, conviction, harm, or death.

7.5   Analysis of Chicago Homicides by Census Tract

Official data on homicide provide a stark contrast to individual self-report data for studying the determinants of juvenile crime. Homicide data have both advantages and disadvantages. Among the advantages, homicides are always reported, and basic information about the victims (e.g., age, sex, and race) and the location of the crime is recorded. Furthermore, unlike the petty crimes that dominate self-reports, homicide has large social costs. The primary disadvantage of using homicide data is that homicides are extremely rare, necessitating substantial aggregation of the data. Also, detailed information on victims, such as income, education, etc., is not available. Even less is known about offenders since roughly one-third of murders are not solved.

In this paper, we use a unique homicide data set compiled by Block, Block, and ICJIA (1998) in cooperation with the Chicago Police Department. These data allow us to determine the race and age of Chicago homicide victims for a number of decades as well as the census tract in which the homicide occurred.[14]

We link the homicide data to census-tract-level data from the 1980 and

14. The content of the data reported in Block, Block, and ICJIA (1998) is similar to the more widely available Supplementary Homicide Reports compiled by the FBI, with the exception that the smallest unit of analysis in the latter data set is a city as opposed to a census tract.

1990 Censuses of Housing and Population in order to analyze the relation between homicide rates and local neighborhood characteristics. Because of the infrequency of homicides, we aggregate homicides by census tract over ten-year periods. Homicides for the period 1975–85 are linked to 1980 census data, and homicides for the period 1985–95 are linked to the 1990 census.

Census data provide a wide range of economic and social variables for inclusion in the analysis. Economic variables include median household income within the tract, percentage of children below the poverty level, and measures of income inequality within the tract. Social controls include the percentage of households in owner-occupied housing, the racial composition of the tract, and the fraction of the population aged sixteen to nineteen that is neither working nor enrolled in school.[15] Because all the tracts are within the city of Chicago, there is no obvious variation across tracts in either criminal-justice measures, macroeconomic variables, or gun-ownership proxies to exploit.

We eliminate from the sample roughly eighty census tracts (out of almost nine hundred) with residential populations under five hundred. These sparsely populated tracts tend to be areas of manufacturing or commerce. Thus, residential population is a poor proxy for the amount of activity in the area. Since crime statistics are tallied by place of occurrence, victimization rates per residential population are likely to be greatly inflated. For example, the central business district (known as the Loop) has very few residents despite an enormous daytime population.

Summary statistics for the remaining census tracts are provided in table 7.10. Our measure of juvenile crime is the annual homicide victimization rate per 100,000 juveniles aged fifteen to nineteen.[16] The age of victims is used rather than the age of assailants because the latter is known only when an arrest is made. Cook and Laub (1998) demonstrate that the ages of victims and killers tend to be similar in most cases. We present summary statistics for 1980, 1990, and the change between 1980 and 1990. Homicide victimization rates almost double for youths between 1980 and 1990. More than one-fourth of the children live in poverty, and this fraction rises slightly in 1990. The number of adults with less than a high school degree falls substantially between 1980 and 1990. We construct a measure of income inequality within the tract that reflects (roughly) the fraction of all income that would need to be transferred among tract residents in order to equalize incomes. This measure is not exact because of top coding of

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15. There are many other potential variables available from the census, including unemployment rates, median rents, households headed by single parents, female labor force participation, etc. There is a high level of multicollinearity between many of the variables, both those that are included in our specifications and those that are left out. For that reason, caution must be exercised in interpreting the coefficients.

16. Although we report annual rates, these are averaged over ten-year periods.

Table 7.10   Summary Statistics for Chicago Census-Tract-Level Analysis

Variable	1980	1990	Change from 1980 to 1990
Annual homicide victimization rate for 15–19-	37.4	69.7	33.5
year-olds (per 100,000)	(65.3)	(99.0)	(108.7)
% of children in poverty	27.6	30.6	3.5
	(21.0)	(24.2)	(14.5)
% of adults with no high school diploma	48.3	38.1	−10.0
	(17.4)	(17.3)	(8.3)
Income inequality within tract (% of total	20.4	19.2	−1.2
income redistribution required to equalize	(6.5)	(7.4)	(7.9)
incomes within tract)			
% black	39.8	41.9	3.0
	(44.9)	(44.5)	(10.2)
% owner-occupied housing	38.3	40.5	1.7
	(24.3)	(24.4)	(6.0)
% of 16–19-year-olds neither working nor in	19.0	16.0	−2.7
school	(13.1)	(13.7)	(15.5)
Median household income (1990 dollars)	25,110	25,110	584
	(9,307)	(11,079)	(5,992)
No. of observations	801	803	792
No. of observations with zero homicides	408	344	235

