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Lance Lochner

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Lance Lochner[1]
University of Rochester
email: lance@troi.cc.rochester.edu

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Abstract

This paper develops and empirically examines a dynamic model of decisions to work, invest in human capital, and commit crime. By making all three activities endogenous, the model makes a number of new and interesting contributions to the study of crime. First, the model explains why older, more intelligent, and more educated workers tend to commit less of some property crimes than others. Age and education are more negatively correlated with crimes requiring little skill. Second, the model is useful for analyzing the impacts of education, training, and work subsidies on criminal behavior. It predicts that all three subsidy policies can reduce criminal activity. However, short-term wage subsidies only temporarily reduce crime, at the expense of increasing future crime rates. Third, unobserved age differences in on-the-job skill investment explain why wages and crime are more negatively correlated at older ages: at later ages, wages more accurately reflect skill levels and the true opportunity cost of crime. Fourth, the model predicts a rise in youth crime should accompany the recent rise in returns to skill; however, adult crime rates may rise or fall since the most able are likely to reduce their criminal activity when older while the least able increase theirs. Finally, the model suggests that law enforcement policies increase education, training, and labor supply, while reducing criminal activity.

A number of testable implications of the model are empirically studied using data from the National Longitudinal Survey of Youth (NLSY), Current Population Survey (CPS), and Uniform Crime Reports (UCR). Both ability and high school graduation are found to significantly reduce criminal participation among young men in the NLSY. High school graduation also reduces the probability that a young man will become incarcerated sometime in the following five years. While the impact of high school graduation on criminal participation declines with age, its effect on incarceration is large and relatively stable throughout young adulthood. We also estimate the deterrent effect of more severe punishment, which appears to be strong in the NLSY. Evidence from the UCR and CPS supports our individual-level findings: states with higher high school graduation rates and more severe punishment policies have lower index property crime rates. A number of other predictions are supported by the data, suggesting that the model is useful for studying the interactions of education, work, and crime.

1 Introduction

In 1993, two-thirds of the more than 1.35 million convicted and incarcerated men had not graduated from high school.[12] While federal spending on schools rose by roughly 2.4% between 1980 and 1990, federal spending on the justice system rose by 32%.[34] The number of individuals incarcerated more than doubled during that time period.[28] Has the U.S. government found the right balance between prisons and schools? While both are thought to reduce crime, education and training have many benefits that prisons and police do not. In fact, Donohue and Siegelman [5] argue that well-targeted preschool-type programs might be more cost-effective criminal deterrents than raising incarceration rates.

This paper develops a life-cycle theory of crime and human capital in which education serves as a criminal deterrent by raising private returns to work. While human capital investments do not raise current productivity, they raise future skill levels and wage rates. Higher future wage rates raise the opportunity cost of crime (assuming investments raise the productivity of work more than the returns to crime) and result in lower lifetime crime rates. Consequently, subsidies that encourage investment in human capital reduce crime by raising future wage rates. Alternatively, wage subsidies lower crime by directly increasing the current returns from work.

Because crime imposes negative externalities on society, the social returns to education and wage subsidies exceed private returns (increased earnings) by an amount equal to the net social cost of all crimes deterred. Subsidies can be welfare-improving, because in their absence, individuals may choose lower work levels and higher crime rates than are socially optimal.[1] Even if crime is considered a transfer of resources, in which case the only social cost of crime is foregone production, wage and education subsidies can be efficient.

The idea that education raises skill levels and wage rates, which then lowers crime, is not a new one. Ehrlich [7] empirically examines a number of predictions from an intuitive model which relates education to crime. Tauchen, Witte, and Griesenger [39] examine the relationship between education and crime in a cohort of young men born in 1945 and living in Philadelphia between ages 10 and 18. More recently, Grogger [14] and Gould, Weinberg, and Mustard [13] have examined the relationship between wage rates and criminal participation; although, they do not take the additional step of linking wages to education or training.[2] While economists have recognized that a relationship between education and crime may exist (and have sometimes

[1] Here, the socially optimal rate of crime refers to a second best optimum where the marginal social cost of crime (however defined) equals the marginal social cost of eliminating crime when criminal activity is unobserved (or very costly to observe).

[2] Along the same lines, Viscusi [41] examines the relationship between individuals' expectations about their relative crime to work earnings and their participation in crime.

attempted to empirically estimate it), they have done little to formalize the theory.

This paper provides a more rigorous analysis, developing a simple model that incorporates individual decisions about work, crime, and education. A number of new insights are derived, and empirical implications are then tested using data from various sources.

The model explains a number of stylized facts about crime with a single unifying concept: human capital. Older, more intelligent, and more educated individuals tend to commit less crime, because their skill levels are higher. See Table 1 for a breakdown of criminal participation by educational attainment and Table 2 for criminal participation rates by age as reported in the 1980 National Longitudinal Survey of Youth (NLSY). Further, the model suggests (and the data confirm) that different types of crime exhibit different correlations with age, intelligence, and education depending on the skill requirements of the criminal activity.

Endogenizing the skill formation process enables one to examine the effects of education, training, and wage subsidies on criminal behavior. In general, subsidies for investment in skills can be expected to reduce adult crime rates, but they are likely to have small effects on youth crime. The model predicts that short-term wage subsidies result in long-term increases in crime among the most crime-prone. While criminals initially respond to such a wage subsidy by reducing their criminal activity, they also reduce skill investments. Once the subsidy ends, criminals find themselves with lower skill levels and (as a result) commit more crime the rest of their lives. Lifecycle models of crime with exogenous wage growth (see Flinn [10], for example) cannot capture these dynamics.

The model also highlights the endogenous relation between crime, training, and observed wage rates. Wage levels are not exogenous and do not measure the true opportunity cost of crime. Instead, they depend on work and crime choices through past and present skill investment decisions. When current investment rates are high, wages are depressed (in comparison to the opportunity cost of time) as individuals pay for their training by accepting lower wages. Because on-the-job investments are greatest at early ages, the correlation between wages and crime will be most negative at older ages (and may even be *positive* early in an individual's career). One needs to account for these investment differences when estimating the effects of human capital on crime, since wage rates do not always reflect skill levels.

The model emphasizes three distinct abilities and skills, which can be analyzed in terms of their impacts on work, crime, and education. The ability to learn affects the rate of skill accumulation given a level of investment; initial market skill levels determine the earnings power of individuals entering the labor market; and criminal ability/preference determines the net return to crime. Individuals will react differently to various early childhood and adolescent

intervention programs depending on which of these abilities is affected most. The model suggests ways to determine whether these types of interventions enhance learning abilities, raise market skills, or better socialize program recipients. To date, these questions are largely unanswered.

Additionally, the theory suggests that a rise in the return to skill (like that experienced in recent decades) is expected to increase overall participation in crime among youth. Effects on skill investment and adult crime are likely to vary by individual learning abilities. An increase in the skill premium should raise investment and lower adult crime among the most able, while having the opposite effect on less able individuals. Even greater polarization of education and crime by ability is expected.

Finally, the theory developed here suggests that law enforcement policies that raise the expected costs of crime will lead to increases in education, training, and labor supply. Thus, traditional cost-benefit analyses of crime-fighting strategies underestimate their total returns.

Section 2 formalizes the intuitive results just discussed, using a simple two-period model of occupational (work or crime) choice, where individuals also choose their education and training levels. A number of testable implications are explored using data from the NLSY and the FBI's Uniform Crime Reports (UCR).

In Section 3, we discuss in detail the NLSY and use data from the panel survey to estimate the effects of ability and education on crime. Self-reported measures of criminal participation in the NLSY are shown to predict future incarceration similarly for individuals of different races and abilities. Using self-reported measures of criminal activity, we then examine the effects of ability and schooling on criminal participation for men ages 18-23 in 1980. High school graduation significantly reduces the probability that an individual will commit crime in early adulthood, although the estimated effects appear to decline with age. Controlling for ability reduces the effect of education on crime by about one-third, but high school graduation still has a sizeable impact. In addition to raising educational attainment, ability directly lowers the probability that an individual participates in crime. We check the robustness of our results by examining the same effects of ability and education on incarceration, finding that high school graduation has a stronger effect on incarceration (which does not decline with age), while the effects of ability are less important. Taken as a whole, these results suggest that ability and schooling raise the return to legitimate work more than the return to crime, or they substantially alter preferences in favor of work. We also find evidence that stricter enforcement and punishment deter crime among the young men we study, confirming the findings of Levitt [23].

Section 4 examines the correlation between education and crime using state variation in high school graduation rates (from the 1997 March Supplement to the Current Population Survey,

CPS) and criminal arrest rates (from the FBI's UCR). We find a negative correlation between graduation rates and most property crimes. However, our estimates suggest that there is little effect of education on white-collar crimes like fraud and embezzlement, as is consistent with the predictions of Section 2. Consistent with other research, we also find that states with more severe punishment have lower property crime rates. [23, 22] Concluding remarks about positive criminal deterrents are offered in Section 5.