Note: Column labeled 1980 gives homicide averages for the period 1976–85; column labeled 1990 gives averages for the period 1986–95. All other variables are taken from the decennial census in the named year. The income inequality measure is the estimated fraction of total census-tract income that would need to be redistributed to equalize income within the tract. Census tracts with fewer than 500 residents are omitted from the analysis. Standard errors are given in parentheses. Both means and standard errors are population weighted.

the income categories and because precise incomes are reported not at the tract level but, rather, by the number of residents falling within various income ranges. Income inequality remains relatively constant on average within census tracts over the sample period, although within a particular tract there is a great deal of variation. Roughly 40 percent of the sample is black, and almost the same fraction own their own home. A substantial fraction (almost 20 percent) of youths report neither working nor attending school.

Table 7.11 presents regression results for the tract-level analysis. We show cross-sectional results for 1980 and 1990 in the first four columns and estimates in first-differences in the last four columns. Because many census tracts did not experience a single youth homicide even when we aggregate homicides over a ten-year period, tobit estimates are presented.[17] In all

17. OLS estimates yield similar signs but are generally less statistically significant. The signs on the coefficients are generally robust to OLS estimation only including the census tracts where at least one homicide took place or using a dependent variable equal to 1 if any positive number of homicides occurred or 0 otherwise.

Table 7.11   Census-Tract-Level Determinants of Juvenile homicide Victimization in Chicago

| | Cross-Sectional Estimates (tobit) | | | | First-Difference Estimates | | | |
| | 1980 | | 1990 | | All Census Tracts | | Tracts with 1+ Homicides | |
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
% of children in poverty	1.43	1.12	1.20	.99	.93	.58	.95	.47
	(.20)	(.31)	(.21)	(.31)	(.24)	(.26)	(.32)	(.34)
% of adults with no high school	.76	.83	1.68	2.07	1.37	.83	1.67	.91
diploma	(.20)	(.23)	(.24)	(.30)	(.40)	(.41)	(.54)	(.57)
Income inequality within tract	1.01	.74	1.46	1.75	.04	−.42	.53	.08
	(.42)	(.45)	(.50)	(.53)	(.40)	(.42)	(.54)	(.55)
% black	.19	.24	1.01	1.14	.55	.57	.48	.57
	(.07)	(.08)	(.09)	(.10)	(.25)	(.25)	(.17)	(.32)
% owner-occupied housing	...	−.48	...	−.69	...	1.06	...	2.11
		(.23)		(.22)		(.60)		(.90)
% of 16–19-year-olds neither	...	.73	...	.21	...	.14	...	.45
working nor in school		(.27)		(.31)		(.21)		(.29)
Median household income	...	.0011	...	.0016	...	−.0026	...	−.0038
		(.0008)		(.0008)		(.0006)		(.0009)
Constant	−94.9	−109.8	−131.6	−166.4	35.9	31.9	48.7	41.7
	(12.6)	(32.5)	(14.7)	(35.7)	(4.8)	(4.9)	(6.5)	(6.7)
Ancillary parameter	62.9	61.5	77.7	77.3	...	...	...	...
	(2.3)	(2.2)	(2.6)	(2.6)				
(Pseudo-)R^2	.047	.051	.075	.077	.051	.076	.047	.084
No. of observations	801	798	803	801	792	788	557	556
No. of censored observations	408	406	344	342	...	...	...	...

Note: The dependent variable is the annual homicide victimization rate for 15–19-year-olds in the census tract. Columns labeled 1980 are homicide averages for the period 1976–85; columns labeled 1990 are averages for the period 1986–95. In all cases, the explanatory variables are taken from the decennial census. The income-inequality measure is the estimated fraction of total census-tract income that would need to be redistributed to equalize income within the tract. Census tracts with fewer than 500 residents are omitted from the analysis. All regressions are population weighted. For the tobit specifications, pseudo-R^2 values are reported.

cases, regression results are weighted by census-tract residential population. In the cross-sectional estimates, homicide victimization rates are positively related to the fraction of children in poverty, the fraction of adults with no high school diploma, and income inequality within the tract. More owner-occupied housing is associated with fewer homicides. In almost every instance, all these coefficients are statistically significant at the .05 level in both the 1980 and the 1990 specifications. Number of idle teens and median income are both positively related to homicide rates but are of only borderline statistical significance.