2 A Two-Period Model of School, Work, and Crime

We develop a two-period model of individual behavior in which adolescents and adults decide how to allocate their time between school, work, and crime. Individual abilities and endowments that are created within families and by investments made during early childhood are taken as given. These abilities affect subsequent decisions about skill investment, work, and crime during adolescence and adulthood. The impacts of government policies (education and wage subsidies, taxes, and law enforcement) on those decisions are also considered. We begin with a description of the model.

2.1 Legitimate Skills and Earnings

Individuals accumulate legitimate labor market skills according to the following human capital production function:

$$H_{t+1} - H_t = h(I_t, H_t; A), \tag{1}$$

where initial human capital, H_1, and learning ability, A, are given, $h(.)$ is increasing in each of its arguments, and there are diminishing marginal returns to skill investment, I_t. These conditions ensure that education and training[3] increase human capital at a diminishing rate.

For each unit of time spent working, L_t, an individual earns $w_t H_t$ where w_t is the period t rental rate on human capital. Investment, I_t, has no immediate payoff. We assume that for each unit of time spent investing, individuals must purchase goods (or pay tuition) costing T. These investment costs are assumed to be exogenously given.

Students with higher levels of human capital, H_t, and learning ability, A, produce more human capital for any amount of investment ($h_{IA}, h_{IH} > 0$). These abilities are determined by early parental expenditures on them as well as their childhood environments.

[3]The productivity of all types of skill investment are assumed to be the same for simplicity.

2.2 Criminal Skills and Earnings

Time spent committing crime, k_t, yields a positive return $G(k_t, H_t)$, which may depend on the level of human capital.[4] For simplicity, assume that all non-monetary costs can be valued in terms of income and foregone earnings. Denote the direct costs of crime by $D(k_t, H_t)$, psychic costs by $M(k_t, H_t)$, and the expected punishment/fine by $J(k_t, H_t)$. Then, the net expected private gain from crime is

$$\begin{aligned} N(k_t, H_t) &= G(k_t, H_t) - D(k_t, H_t) - M(k_t, H_t) - J(k_t, H_t) \\ &\equiv G(k_t, H_t) - C(k_t, H_t) \end{aligned}$$

less earnings lost while incarcerated. The total cost function $C(k_t, H_t)$ includes all costs of crime. We assume the expected period of time spent incarcerated in period t is $\gamma(k_t)$.

What do we know about $N(k_t, H_t)$ and $\gamma(k_t)$?

Survey results studied by Freeman [11] suggest that $G_k > 0$ and $G_{kk} < 0$. It seems reasonable to assume that $C_k > 0$, but it is difficult to determine whether marginal costs are rising or falling. Whether the net marginal return to crime, N_k, is positive or negative is uncertain since both G_k and C_k are positive. For criminals, N_k must be positive, but this need not be the case for non-criminals. Many individuals commit crime while working or attending school. This suggests that $N_{kk} < 0$ whenever $N_k > 0$, i.e., if net returns to crime increase with the amount of time spent committing crime, they do so at a diminishing rate. (If net marginal returns were positive and increasing, individuals would specialize, as will become obvious below.) We can also allow $N(k_t, H_t; \theta)$ to depend on some criminal ability θ (such that $N_\theta > 0$ and $N_{k\theta} > 0$), which may be a function of parental investments, family background, and police expenditures.

On the one hand, individuals with more human capital are likely to be better criminals as well as better workers.[5] On the other hand, more highly skilled workers experience greater losses in earnings while imprisoned, and they may also have a greater aversion to crime (as in Usher [40]). We place no *a priori* restrictions on N_H or N_{kH}, although we argue below that for many property crimes, human capital is likely to have little effect on their returns.

Estimates by Peterson, Braiker, and Polich [35] suggest that the probability of arrest per crime committed is constant across criminals of different ages and criminal backgrounds. This justifies

[4] While this model assumes that crime itself takes time, it can easily be re-interpreted as a model in which finding criminal opportunities takes time. To the extent that it is much easier to find high-return criminal opportunities when one is not working or in school, crime does require time. Whether it is time spent committing crime or time spent looking for a criminal opportunity is largely irrelevant. See Lochner [25] for a discussion of this alternative framework.

[5] White collar crimes like fraud and embezzlement are perfect examples.

the exclusion of market and criminal skills from $\gamma(.)$ (assuming the conditional probability of incarceration given arrest and prison sentence length are also constant). Results from Kling [20] suggest that for most property crimes, there are small or no long-term effects on earnings of individuals following incarceration, although short-term (less than a year) declines can sometimes be substantial. Thus, we may want to think of $\gamma(.)$ as representing the expected amount of time spent incarcerated plus the amount of time it takes a criminal to get back to his original level of earnings. For simplicity, we assume a linear relationship between time spent committing crime and expected prison time so that $\gamma(k_t) = \gamma k_t > 0$.

2.3 Time Allocation

Time is allocated to each activity – school, work, and crime (and its associated prison time) – up to the time endowment (normalized to one) so that $I_t + L_t + k_t(1+\gamma) = 1$ and $I_t, L_t, k_t \geq 0$. For simplicity, it is assumed that all criminals spend the expected amount of time in prison, and they serve their prison sentence in the period they commit their crimes.[6]

2.4 Government Policy

While subsidies for parental investment in their children are likely to affect ability and initial skill levels, we focus on policies that directly affect one's own decisions in adolescence and adulthood. Let $S(I)$ be the subsidy for investment level I (where $S'(I) \geq 0$ and $S''(I) \leq 0$). Proportional taxes on income earned from work, τ_t, affect the trade-off between work and crime. Since criminal income is unreported, the government is unable to levy taxes against it.[7] We assume that tuition payments, T, are paid after taxes have been collected on earned income and are, therefore, not tax-deductible. Finally, wage subsidies can be used to encourage work. In their simplest form, these subsidies raise the returns to work equally for all levels of skill. A proportional wage subsidy is simply the opposite of a proportional wage tax, and we represent such a policy as a reduction in τ_t.

[6] While it might seem natural for individuals to spend part of period $t+1$ in jail for crimes committed in period t, this causes problems in the final period of life. In a two period model, it seems extreme to consider no incarceration penalty for crime in the last period. Moreover, if the first period represents adolescence and the second represents adulthood, it seems natural to think that adolescents caught committing crime serve their prison time during adolescence and adults who are caught serve their prison time as adults. Dealing more explicitly with uncertainty does not change the nature of the results discussed in this paper.

[7] While marginal tax rates are generally low for low income workers, many often receive some form of government assistance that is reduced when labor earnings rise. As a result, their effective marginal tax rate (the fraction of benefits lost per dollar earned from work) may be quite high.

2.5 The Individual's Decision

Taking $(A, H_1, S(I), T, \tau_1, \tau_2, w_1, w_2)$ as given, individuals choose investment (I_t) and time spent in work and crime (L_t, k_t) to maximize the present value of lifetime earnings. Substituting $1 - I_t - k_t(1+\gamma)$ for L_t, individuals

$$\max_{I,k_1,k_2} y_1 + R^{-1} y_2, \tag{2}$$

subject to

$$y_1 = w_1(1-\tau_1)H_1(1 - I_1 - k_1(1+\gamma)) - TI_1 + S(I_1) + N(k_1, H_1)$$
$$y_2 = w_2(1-\tau_2)H_2(1 - I_2 - k_2(1+\gamma)) + N(k_2, H_2)$$
$$I_t, k_t \geq 0, \;\; 0 \leq I_t + k_t(1+\gamma) \leq 1, \;\; for\; t = 1, 2,$$

and the human accumulation equation (1).

We assume that $S'(0) < T + w_t(1-\tau_t)H_t$ for all t, so that investment subsidies are not large enough to make investment more lucrative than work unless there is some future return on the investment. Under this assumption, I_2 will always be zero, since human capital is not productive after death. Recognizing this, the problem yields the following FOCs for I_1, k_1, and k_2 at an interior:

$$-w_1(1-\tau_1)H_1 - T + S'(I_1) + R^{-1}\left[w_2(1-\tau_2)(1 - k_2(1+\gamma)) + N_H\right] h_I = 0 \tag{3}$$

$$-w_1(1-\tau_1)(1+\gamma)H_1 + N_k = 0 \tag{4}$$

$$-w_2(1-\tau_2)(1+\gamma)H_2 + N_k = 0 \tag{5}$$

These FOCs hold for individuals who allocate some time to each activity during adolescence and adulthood and are useful for studying investment, work, and crime at the intensive margin.[8]

Equation (3) reveals the costs and returns to investment in skills. Investment provides returns in terms of higher future earnings from work and in terms of higher criminal earnings (if the net returns to crime are increasing in market skills). Investment is costly in terms of both foregone earnings and net tuition payments. Investment in market skills will reduce future marginal returns from crime if $N_H < 0$. Equations (4) and (5) show that individuals spend their time committing crime in each period up to the point where the marginal return equals the after-tax potential wage rate.

[8]The second order conditions are not particularly informative. They do require that $N_{kk} < 0$, as noted above. While the second order conditions do not necessarily hold everywhere for all possible parameterizations, we assume that they hold at any given interior solution for the (local) comparative static results derived below.

2.6 Implications of the Model

Table 3 reports the activities of young men based on the NLSY in 1980. Nearly 80% of males ages 16-23 report no income from crime. Since these ages are those for which we predict the most crime, it is likely that they never commit crime to any large extent. Data from victimization surveys and the FBI's UCR suggest that most criminals are young, although there is still a considerable population of adult criminals. Men who allocate all of their time to crime (and never work) are extremely rare, since more than 97% of all young men in the 1980 sample spent some time working or in school. Among those engaged in crime, more than 90% reported earning some income from work during the year. Most of those not working or in school report no involvement in crime either. Almost 15% of adolescent males (ages 16-19) do not work at all during the year. About 20-25% of those non-workers report some criminal income, while the rest do not. Taken as a whole, there is considerable heterogeneity in criminal, investment, and work choices. Most men never commit crime to any noticeable extent. Those that do are also typically involved in legitimate work or school. Full-time criminals (for life) are the rare exception.

Since most adolescent criminals are at an interior solution (59% of all 16-19 year old males engaged in crime are in school and report some income from legitimate work), we focus our attention on them. We derive all results for individuals at an interior solution, noting important differences that arise for individuals constrained by one or more boundary condition.

It seems likely that the returns to most street crimes (e.g. burglary, larceny, robbery, auto theft, etc.) are largely unaffected by previous criminal experience or the market skills of criminals. The fact that most street criminals are of low ability (as measured by IQ [18, 42] or the Armed Forces Qualifying Test (AFQT) scores discussed below), have little education (Table 1), and are very young (see Figure 1 and Table 2) suggests that the returns to traditional market skills are substantially lower in the criminal sector than the legitimate labor market. We, therefore, begin by studying crimes that do not require skill investments, assuming that $N_H = 0$. We end this section with a discussion of both white collar crimes (for which we expect market skills to positively affect criminal returns) and crimes in which criminal experience is valuable.

Crime over the Life-Cycle

Our model yields a declining age - crime profile once work begins, as long as human capital rental rates are non-decreasing over the life-cycle.[9] This occurs because returns to work rise with human capital, but the returns to crime remain unchanged. It is possible, however, for criminal

[9] Assume $w_t = w$ throughout this subsection. Clearly, if rental rates are declining fast enough, crime can rise over the life-cycle.

participation to rise with age for individuals who do not work during adolescence. In a more general multi-period model, criminal participation is likely to rise with age before individuals begin working.[10] But, once an individual enters the labor market, the model predicts that crime decreases forever after, as increases in hours worked come at the expense of both investment and crime. Even with time invariant returns to crime ($N(k)$ constant over all ages), the model can produce a single-peaked age - crime profile where the peak occurs at the age of entry into the labor market. Figure 1 and Table 2 reveal a peak in index property crimes[11] at ages 16 or 17, roughly the same age most males (especially those of lower ability) enter the labor market. When criminal experience or market skills are important determinants of criminal returns, the peak is likely to occur at a later age (as seen in the figure and discussed in detail below). For most property crimes, however, the model predicts declining criminal participation with age in the overall population once most crime-prone individuals have entered the labor force.

Other social theories of crime also give rise to a declining age - crime profile. These theories stress individual maturity as a reason for decreased criminal activity, or they claim that individuals become more attached to the rest of society as they become older (building social networks through activities like work or marriage). According to the theory developed here, street crime rates decline with age, because individuals accumulate more human capital and substitute legitimate work for crime as they age. Thus, in time periods with little human capital accumulation, we would expect flatter age - crime profiles for property crimes. Comparing arrest rates for index property crimes by age in 1980 with property crime rates measured by Quetelet [1] in the late 1820s (when skill investments were presumably much lower), we find that property crime rates fall substantially faster with age today. For example, in 1820, Quetelet found that property crime rates among males fell by less than 7% as they aged from their late teenage years into their early thirties; whereas in 1980, arrest rates for property crime among males declined by more than 75% over the same age range. It would be hard to argue that individuals mature much faster today or that they are integrated into society at a younger age than in the early 1800s. In fact, conventional thinking might suggest the opposite. One might also expect flatter age - crime profiles in countries where education and training are less important. To date, however, it has been difficult to find reliable data on age - crime profiles across a wide range of countries. Finally, Figure 1 suggests that the age - crime profile for white collar crime is much flatter (and peaks later) than that of street crimes. This is consistent with the theory of human capital and

[10] This occurs because individuals begin life by specializing in investment, reducing their investment with age as the marginal returns to investment decline. Initially, reductions in investment will be offset by increases in crime before individuals enter the labor market.

[11] Index property crimes include burglary, larceny, auto theft, and arson. Their respective shares of total arrests for property crimes in 1980 are 0.18, 0.71, 0.10, and 0.01.

crime developed in this paper (see the theoretical discussion below on white collar crime), but it is more difficult (if not impossible) to explain with traditional social theories of crime.

Crime and Wages

From the first order conditions, we observe that an increase in human capital tends to reduce property crime by raising its opportunity cost. While it is difficult to estimate the effect of human capital on crime, the elasticity of criminal activity with respect to pre-tax observed wages has been estimated by Grogger [14]. Such estimates are difficult to interpret, since observed wages confound the effects of rental rates, human capital levels, and on-the-job investment. To see this, write the observed wage rate as

$$wage = wH(1 - I^*),$$

where $I^* \equiv \frac{I}{1-k}$ is the share of time on the job spent investing (assuming, for expositional purposes, that all investments are made on the job). It is clear from the FOCs that observed wage rates are not the appropriate price of time – the true price of time equals human capital times the after-tax price of skill. Since criminal activity responds to the price of time and not observed wage rates, we would like to measure the effects of changes in rental rates and/or skills on crime. Observed wages are less than potential wages (the price of time), because some time on the job is spent learning new skills rather than producing output (and workers indirectly pay for that training through lower wages).

As a simple example, consider two individuals with identical criminal returns, $N(k)$, and observed market wage rates. The first does not invest, so $wage_1 = wH_1$. Assume that the second individual has twice the human capital and spends half of his time on the job investing, so $wage_2 = wH_2(1 - I_2^*)$ where $H_2 = 2H_1$ and $I_2^* = 1/2$. While both individuals have the same observed wage rate, the second has twice the human capital and will commit much less crime. Observed wages tell us nothing about criminal activity in this case. Without observing investment, it is difficult to isolate the effects of human capital or rental rate changes on criminal activity using observed wages. Heckman, Lochner, and Taber [15] show that at early ages, as much as 50-60% of time on the job is spent investing in new skills. Lochner [24] shows that this distinction is empirically important when studying crime. While average wage rates for males age 17 are remarkably stable across AFQT quartile (In 1995 dollars, the average wage among those in the lowest AFQT quartile was \$6.24 while the average wage for those in the highest quartile was \$6.19.), crime rates are nearly three times higher for those in the highest quartile relative to those in the lowest quartile. Attempting to estimate the effects of skills on crime using these wage rates would prove disastrous. Taking account of unobserved on-the-job

training, Lochner estimates that human capital levels are about 1.5 times higher for 17 year old males in the highest AFQT quartile than for those in the lowest quartile. In this light, it is not surprising to observe substantially lower crime rates among those with the highest AFQT scores.

If the most skilled individuals simultaneously invest the most in their skills and commit the least crime, correlations between wages and crime may be positive at young ages when investments are substantial. But, as individuals age, investment differences decline so that wage rates more accurately reflect skill levels. We would, therefore, expect to observe little correlation (perhaps, positive) between crime and wage rates among very young workers and more negative correlations among older workers. While the NLSY only reports criminal participation for individuals age 16-23, we can break the sample into an older (ages 21-23) and younger cohort (ages 16-20) to test this implication. As predicted, the correlation between wages and crime is significantly negative for older non-high school graduates (-0.13); however, for younger non-graduates, the correlation is insignificantly positive (0.03). Among high school graduates the correlation is significantly positive for the younger cohort (0.11) and insignificantly different from zero for the older cohort (0.03). It should not be surprising to observe zero correlation between wages and crime among the older cohort of high school graduates, since their is little doubt that they are still engaged in substantial on-the-job investment in their early twenties (more so than similar aged high school dropouts). Partial correlations controlling for a number of factors[12] show a similar pattern: positive correlations for younger workers and zero correlation for older workers. As wages more accurately reflect skill levels, there is a tendency to observe a more negative correlation between wages and crime as predicted by theory.

Failure to account for unobserved heterogeneity in on-the-job skill investments tends to bias estimates of the effect of skill (or skill prices) on crime upward (assuming observed wages are increasing in skill), since

$$\frac{\Delta_i k}{\Delta_i wage} > \frac{\Delta_i k}{\Delta_i H}$$

in a cross-section of individuals (Δ_i refers to differences across individuals of heterogeneous ability) the same age.