The coefficients are relatively stable across the 1980 and 1990 periods, with a few notable exceptions.[18] The fraction of adults with no high school degree becomes more important in 1990, as does the income-inequality measure and the percentage black. Given the sharp divergence between white and black homicide rates between 1980 and 1990, it is not surprising that the coefficient on percentage black increases substantially in the 1990 tobit.

The implied effect of the explanatory variables on homicide rates is substantial. For instance, a 10 percentage point increase in the number of children in poverty increases the juvenile homicide rate by six to eight per 100,000 across the various cross-sectional regressions—a substantial change relative to the baseline homicide rates of 37.4 in 1980 and 69.7 in 1990.[19] A 10 percentage point increase in the fraction of adults with high school diplomas or a 10 percentage point reduction in income inequality reduces homicide rates by four to five in 1980 and by ten to thirteen in 1990.

When doing cross-sectional estimates of this kind, an important concern is the presence of omitted-variables bias. In particular, when using census-tract-level data, there is a high degree of multicollinearity between the variables included in the regression and other potential covariates, such as single-parent families, local labor market conditions, family size, etc. Thus, the particular variables included in the regressions, in all likelihood, are proxying for other social and economic factors. First-difference estimates provide one check on the plausibility of the specification. To the extent that changes in the named variables affect changes in homicide rates in a manner similar to that in which the levels of the variables influence homicide rates in the cross section, our confidence in the coefficients is enhanced. We present first-difference estimates in columns 5–8 of table 7.11.

18. It is also the case that there is less censoring in the 1990 sample. When calculating the overall effect of a given change in an explanatory variable, the raw coefficient reported in the table must be corrected to account for the degree of censoring. In practice, the correction is nearly proportional to the fraction of observations that are censored (about 50 percent in 1980 and about 40 percent in 1990).

19. These calculations take into account the correction required because of censoring in the dependent variable.

In columns 5 and 6, all census tracts are included; in the final two columns, only those census tracts in which at least one youth homicide occurred over the period 1975–95 are in the sample. The coefficients on children in poverty, adults without high school degrees, and the percentage black are all robust to estimation in first differences, although, in all cases, standard errors rise. The degree of income inequality appears less robust. Owner-occupied housing and median household income actually reverse signs, making us very cautious about drawing any conclusions for these variables.

Given the dramatic increase in homicide among youths in Chicago between the years 1980 and 1990, it is worth examining the extent to which changes in the observed variables can account for this time-series pattern. The percentage of children in poverty rose 3.5 percent in Chicago between 1980 and 1990. Using the median estimate across the eight specifications in table 7.11, this increase in poverty can explain a rise of two to three homicides per 100,000, or roughly 6–10 percent of the overall increase. The dramatic increase in the number of adults with high school diplomas over this period actually works in the wrong direction, implying an expected decrease in crime of eight to nine per 100,000. Increases in the percentage black (a 3.0 percentage point rise overall in Chicago) would be predicted to increase homicide rates by only 1.5 per 100,000. Thus, on net, the three factors that are consistently linked to higher crime across the different specifications actually worked to *lower* crime between 1980 and 1990 and thus do not provide a plausible explanation for crime's increase.

7.6   State-Level Panel-Data Analysis of the Effect of the Criminal-Justice System

The final set of estimates presented use a state-level panel-data set for the period 1978–93.[20] Unlike the analyses presented in previous sections, this approach is ideal for studying the effect of the justice system on juvenile criminal behavior since crime and criminal-justice data (such as the number of juveniles in custody) are available exclusively at the state level.

Data limitations present substantial challenges for examining juvenile delinquency at the state level. First, criminal involvement by age of perpetrator is not directly observed since, for many crimes, the age of the criminal is unknown. Arrest data, which are collected by age of offender and type of crime, must therefore be used as a proxy.[21] Second, the data on juveniles in custody are more limited than the corresponding data on adults. Censuses of public and private juvenile facilities were conducted

20. This section draws heavily on the analysis of Levitt (1998).

21. As Greenwood (1995) notes, however, juveniles and adults may be arrested at different rates for a given crime. For instance, juveniles are more likely to commit crimes in groups, potentially leading to more arrests per crime.

roughly every two years between 1977 and 1993. Third, in some of these censuses, delinquents are not separately identified from status offenders (e.g., runaways and truants) and neglected children.[22]