On the other hand, life-cycle effects on investment tend to bias estimates of the effect of skill on crime downward, since young workers invest more than older workers causing observed wages to rise much more quickly than skill levels. Thus, following the same person over the life-cycle, we observe

$$\frac{\Delta_t k}{\Delta_t wage} < \frac{\Delta_t k}{\Delta_t H}.$$

[12]Controls include high school graduation status, race, AFQT, whether the individual lived with both of his natural parents at age 14, region of residence, and current SMSA status.

Here, Δ_t refers to differences over time or age. The net effect of these two biases is ambiguous, making estimates of the elasticity of crime with respect to wages difficult to interpret.[13] In general, cross-section estimates (of closely aged individuals) should over-predict the correlation between skill and crime, while estimates based on following individuals over the life-cycle should under-predict the correlation.

Education and Training Subsidies

Education and training subsidies may be effective criminal deterrents by raising individual skill levels. For the following, assume that education subsidies are proportional to the amount of investment, so that $S(I) = sI$.

Result 1 *Investment subsidies, as measured by s, increase investment in human capital and reduce adult crime rates. Crime is unchanged for working adolescents, but it declines for those who do not work.*

Education subsidies do not affect criminal behavior for adolescents who work, because the amount of time spent committing crime is only determined by their potential wage rate. Time spent investing trades off one-for-one with time spent working.[14] Non-working adolescents increase their investment and reduce their criminal activity in response to higher investment subsidies. For them, criminal activity necessarily trades off with investment, since $L_1 = 0$. In general, an economy with larger education and training subsidies will be characterized by more training/education, less work, less crime, and lower earnings by adolescents. Adults will work more for higher wages, and they will commit less crime.

Taxes and Wage Subsidies

Because wage subsidies and taxes enter the individual decision in the same way (although opposite in direction), we focus on only one: the effects of a tax reduction. A global flat wage subsidy funded by a global flat wage tax would have no effect on individual decisions.

It is important to distinguish between the long-run and short-run effects of a change in tax policy. The long-run effects take into account the effects taxes have on skill acquisition when considering changes in criminal participation at older ages. In the short-run, however,

[13] Recognizing that the same biases apply to estimates of labor supply elasticities, Mulligan [31] finds that elasticities increase substantially (almost doubling in some cases) when reasonable adjustments are made for unobserved job training.

[14] The fact that wage rates are unaffected by hours worked but criminal earnings are declining in time spent committing crime is key to this result. If wage rates depended on the number of hours worked, time spent committing crime during adolescence would be affected by an investment subsidy.

older workers cannot change earlier decisions. The response of adult workers to changes in tax policy will depend on when they learn of the new policy. Individuals who have time to adjust their adolescent decisions when a new tax policy is implemented will often show larger criminal responses when they are older than individuals who are already adults when the new tax policy is introduced. Therefore, we might expect changes in tax policy to produce lagged effects on adult crime rates.

In order to understand the long-term effects of tax policy, consider two counterfactual economies: one with low tax rates and another with high tax rates. For simplicity, assume that wage and tax rates are constant over time in each economy ($w_t = w$ and $\tau_t = \tau$).

Result 2 *In the long run, lower taxes on wages (or a wage subsidy) increase human capital investment and reduce crime at all ages if net tuition is non-negative ($T \geq S'(0)$).*

The effect of taxes on adolescent crime is simply

$$\frac{dk_1}{d\tau} = -\frac{wH_1(1+\gamma)}{N_{kk}} > 0,$$

but the impact of taxes on adult crime requires us to consider the effects of taxes on investment in addition to the direct effects of taxes on crime. The endogeneity of crime and investment leads to even larger effects from taxes than one would expect if either were exogenous. Higher taxes directly encourage adult crime, which lowers the amount of time spent working and the return to investment. Thus, even if tuition costs are tax deductible, wage taxes discourage investment – this differs from the prediction of no effect in standard human capital investment models without crime. Additionally, investment is directly discouraged by taxes when marginal tuition costs exceed marginal subsidy rates. The decrease in investment leads to an additional increase in adult crime.

When examining the immediate impact of a change in tax rates on older workers, its effects on investment are muted. Adults cannot adjust previous investments, so the short-term effect on adult crime is less than the long-term impact.

While we do not explicitly study progressive taxes in this paper, they have been shown to reduce investment in skills in human capital models without crime by reducing the marginal return to investment more than the marginal cost.[16] This effect tends to encourage crime among adults who reduce their investment in skills when they are young and, as a result, face lower opportunity costs of crime when they are older. For very low skill workers who earn little from work, however, facing low marginal tax rates throughout much of their lives can discourage crime (assuming the marginal tax rate for low income workers is lower in a progressive tax environment

than it would be in a flat tax environment) and encourage work. They may invest more as a result. The net effect of a progressive tax schedule will, therefore, depend on both the level of the marginal tax rate and the progressiveness of the schedule faced by crime-prone workers.

It is important to note that government assistance programs may impose a large effective tax rate on low skill workers, since benefits are usually tied to reported income levels. The more low-skill workers earn in the labor market, the less benefits they receive from the government. In fact, the poor may face a higher effective marginal tax rate (the fraction of benefits lost per dollar earned from work) than many middle income workers. For example, effective marginal tax rates for AFDC recipients earning more than the allowed earnings exemption typically range from 0.6 to 1.0. [29] Since criminal earnings are not reported, they do not reduce benefit levels. Thus, traditional welfare and general assistance programs may actually increase crime among the least-skilled by encouraging individuals to earn unreported rather than reported income.

Prolonged declines in rental rates, w, can also lead to higher crime rates and lower investment in skills. In fact, Bound and Freeman [3] and Grogger [14] assert that much of the increase in youth crime observed in the 1980s can be attributed to the decline in real wage rates for young unskilled workers. If these wage declines are permanent, we might expect even greater increases in adult crime to follow.

In contrast, recessions characterized by temporary declines in rental rates reduce the time cost of investment and crime for adolescents, leading to increases in both. (Assuming future rental rates return to the original level, only the costs of investment fall while the returns do not.) Once the recession ends and rental rates return to their higher levels, crime rates will be lower than if there had been no recession. Thus, the model predicts that property crime should be counter-cyclical. This depends crucially on the assumptions of no learning in the criminal or legitimate sector. If there is learning-by-doing in the legitimate sector, the negative effects of reductions in adolescent work on adult human capital levels may offset the positive effects of increased investment. With learning in the criminal sector, adult crime may increase due to the increase in criminal experience acquired during adolescence. Thus, the effects of temporary wage changes depend critically on the returns to investment and experience for both work and crime.

Since crime rates are higher at young ages, one might think that wage subsidies targeted to adolescents are efficient for reducing crime. While they increase time spent working and decrease crime during adolescence, they also reduce skill investment. Investment declines, since adolescent wage subsidies raise the cost of acquiring skills but do not affect the returns. We unambiguously predict decreases in adolescent crime rates and *increases* in adult crime rates in response to youth wage subsidies. This type of wage subsidy could reduce adult crime if there are substantial gains

to experience in the criminal or legitimate sector or if human capital affects the returns to crime more than work. We discuss these possibilities in greater detail below.

These simple tax and subsidy examples highlight the need to consider the simultaneous effects of policy on both crime and investment – in most cases, interactions between adult crime and adolescent investment will have important consequences. While policies that subsidize work for youth may look effective when examining the current crime rates of adolescents, they can have negative long-term consequences on crime rates once those individuals grow older if they sufficiently reduce investment in skills.

Empirically, one can ask whether individuals commit less crime when they can earn a higher wage rate from work. A related question is whether education reduces crime and, if so, does it reduce crime primarily through increasing potential wage rates or by changing individual preferences. Kip Viscusi [41] found that individuals who thought they could earn more from work than from crime were less likely to engage in criminal activity. Grogger [14] estimates that the elasticity between crime and wages is in the neighborhood of one. More recently, Gould, Weinberg, and Mustard [13], find that variations in the local wage rates of young unskilled workers explain 25-37% of the variation in local property crime rates. Tauchen, Witte, and Griesinger [39] report that spending more time working and in school significantly lowers the probability that an individual engages in criminal activity. These few studies suggest that there is a negative relationship between potential wage rates and crime. Furthermore, Gould, Weinberg, and Mustard [13] find that the correlation between violent crime and wage rates is substantially lower than the correlation between property crime and wages, suggesting that choices about how to generate income are central to the link between wages and property crime. To the extent that education and training increase skill levels and wage rates, we should expect those increases to reduce criminal participation. To date, evidence on the latter is sparse.

Ability Endowments

Since parental inputs and family background operate on the ability endowment parameters (A, H_1, θ), understanding how these parameters affect individual decisions is important. We examine the effects of each parameter separately, beginning with individual learning ability, A.