Using this state-level panel data, Levitt (1998) analyzes the responsiveness of juvenile crime to juvenile punishment. Two different measures of juvenile punishment are used: juveniles in custody as a fraction of the total juvenile population and juveniles in custody per juvenile violent crime committed. In addition to the punishment variables, controls for percentage black, percentage living in metropolitan areas, the unemployment rate, drinking-age dummies, age-distribution measures, state fixed effects, and year dummies were included. In some specifications, state-level trends were also included. For both violent crime and property crime, more severe juvenile punishments are always associated with lower juvenile crime. The magnitude of the crime decrease is consistent with the response of adult crime to punishment (Levitt 1998) as well as with previous estimates of adult responsiveness (Marvell and Moody 1994; Levitt 1996). A 1 percentage point increase in the unemployment rate increases juvenile property crime by 1–2 percent but has no consistent effect on violent crime by juveniles. The estimated effect of unemployment on adult crime is very similar to that on juvenile crime.

Perhaps more interesting than these panel regressions is the unique opportunity afforded by the sharp changes in expected punishment that accompany the transition from the juvenile to the adult criminal-justice system. Prior to reaching the "age of majority," jurisdiction falls to the juvenile courts, which operate almost wholly independently of the adult courts.[23] On reaching the age of majority, the adult courts take over. In states where juvenile and adult punishments differ substantially, the age of majority represents an abrupt change in the costs associated with committing crime. If juveniles respond to the incentives of the criminal-justice system, an abrupt change in criminal behavior should be observed. For the sake of this analysis, it is fortunate that there is an enormous amount of variation in the "relative punitiveness" of the juvenile and the adult justice systems across states. Some states (e.g., Illinois and Massachusetts) are extremely lenient toward juveniles relative to adults. In other states (e.g., California), the treatment of juveniles is quite severe—perhaps even more so than that of adults (Harris 1993).

Although the logic of this analysis is straightforward, some difficulties are present. First, there is strong evidence that criminal involvement varies markedly over the life cycle (e.g., Blumstein et al. 1986). Therefore, one

22. Levitt (1998) demonstrates an algorithm—based on the number of juveniles held in public vs. private detention facilities—that appears to provide close estimates of the number of juvenile delinquents in custody.

23. In a small fraction of cases, typically the most severe offenses or those involving juveniles very close to the age of majority, jurisdiction of cases is transferred to the adult courts.

cannot simply compare crime rates in a state before and after the age of majority. Rather, one must employ a "differences-in-differences" approach, looking at crime patterns in states that have the same age of majority but in which the change in punishment on reaching adulthood varies. Second, it is difficult to make a direct comparison of the punitiveness of juvenile and adult punishments. Juvenile institutions are qualitatively different than adult institutions (typically, the former are much safer and more pleasant). Since juvenile records are sealed, the long-term financial effect of juvenile convictions may be less than that of adult convictions. On the other hand, being institutionalized may simply involve a higher psychic cost for a fourteen-year-old than for a twenty-four-year-old. For this reason, the analysis focuses on what we term the *relative punitiveness* of state juvenile and adult criminal-justice systems, defined as follows:

$$\text{relative punitiveness} \ = \ \frac{(\text{adult prisoners/adult violent crime})}{(\text{juvenile delinquents/juvenile violent crime})}.$$

The harsher are adult punishments relative to juvenile punishments, the greater is the measure of relative punitiveness, and, consequently, the greater is the predicted decrease in criminal involvement associated with the transition to adult court.[24]

The results of this analysis are presented in table 7.12.[25] The left side of the table reports results for states in which the age of majority is eighteen (the most common age of majority in the United States). Columns 1–3 divide states into three groups according to the relative punitiveness of the adult and juvenile courts. Column 1 contains those state-year pairs where the transition to adult court is associated with the greatest increase in punishment (a ratio greater than 2). Column 2 captures state-year pairs with moderate increases in punitiveness with the onset of adult status. Column 3 reflects those cases with apparent decreases (or, possibly, the smallest increases) in the severity of punishment.[26] The mean percentage change in crimes committed annually by cohort from age fifteen to age nineteen is presented for both violent crime and property crime. The boxed observations represent the age at which an individual passes from the juvenile court to the adult court.

The top row of the first column in table 7.12 shows that, in those states

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24. To the extent that this measure of punitiveness is not perfectly capturing true differences in punishment across states (e.g., because the living conditions of juveniles in custody in one state are more pleasant than those in another state), there will be misclassification errors that should attenuate any measured differences across states, making it more difficult to find significant results.