Result 3 *Ceteris paribus, individuals with a higher learning ability, A, will invest more in their market skills and commit less crime as adults. For working adolescents, crime is unaffected by A – investment time trades off with time spent working. Crime declines for non-working adolescents.*

Investments by more able students are more productive and the costs of investment are unaffected by A, so 'smarter' individuals will choose to invest more when they are young. Initial potential wage rates are fixed, so criminal activity is unaffected during adolescence.[15] With higher rates of investment and the same amount of time allocated to criminal activity, time spent working must decline. Individuals simply substitute work for investment. More investment means higher levels of human capital and higher wage rates during adulthood. This lowers the amount of time spent committing crime and raises the amount of time spent working. Adolescents who do not work will commit less crime if they are of higher ability, A, since investment must trade off with time spent committing crime.

Heterogeneity in initial skill levels (H_1) has different implications. *Ceteris paribus*, individuals with a higher initial human capital level, H_1, will commit less crime during adolescence, since their opportunity costs of crime are unambiguously increasing in human capital. Higher initial human capital has ambiguous effects on investment, because it raises both the opportunity cost of and the return to investment. Thus, little can be said about adult crime without specific knowledge about the productivity of investment.

Result 4 *Individuals with a lower criminal ability, θ, will invest more in their skills and commit less crime at all ages.*

Since a lower criminal ability directly reduces the productivity of crime in all periods, individuals will choose to work more. Because individuals with low criminal abilities work more as adults, the returns to investment are higher. Increased investment during adolescence increases adult wage rates and time spent working, which indirectly lowers adult crime rates (in addition to the direct effect of lower criminal ability). Thus, the endogeneity of investment and labor supply leads to larger reductions in adult crime than would be predicted by a model in which both are treated as exogenous.

More intensive law enforcement raises the cost of crime for everyone (lowering θ). Other things equal, states with longer prison sentences and more police should be characterized by lower crime and higher adult employment. Youth will invest more in their skills, so wage profiles should be steeper. In short, traditional crime-fighting policies impact human capital investment and earnings in addition to their effects on crime. Studies of enforcement and incarceration policies ignore these potential benefits.

Programs which improve the skills and learning abilities of disadvantaged children and adolescents can substantially reduce their crime rates as seen in Table 4. The Perry Preschool Program

[15] It is likely that individuals with a higher learning ability also have a higher initial skill level (H_1) by the time they reach adolescence. In this case, criminal activity during adolescence will be lower.

for disadvantaged minority children reduced lifetime arrests through age 27 by 50% for program participants.[36] The Syracuse University Family Development Program showed an even larger reduction in delinquency.[21] These findings led Donohue and Siegelman [5] to conclude that small, rigorous early intervention programs may pay for themselves through reduced crime rates alone, if they can be targeted to high crime groups.

Programs targeted at high-crime adolescents have also shown promise. In their study of the Job Corps, Long et al. [27] estimated the social benefits attributed to reduced criminal activity to be $4,500 (in 1990 dollars) per participant – almost 30% of the total social benefit of the program. The program entailed basic educational and vocational training for economically disadvantaged adolescents, and typically lasted 6-7 months. A different approach was taken by the Quantum Opportunity Program (QOP). Individuals entering high school were provided a mentor/tutor (25 students per mentor) who aided them in schoolwork and community activities for four years. Financial incentives were provided for educational, service, and developmental activities, and they were structured to encourage individuals to finish high school and attend post-secondary training or education. Two years after program completion, randomly assigned participants were 34% more likely to have received their high school diploma or GED and had half the number of total arrests as non-participants.[38]

These studies indicate that either individual preferences are very malleable and childhood and adolescent intervention programs can effectively reduce crime by altering the preferences of program participants (e.g. increase the psychic costs of crime or lower the rate of time preference), or market forces are at work and these programs raise the market skill levels of participants, which makes work and human capital investment more attractive than crime. Further study is needed to determine exactly how these programs achieve their reductions in crime and whether more comprehensive programs can attain the same levels of effectiveness.

Childhood investments and community/family influences are likely to affect all three types of endowments. In fact, much of the debate on early interventions revolves around whether programs achieve their long-term impacts through improvements in cognitive abilities (denoted by A), skill levels (as measured by H_1), or through improved socialization (as reflected in lower θ). Positive investments and improvements in family influences reduce (or at least, do not raise) adolescent crime rates and are likely to lower adult crime rates even more. The relative impacts of different programs and backgrounds on crime, investment, and earnings will depend on what types of endowments are affected most and how market and criminal skills are formed. Influences which affect learning abilities most will tend to lower youth earnings and raise schooling. As a result, adult incomes will be higher and crime rates lower for most types of property crime.

Crime among working adolescents will not be affected (unless there is learning-by-doing in the criminal or legitimate sector). In aggregate, adolescent crime should fall, because non-working youth will substitute out of crime and into investment.

Evidence of reduced criminal activity among adolescents attributed to early intervention programs (Table 4), suggests that these programs raise initial market skills. These studies are also consistent with the idea that early or adolescent intervention programs reduce θ through socialization. In sum, they raise the returns to work relative to crime at all ages.

2.7 Rising Returns to Skill and its Impact on Crime

Allowing human capital rental rates to depend on skill levels permits us to analyze the impacts of the recent rise in the return to skill on criminal behavior. A static analysis in which rental rates are a linear function of current skill according to $w(H) = \omega^0 + \omega^1(H - \underline{H})$ is illustrative. (The above analysis implicitly assumes that $\omega^1 = 0$.) The recent rise in inequality is characterized by an increase in rental rates for the most skilled and a decline in rental rates for the least skilled.[19] Such a trend can be captured by a rise in ω^1 and fall in ω^0. For a sufficiently small relative decline in ω^0, investment and youth crime will increase and adult crime will decline. However, if ω^0 declines enough (relative to the increase in ω^1), average investment is likely to decline and crime is likely to rise at all ages. Responses will differ both quantitatively and qualitatively by ability, A. The most able are likely to respond by increasing adolescent crime and investment and reducing adult crime, while the least able are more likely to respond by scaling back investment and committing more crime at all ages. This is because the most able stand to gain more from the rise in return to skill by raising their investment. So, while they initially commit more crime in their youth due to the decrease in rental rates for low skill workers, they commit less crime as adults, once their higher rate of investment pays off and they earn a high-skill wage premium. Those for whom investment in skills is unproductive are primarily affected by the reduction in ω^0 at all ages, which reduces their returns from work. Thus, the model predicts that adolescent and adult crime rates should rise among the least able, while only adolescent crime rates are expected to rise among the most able. In the end, education, crime, and earnings all become more polarized by ability as a result of the increase in the return to skill.

2.8 White-Collar Crime

Not all types of crime decline quickly with age. As seen in Figure 1, only 3.3% of arrests for fraud among males in 1997 were for those under age 18. Similar observations could be made

for forgery and embezzlement. Compare this with the 35.6% of all arrests for index property crimes (among males) that were attributed to males under age 18. If human capital increases the returns to certain crimes, then we should observe a slower decline in those crimes with age. We may even observe increases in crime over much of the life-cycle if human capital is more productive in the criminal sector than the legitimate sector (i.e. $N_{kH} > w_2(1-\tau_2)(1+\gamma)$). We expect the slope of the age - crime profile to be increasing (less negative) in the rate of return to skill in the criminal sector. Among white collar crimes, fraud peaks the latest, age 22, while forgery and counterfeiting peaks at age 19, and embezzlement peaks at age 18. [33] Arrests for property crime peak at age 16, as noted above. By this simple measure, fraud requires the most skill on average, followed by forgery, embezzlement, and other index property crimes.

If market skills are more productive in the criminal sector than the legitimate sector, a youth wage subsidy reduces both adolescent and adult crime rates. In this case, reductions in investment lower the returns to crime more than returns to work during adulthood. On the other hand, an education subsidy (or improvement in learning capacity, A) would raise investment in skills, leading to an increase in adult crime. So, while programs and subsidies which encourage investment in skills should reduce most property crimes, they may lead to increases in crimes requiring substantial amounts of market skill. In Section 4, we show that states with higher high school graduation rates have lower robbery and index property crime rates, while similar rates of arrest are observed for white-collar crimes regardless of state education levels. This is consistent with the hypothesis that the returns to education are similar for legitimate work and white-collar crime, while they are much lower for typical index property crimes. Subsidies for education should, therefore, have negligible effects on crimes like embezzlement and fraud, while youth wage subsidies should reduce white-collar crime at all ages.

2.9 Criminal Experience

If criminal returns rise with criminal experience, the returns to adolescent crime include current criminal earnings as well as the increase in earnings from future criminal activity.[16] For sufficiently large returns to experience, crime can increase with age. Given that we observe sharp declines in most property crimes for early years of the life-cycle, it seems that there is little return to criminal experience for those activities.