25. Levitt (1998) demonstrates that the simple differences-in-differences results presented here are robust to the inclusion of a wide range of other controls.

26. Although the observations reported in col. 3 have relative punitiveness ratios less than 1, this does not necessarily imply that actual punishment is lower in the adult court for the reasons discussed earlier in this section.

Table 7.12   **Changes in Crime Rates and the Transition from the Juvenile Court to the Adult Court**

Year to Year % Change in Crime for Cohort	Relative Punitiveness of Adult versus Juvenile Court in States Where Age of Majority Is 18				Relative Punitiveness in States Where Age of Majority Is 17		
	Most Punitive (N = 61) (1)	Intermediate (N = 115) (2)	Least Punitive (N = 102) (3)	Difference of (1) − (3) (4)	Most Punitive (N = 29) (5)	Least Punitive (N = 29) (6)	Difference of (5) − (6) (7)
Violent Crime							
15–16	40.6	37.5	39.9	0.7	51.2	37.1	14.1
	(3.8)	(2.6)	(3.8)	(5.4)	(5.4)	(5.0)	(7.2)
16–17	25.1	28.4	24.8	0.3	**13.0**	**39.4**	**−26.4**
	(3.1)	(2.4)	(3.2)	(4.5)	(4.4)	(6.7)	(8.0)
17–18	**−3.8**	**10.2**	**23.1**	**−26.9**	26.3	29.7	−3.4
	(3.6)	(3.1)	(3.4)	(5.0)	(6.1)	(3.6)	(7.1)
18–19	.5	3.8	5.9	−5.4	−3.8	.5	−4.3
	(2.4)	(1.8)	(1.6)	(2.9)	(2.7)	(2.5)	(3.7)
Property Crime							
15–16	8.4	8.4	6.3	2.1	13.2	9.6	3.6
	(1.5)	(1.0)	(1.0)	(1.8)	(2.1)	(3.0)	(3.7)
16–17	−1.9	−1.8	−5.4	3.5	**−6.7**	**7.1**	**−13.8**
	(1.5)	(1.0)	(.9)	(1.7)	(2.6)	(3.4)	(4.3)
17–18	**−20.5**	**−12.8**	**−9.2**	**−11.3**	−2.6	4.0	−6.6
	(1.7)	(1.7)	(1.5)	(2.3)	(3.2)	(3.2)	(4.5)
18–19	−19.4	−16.2	−15.9	−3.5	−21.3	−20.9	−0.4
	(1.3)	(1.0)	(.9)	(1.6)	(1.8)	(1.4)	(2.2)

Note: Values in the table are state-population weighted means of the percentage change in crime committed by the named cohort from last year to this year. Standard deviations are given in parentheses. Values printed in boldface type reflect passage from the juvenile to the adult court. The number of observations listed at the top of the table is the number of state-year pairs in the category. The ranges in cols. 1, 2, and 3 are > 2, 1–2, and < 1, respectively. The cutoff separating cols. 5 and 6 is 1.5.

where the transition to the adult court is the harshest, sixteen-year-olds commit 40.6 percent more violent crime than that same cohort of adolescents committed as fifteen-year-olds. This large increase—mirrored in columns 2 and 3—reflects the natural age profile of violent crime. Similar results are obtained for the second row: seventeen-year-olds commit about 25 percent more crime than sixteen-year-olds. This is true across all the first three columns. For eighteen-year-olds, the age at which the adult court gains jurisdiction in these states, a starkly different pattern emerges. In the states where punishments increase the most with the adult court (col. 1), violent crime rates fall by 3.8 percent for eighteen-year-olds. In contrast, where the transition to the adult court is most lenient, violent crime committed by eighteen-year-olds increases 23.1 percent. Where the rise in sanctions with adult court is intermediate, the rise in violent crime is also intermediate: 10.2 percent. A similar but less extreme pattern also emerges in property crime (the lower-left-hand panel of the table), where the states with the harshest transition see 20.5 percent decreases in crime at age eighteen, compared to 12.8 and 9.2 percent decreases in the moderate and most lenient states, respectively.