If there is learning-by-doing in the criminal sector, investment subsidies and increases in A unambiguously reduce adolescent crime (in addition to adult crime). This is because increases in investment lead to increases in future hours of work and reductions in future crime. When there

[16] See Lochner [24] for a rigorous treatment of this extension.

is learning in the criminal sector, reductions in future crime lower the returns to youth crime, because the increase in future criminal skill is no longer as profitable. A youth wage subsidy now has ambiguous effects on investment and crime. In response to short-term youth subsidies, it is possible to observe increases in investment coupled with reductions in adolescent and adult crime. Even if investment declines in response to the subsidy, adult crime rates may be lower if there is a sizeable reduction in youth crime and the experience premium it carries in the criminal sector. Now, one needs to balance reductions in market skill resulting from less investment with reductions in criminal skill caused by less criminal experience.

3 A Micro Empirical Analysis of the Effects of Schooling & Ability on Crime

The model presented in this paper predicts that education reduces property crime. This section uses data from the NLSY to empirically examine the relationships between education, cognitive ability, and crime among young men. We also examine the extent to which state punishment levels deter crime in our sample.

3.1 National Longitudinal Survey of Youth (NLSY)

The NLSY follows 12,686 individuals from 1979 through the present and contains information on annual earnings from work, educational attainment, and numerous variables reflecting the family and environment in which individuals grew up. Since respondents were ages 14-22 in 1979, the survey is ideal for measuring their final years of schooling and early years in the workforce. The 1980 questionnaire contains a supplemental survey on crime and delinquency, detailing self-reported criminal activity for individuals in their late teens and early 20s. We focus our attention on males, as they commit the vast majority of crime in the U.S.

Family Background, Ability, and Environment

One advantage of the NLSY is that it contains detailed background information that is likely to predict schooling decisions as well as future earnings and criminal activity. In particular, age, race (white, hispanic, or black), and marital status are available. We know whether individuals are enrolled in school during each survey year and their highest grade completed. Scores on the Armed Forces Qualifying Test (AFQT) – given to almost all respondents in 1980 – have often been used as a measure of cognitive ability; they show a positive correlation with both schooling and earnings.[4] Parents' age and education are also available, as is family income. Dornbusch,

et al., [6] have shown that family composition during childhood can affect delinquent behavior. The NLSY indicates whether or not individuals lived with both of their natural parents at age 14. We also observe the state of current residence and whether the individual currently resides in an SMSA (Standard Metropolitan Statistical Area). Finally, the NLSY contains information on the unemployment rate of the local labor market.

Criminal Behavior

The NLSY contains a broad range of information on criminal behavior in 1980. Self-reported criminal and delinquent activities include: damaging property, shoplifting, stealing, using force to get something, hitting or seriously threatening to hit someone, attacking with intent to injure or kill, selling marijuana, selling hard drugs, and involvement in organized (illegal) gambling.

Respondents are also asked to categorize what proportion of their earnings in the previous year came from criminal activity.[17] We generally categorize individuals as either criminals or non-criminals in 1980, depending on whether or not they earned any income from crime.[18] This variable focuses attention on the issues of this study – the trade-off between investment, work, and crime. Furthermore, it does not require that criminals accurately (truthfully) report the extent of their criminal activities, only that they accurately report criminal participation.

Finally, the NLSY has one or two measures of incarceration in each survey year. These measures are useful for checking the validity of self-report measures and the robustness of our findings: (1) For all years, we know whether an individual was surveyed in prison. (2) Following 1988, survey respondents could report incarceration as a reason for not looking for work if they were unemployed at some point during the survey year. This latter measure is more likely to detect short periods of incarceration. To the extent that criminal activity is positively correlated over time, as is suggested by the model, knowledge about incarceration in later periods should give us information about criminal activity in earlier periods.

Table 5 reports incarceration rates[19] for males according to their 1980 response to the self-reported criminal income question. Total incarceration rates for the entire NLSY sample of males (see the final row of the table) and for the subgroups by race are similar to the actual chances

[17] Imputing the criminal earnings of respondents from their reported legitimate earnings is problematic for two reasons. First, many respondents either report zero or do not report (i.e. missing values) legitimate earnings. Second, the categories listed for the 'proportion of income from crime' question are broad, making it difficult to obtain a good estimate of the true proportion of earnings from crime for those respondents who do report positive legitimate earnings. Categories include: none, very little, one-quarter, one-half, three-quarters, and almost all.

[18] On average, individuals who reported some criminal income reported committing more of every type of reported crime than individuals reporting no income from crime.

[19] Individuals were considered incarcerated if they were ever interviewed in jail (from 1981-93), or if they ever reported incarceration as a reason for not searching for work while unemployed (from 1989-93).

of going to state or federal prison by age 30, as calculated from first admission to prison rates by age in the U.S. resident population. For example, Bonczar and Beck [2] estimate that the cumulative chance that a man goes to prison by age 30 is 5.9%. For white, black, and hispanic males, the chances are 2.5%, 21.4% and 8.8%, respectively. Thus, our incarceration measures are consistent with aggregate incarceration rates in the U.S.

Individuals who report no income from crime are much less likely to become incarcerated later in life (3.0%) than individuals who report positive criminal income (8.8%). It is interesting (though not surprising) that individuals who do not answer the criminal self-report question are more likely to become incarcerated than even the average respondent who reports criminal earnings (14.2%). Their incarceration rates most closely match those of individuals with substantial self-reported involvement in crime. Thus, for studying criminal behavior, treating individuals who do not respond to questions about criminal involvement as criminals may be better than simply removing them from the sample. Overall, the self-report measure has considerable predictive power in explaining future incarceration rates, as individuals reporting no income from crime are the least likely to become incarcerated and incarceration rates are (in almost every case) increasing in the share of income reported from crime.

Differences in reporting behavior by race are also shown in Table 5. About 76% of whites and 70% of non-whites report no criminal income. Of those who report criminal income, non-whites are more likely to earn a greater share of their total income from criminal activity and are much more likely to become incarcerated than whites. Numerous studies comparing self-report measures of crime with official arrest and victimization data have found that while participation rates of blacks and whites are similar, black criminals tend to commit more crimes. In short, criminal behavior for blacks and whites differs more at the intensive margin than the extensive margin. [8, 9, 17]

As with those reporting income from crime, non-whites reporting no income from crime are much more likely to become incarcerated (10.4%) than are whites (1.4%). There are four potential reasons for this discrepancy: (1) non-whites may under-report criminal activity more than whites; (2) market opportunities worsened more for non-whites than whites in the 1980s (due to the decline in low-skill wages [19]), causing non-whites to become more involved in crime; (3) non-whites are more involved in violent non-property crimes; or (4) non-whites may be discriminated against by law enforcement.[20] Within each racial category, men reporting no earnings from crime are incarcerated at substantially lower rates than those reporting criminal income.

[20]Lochner [26] finds little evidence of discrimination in arrests for auto theft in 1997; however, reliable studies for periods as early as 1980 are non-existent.

Are there differences in reporting behavior by intelligence? In particular, do smarter men under-report or not report criminal activity? In the NLSY, lower ability (AFQT) individuals are more likely to become incarcerated regardless of their self-reported criminal status. However, individuals self-reporting crime in 1980 were more than twice as likely to be incarcerated than those reporting no income from crime if they were from the lowest AFQT quartile, while they were nearly four times as likely if they were from the highest ability quartile. Additionally, men from the lowest AFQT quartile were least likely to answer questions about crime (10.6%); non-response was not an important source of mis-reporting for high ability men (2.8%). While this does not prove that smarter people never lie about their criminal behavior, it does suggest that self-report status is a useful predictor of future incarceration for all ability groups.

In Table 6, we further explore whether self-reported crime was predictive of future incarceration and whether self-reporting biases with respect to race and ability are important using a probit regression, which simultaneously controls for age, race, and ability. We find that self-reported criminals are significantly more likely to become incarcerated, as are blacks and men with low AFQT scores. Individuals not answering the question about criminal income are even more likely to become arrested (see column 2). More importantly, the interaction terms for self-report status and race or AFQT quartile are all insignificant. If we thought that high ability individuals (or blacks or hispanics) were more likely to under-report criminal participation, then we should observe negative interaction terms. (A negative interaction would indicate that criminal self-report status is less predictive of future incarceration for that group.) Thus, the absence of significant interaction terms suggests that the self-report measure we use is equally predictive of subsequent incarceration for all races and ability groups.

3.2 Examining the Link Between Education and Crime

The model predicts that human capital is negatively correlated with criminal participation. Table 1 presents some simple statistics on educational attainment and self-reported criminal activity among 20-23 year old men in the NLSY. Dropouts are much more likely to engage in crime than high school graduates and individuals attending college. To the extent that initial skill levels and learning abilities are positively correlated with education, these simple correlations overstate the effect of schooling on crime. It is, therefore, important to control for these differences as much as possible when examining the relationship between education and crime. We use standard probit models for criminal participation to estimate this relationship.[21]

[21] It is not difficult to justify using a probit model based on a simple discrete choice framework in which individuals commit crime in any period if the marginal return exceeds the marginal cost.