Column 4 of table 7.12 calculates mean differences between the values in column 1 and those in column 3, along with standard errors on these differences. For violent crime, the differences are small before the transition to the adult court. For eighteen-year-olds, who have just come under the jurisdiction of the adult court, the 27 percent difference in violent-crime rates in column 4 is highly statistically significant. Crime continues to fall faster in the most punitive states for nineteen-year-olds. The identical pattern is also observed for property crime.[27]

Columns 5 and 6 present parallel estimates for states where the age of majority is seventeen. Owing to the smaller number of states falling into this classification, observations are assigned to two groups rather than three, with a punitiveness ratio of 1.5 as the dividing line. Column 7 presents the difference between column 5 and column 6. Once again, the percentage changes in both violent- and property-crime rates are slightly higher prior to the transition, dramatically lower in the year of transition, and slightly lower in the ensuing years. The magnitude of the differences across columns, displayed in column 7, is very similar to the results for states with an age of majority equal to eighteen.[28]

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27. Bearing in mind that the estimated crime rate by cohort is not a direct measure of crime involvement but rather derived from the number of arrests by cohort, an alternative explanation for the patterns observed would be that the police are more hesitant to arrest those who have passed the age of majority because the sanctions that they will face are so severe. Anecdotal evidence, however, suggests just the opposite: that the police are less likely to arrest juveniles because punishments are so slight that it is not worth the effort.

28. It is also interesting to compare the patterns observed in states where the age of majority is eighteen to those where it is seventeen. For both crime categories, the change in crime is smaller for eighteen-year-olds becoming adults (cols. 1–3) than for eighteen-year-olds who

The results presented in table 7.12 are noteworthy for two reasons. First, they provide strong evidence that juvenile crime is responsive to punishment. This, however, is not particularly surprising given the existing literature on adult responses to increased punishments. What is more remarkable about the findings presented above is that they provide some of the most compelling empirical evidence to date of deterrence (as opposed to incapacitation). The economic model of crime revolves around the concept of deterrence (i.e., a behavioral response of potential criminals to the incentives that they face). In practice, however, it is extremely difficult empirically to differentiate between deterrence and incapacitation (i.e., a mechanical reduction in crime that occurs because criminals are unable to commit crime while incarcerated). Because the fall in crime associated with reaching the age of majority occurs so quickly, and because juvenile criminal records are sealed, leading to very low incarceration rates for those just beyond the age of majority, the results presented in table 7.12 strongly suggest a large deterrent effect.

Although the results presented in table 7.12 cannot be directly used for the purpose of calculating the extent to which criminal-justice factors can explain the time-series pattern of crime observed over the last two periods, other results reported in Levitt (1998) are useful for that purpose. Over the period 1978–93, punishment per crime fell by 20 percent for juveniles, which can account for an 8 percentage point increase in juvenile violent crime, or only about 10 percent of the total observed change. Increases in juvenile punishment since 1993 are likewise too small to explain the recent declines in crime. On the other hand, it is worth noting that the gap between juvenile and adult crime trends is relatively well explained by the differential trends in punishment. Between 1978 and 1993, adult punishments rose 60 percent, and juvenile punishments fell 20 percent. Over half the gap between juvenile and adult violent-crime growth rates (i.e., the difference between the 79 percent increase for juveniles and the 31 percent increase for adults) can be attributed to the differences in punishment. In other words, there appears to have been an unexplained upward trend in both juvenile and adult crime over the period, but, once that trend is removed, criminal penalties are quite important in explaining the residual differences between juveniles and adults.

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were previously treated as adults (cols. 5 and 6). This suggests that, even in states where the relative punitiveness of the adult court is the least, the adult court is more severe than the juvenile court. Looking at seventeen-year-olds, however, yields a somewhat different result. In states where seventeen-year-olds are treated as adults and adults are punished severely (col. 5), crime growth rates for seventeen-year-olds are lower than they are in states where seventeen-year-olds remain juveniles (cols. 1–3). On the other hand, when seventeen-year-olds are treated leniently as adults (col. 6), crime increases are even greater than they are in states where seventeen-year-olds are considered juveniles.

7.7   Conclusion

Using three different data sets, this paper has analyzed the determinants of juvenile crime. Individual-level analysis using the NLSY highlights the importance of such factors as gender, family environment, and cognitive ability in predicting criminal involvement. Census-tract-level panel data from Chicago also point to the criminogenic effect of unstable homes as well as identifying an important role for high concentrations of children in poverty and local income inequality. State-level panel data demonstrate the importance of the criminal-justice system in restraining criminality. Coincident with the transition from juvenile to adult court, crime drops sharply in those states where adults are punished more heavily. None of these determinants of crime, however, do a particularly good job of explaining the time-series pattern of juvenile crime over the last two decades.

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