Using the 1980 NLSY survey, we classify individuals as criminals if they self-report any income from crime or if they do not answer the question on criminal earnings. Since Table 5 suggests that most individuals who do not respond to this question more closely resemble criminals rather than non-criminals, this seems most appropriate. (The results are very similar if all non-respondents are dropped from the sample.[22])

Table 7 reports the estimated coefficients from probit models using different specifications and subsamples of young men. Columns (1)-(4) are based on a sample of all men (ages 18-23); column (5) only includes men who are no longer enrolled in school; and column (6) only includes men living in an inner city. The first column does not control for differences in ability (AFQT). The effect of high school graduation is substantial and statistically significant. Controlling for AFQT, the coefficient on high school graduation drops by about one-third in all other specifications.

Ability reduces criminal participation most for blacks, although the coefficient on the interaction terms for AFQT and race are insignificantly different from zero for both hispanics and blacks. We also cannot reject the null hypothesis that AFQT[23] does not matter for hispanics. AFQT significantly reduces crime for whites and blacks, however. AFQT not only reduces crime by increasing education; it also has sizeable direct effects on criminal participation. This suggests that if intelligence does increase the return to property crime, its effects on schooling and market skills are substantially larger.

Controlling for current enrollment in school (column 4), we observe little change in the estimated coefficient for high school graduation. Current enrollment reduces criminal participation, though the coefficient is insignificant. Theory suggests that enrollment in school is endogenous. Rather than include enrollment as a regressor, we only consider non-enrolled men in column 5. Again, we find that both ability and high school graduation significantly reduce criminal participation. Most of the coefficients are quite similar to those in other columns.[24] Limiting our sample to men living in a central city does not affect the coefficient on high school graduation (column 6); however, the standard errors increase substantially with the reduction in sample size. Though not shown in the table, even when conditioning on individuals who report smoking marijuana or taking harder drugs, the coefficients on high school graduation and ability are significantly negative. On the whole, high school graduation and ability reduce criminal participation among any subsample we choose.

As in Levitt [22], we use the ratio of total incarcerated adults to the total number of reported

[22] Appendix available upon request from the author.

[23] AFQT represents the percentile in the AFQT distribution of a given individual. Using indicator variables for AFQT quartile rather than assuming a linear relationship yields similar conclusions.

[24] Further restricting the sample to non-enrolled males with only 10-12 years of education yields similar results, suggesting that these estimated impacts of graduation measure the marginal effect of completing grade 12.

violent index crimes in an individual's state of residence as a measure of state punitiveness. In all specifications, our estimates suggest that stricter punishments reduce criminal participation. These estimates capture the deterrence effects of increased incarceration rates, which is an advantage over more aggregated measures which cannot easily distinguish between deterrence and incapacitation effects. [23, 22]

As we might expect, young men from an intact family (both parents present at age 14) and with more educated mothers are significantly less likely to commit crime. Hispanics are less likely to commit crime than whites, but there is no statistically significant difference between black and white rates of criminal participation. Surprisingly, living in an SMSA and age have little effect on criminal participation. We also find little or no effect of local unemployment rates on crime, except among non-enrolled men (column 5). This is consistent with most other studies.[12]

Table 8 reports the effects of high school graduation and state punishment rates on a number of self-reported crimes based on probit specifications identical to those of column 3 in Table 7. The first column reports the average probability that a young man commits each crime in our sample. Columns 2 and 3 report the coefficients and standard errors for high school graduation, while column 4 reports the average effect of graduating from high school on the probability of committing each crime. Columns 5-7 report the analogous statistics for state punishment rates (where column 7 is the average derivative rather than the average effect of a discrete change in an indicator variable). Both high school graduation and punishment reduce nearly all types of reported crimes. The first row reports their impacts on the criminal income measure used in Table 7. High school graduation reduces the probability that a young man earns an income from crime by 0.09 on average–about a 30% reduction from the average probability of non-graduates. As a percent of average probability, high school graduation has the greatest effect on selling hard drugs. The mean effect of -0.06 is 54% of the average probability of selling hard drugs among those who have not graduated from high school. That is, when compared with a non-graduate, a high school graduate is 54% less likely to sell hard drugs. The final row reports the effect of graduation and punishment on the probability of committing more than five of at least one of the following crimes: shoplifting, stealing something worth less than $50, stealing something worth more than $50, selling marijuana, or selling hard drugs. This more accurately measures the effects of education and punishment on highly active criminal involvement. The 5 point reduction in probability caused by high school graduation corresponds to a 34% reduction from non-graduate levels. The deterrence effects of punishment rates are substantial, as well. A one standard deviation in the custody rate (about 0.14) reduces the probability that an individual earns an income from crime by nearly 4 points – close to 20% of the average probability. In

general, both education and increased criminal incarceration rates substantially reduce a wide range of self-reported criminal behaviors.

In order to check the robustness of our findings, we study the effects of high school graduation and ability on incarceration in Table 9. Using the same sample of young men as in Table 7, we examine the probability that individuals are interviewed in jail in any year from 1981-1985 (the five years following our self-report measure) for ease of comparison with the self-reported crime results. In all specifications, high school graduation significantly reduces incarceration, but AFQT has no effect. Controlling for ability has little effect on the schooling coefficient. State punishment rates reduce crime, although the standard errors are large and the coefficients insignificant. Blacks are most likely to become incarcerated, while incarceration rates among whites and hispanics are similar. This differs markedly from the self-reported activity in Table 7, which suggested that blacks have crime rates similar to whites, and hispanics have significantly lower crime rates. Whether the racial differences in Table 7 and Table 9 reflect differences in self-reporting crime rates, a bias in our justice system, differences in the extent of involvement in crime conditional on being a criminal, or differences in violent crime rates is impossible to determine from these results. Previous studies suggest that differences in involvement conditional on participation are important. [8, 9, 17]

It is reasonable to think that schooling may have different effects on criminal behavior depending on age, race, and ability. Table 10 displays the effects of high school graduation and punishment on self-reported crime (panel A) and subsequent incarceration (panel B) for our sample. The first row in each panel reports the mean probability, coefficient estimates, and mean effects (average derivatives) taken from Tables 7 and 9. The second set of rows explores heterogeneity in effects by age. These probit regressions allow for different intercepts, effects of high school graduation, and effects of punishment rates by age. The third set of rows performs a similar analysis allowing for differences by race, and the fourth set allows for differential effects by AFQT quartile. Otherwise, all other regressors are the same as in column 3 of Tables 7 and 9.

The effects of high school graduation on self-reported crime fade out with age, as seen in panel A. While graduation substantially reduces crime among 19 and 20 year olds, its impact on crime at age 22 is quite small and statistically insignificant. We do not observe the same declining effects of high school graduation with age when we examine incarceration. Our estimates suggest that graduating from high school reduces the probability of becoming incarcerated within the next 5 years by 85-95% for individuals ages 19-22. These effects are substantial and statistically significant.

The effect of high school graduation is greatest for whites and the least for blacks. However, we cannot reject the null hypothesis that graduation has the same effect for all three groups. While the effects of graduation on self-reported crime are negligible for blacks, they are statistically significant for subsequent incarceration. The estimates in panel B suggest that graduation reduces incarceration by nearly 95% for all three groups.

High school graduation reduces self-reported crime substantially for all men except those in the highest AFQT quartile. Again, one cannot reject the hypothesis that the impact is identical across all ability quartiles. Impacts of graduation on incarceration are significant for all ability groups.

In contrast to the effects of education, punishment levels have the greatest effect on self-reported crime among the oldest men. Consistent with the results for schooling, the effects of punishment are also greatest for whites. Estimates suggest that the most able are the most deterred by punishment, perhaps reflecting the fact that time spent in jail (and out of the labor market) is more costly for them. Standard errors for coefficient estimates in panel B are too large to say with precision how the effects of punishment vary by age, race, or ability. In general, all estimates are negative.

Table 10 does not suggest substantial heterogeneity in the effectiveness of schooling and punishment for reducing crime. The one notable exception deals with the differential effects of high school graduation by age. While the impact of education on self-reported criminal participation declines with age, its impact on incarceration does not. There are a number of possible explanations for this phenomenon. First, high school graduation may substantially reduce involvement in crime at the intensive margin, while it has smaller effects at the extensive margin. While incarceration rates are determined by the number of criminals and the amount and severity of crimes each criminal commits, criminal participation rates only depend on the number of criminals. Even if the total number of criminals does not change, each criminal may spend less time committing crime causing incarceration rates to fall. Second, education may have larger impacts on criminal behavior for high-crime individuals, while it has smaller impacts on the marginal criminal (i.e. there may be a θ - education interaction). Third, the judicial system may be more lenient on criminals with a high school education, sentencing them to prison less often and for shorter terms.[25] Finally, more highly educated criminals may be more adept at evading arrest and conviction given any level of criminal activity. The evidence presented in Table 6 showing that the probability of incarceration conditional on self-reported participation

[25]Mustard [32] finds evidence that high school dropouts receive federal prison sentences that are 1.2 months longer, on average, than graduates, even after controlling for criminal offense level, criminal history, race, income, and other demographic variables.

does not depend on ability (as measured by AFQT) suggests that this explanation may not be too important.

These results suggest that individuals who fail to graduate from high school are significantly more likely to be involved in crime at young ages. However, as they age, the probability that they are involved in crime converges to that of high school graduates. That is, perhaps, the good news. The bad news, undoubtedly, is that individuals who drop out of high school are substantially more likely to become incarcerated within the next five years. And it does not appear as though differences in incarceration disappear with age (at least over young adulthood).

3.3 Are These Education Effects Causal?

In order for the estimated effects of education on crime to be causal, it must be the case that after conditioning on the other regressors: (1) there are no unobserved factors correlated with both education and crime that we have missed, and (2) differences in schooling are exogenously determined (i.e. they are not caused by differences in expected criminal activity). Regarding the first, we should be assured that our coefficient estimates for high school graduation are quite stable across specifications and across subgroups of young men. We do not observe the worrisome pattern of declining estimated impacts when more and more controls are added. Whether we include the long list of covariates in Tables 7-10 (along with a few others) or not, our estimates for graduation are largely unchanged. Only inclusion or exclusion of AFQT tends to matter, which is not surprising. The impacts are similar even when conditioning our sample on self-reported drug users. That is, within those reporting drug use, the estimated effects of high school graduation are the same as in our overall sample.

The second caveat is potentially more worrisome, since the model presented in Section 2 suggests that individuals who expect to commit crime in the future will invest less in their skills. The typical first response to this problem is to find an instrument for schooling. Unfortunately, the small sample sizes of the NLSY do not yield reliable estimates for these regressions when using any plausible instrument.[26] Instead, we examine implications of the model that would suggest that reverse causality (that differences in expected criminal behavior are responsible for differences in schooling choices) is an important problem. This has two advantages over an IV approach. First, our results do not hinge on the 'quality' of the instrument. And, second, we gain some insight regarding other implications of the model as a side product.

Based on the model in Section 2, differences in expected future crime affect schooling choices

[26] Attempts were made to use state variation in compulsory schooling laws, local community college tuition rates, high school curricula (e.g. availability of vocational or business curricula), and school quality measures as instruments. None of these approaches proved fruitful.

by altering hours at work and, thereby, the return to education. An individual expecting to spend a considerable amount of time committing crime expects to work less in the labor market as a result. This reduces the return to investing in market skills, which should reduce schooling. If this effect is important, our estimated coefficients on high school graduation no longer measure the causal effect of additional schooling on crime – which is of primary interest when considering programs to raise schooling levels to deter crime.

Since the NLSY asks individuals about criminal participation in 1980 and continues to follow their labor market decisions and earnings up to the present, we can see whether those reporting criminal earnings do indeed work less and earn less in the legitimate labor market. Table 11 reports the estimated differences in hours worked, wages, and labor market earnings for criminals and non-criminals over the life-cycle, controlling for experience, education, race, ability, family background, geographic factors, and local labor markets. We only consider men at least 18 years of age who are no longer enrolled in school. Column 1 shows, as predicted by the model, that hours worked are lower for those reporting criminal income in 1980, although that difference fades with experience. The men in our sample work about 2000 hours per year on average, so the initial difference in hours attributed to criminal participation (123 hours per year) is about 6%. If market skill levels are identical between criminals and non-criminals, our estimates suggest that non-criminals are likely to earn less than a 6% higher return from high school graduation than criminals. (So, for a 10% average rate of return to education, criminals would have less than a 0.6% lower rate of return.) Using the average difference in hours worked (for individuals with less than 20 years of experience) of 74 in column 2, suggests that the difference in returns to schooling are less than 4%. Presumably, criminals are somewhat less skilled to begin with as suggested by the difference in wage rates by criminal status. Thus, labor supply responses to wage differences also explains part of the difference in hours worked between the two types. Not surprisingly, the final two columns show that annual labor income is much lower for criminals than for non-criminals, especially among those just entering the labor market.

All of these findings are consistent with the model presented in Section 2. We expect criminals to be less skilled on average – that is an important reason for choosing crime in the first place. We also expect criminals to work less initially, as they spend time committing crime rather than working. However, as their labor market skills grow with experience/investment, hours spent working should increase while hours committing crime decline. Thus, hours worked should converge to those of non-criminals. We expect to observe a similar pattern for labor income.

Since the difference in hours worked (and, therefore, returns to schooling) is less than 4% on average, it is unlikely that much of the variation in schooling is caused by differences in expected

returns. Furthermore, these estimates do not suggest that the criminals in our sample differ substantially from non-criminals with similar observed characteristics. The possibility that some unobserved characteristic which makes the criminals in our sample unable to work productively or do well in school does not seem real given the similar work habits and wage patterns. To the extent that schooling differences in our data (after controlling for the numerous individual, family, and geographic characteristics) are caused by different tastes for and costs of schooling, we are safe to interpret our estimated effects of schooling on crime as causal: education reduces crime. Evidence from the experimental Quantum Opportunity Program confirms this interpretation, as we discuss next.

3.4 The Quantum Opportunity Program (QOP) and the Effects of Education on Crime

As discussed earlier, QOP randomly assigned 100 entering ninth graders[27] to a local mentor/counselor (25 students in each of four cities were assigned to a single mentor) for the next four years (throughout high school years). Participating students (all disadvantaged minorities in large cities) were provided social and emotional support as well as incentive-based financial assistance for post-secondary training or education.[28] Two years after program completion, about a third more participating students graduated from high school (or obtained their GED) than similar non-participants. Arrest rates for program participants were one-half those for non-participants. See Taggart [38] for a full description of the program and its impacts.

If we assume that the only impacts of QOP on crime can be attributed to the increase in educational attainment of participants, we can use the numbers reported in Taggart [38] to estimate the impact of high school graduation on crime. More specifically, assume that crime rates only vary by high school graduation status, such that graduates commit crime at the rate r_g and dropouts commit crime at the rate r_d. Then, if π_p and π_n are the graduation rates for participants and non-participants, respectively, crime rates for participants (R_p) and non-participants (R_n) will be

$$R_j = r_d(1 - \pi_j) + r_g\pi_j$$

for $j = p, n$. With information on graduation rates and crime rates by participation status, we

[27] Originally, an additional 25 students in Milwaukee were assigned to the program, but that location was dropped from the study before completion for administrative reasons.

[28] Financial assistance was structured so that participants could earn one dollar up front and one dollar placed in a college fund (along with occasional bonuses) for every hour spent in activities aimed at improving social and market skills. All participants were kept in the program for four years regardless of whether they dropped out of school or not. Over four years, the average participant logged 1,286 hours of educational activities like studying with tutors or visiting museums.

can determine the effect of high school graduation on crime, α, using a Wald estimate:

$$\hat{\alpha} = r_g - r_d = \frac{R_p - R_n}{\pi_p - \pi_n}.$$

These estimates suggest that high school graduation substantially reduces criminal activity as measured by arrests, incarcerations, or convictions. They suggest that high school graduation reduces the probability of incarceration by 86% (compare this with our NLSY estimates which range from 85-95%). The least severe measure of criminal participation – arrest rates – suggests slightly smaller effects of high school graduation. Graduation reduces the probability of being arrested by 61% and total arrests by 87%. This accords with the NLSY finding that criminal participation rates are affected less (in percentage terms) by graduation than incarceration – the more severe the criminal measure being examined, the greater the effect of high school graduation. This is consistent with the hypothesis that education not only reduces the probability of participating in criminal activities, but it also reduces the frequency and severity of crime conditional on participation. Such a result is implied by the model presented earlier.

Thus, the random assignment of QOP allows for a simple analysis of the effects of education on crime. Estimates based on the numbers reported by Taggart [38] accord well with the estimates derived from the NLSY. Both methods produce sizeable impacts of high school graduation on crime. To the extent that QOP also altered individual preferences, which may have an independent effect on criminal behavior, the simple Wald estimates over-attribute reductions in crime to educational differences. However, the primary emphasis of the program was to increase educational attainment, not to alter preferences and criminal behavior. The high benefit-cost ratio of QOP suggests that programs which effectively increase the educational attainment of disadvantaged youth through subsidies and counseling/mentors have large social benefits from a substantial reduction in crime.

3.5 Social Returns to Education from Crime Reductions

We can use our estimates to calculate the social benefits of increased education resulting from reductions in crime. Using the costs of incarceration and the costs to victims of the crimes reported by respondents in the NLSY, we estimate the social savings of an additional high school graduate. As a measure of the incarceration cost per crime, we multiply the annual cost of incarceration per inmate ($20,100)[37] times the incarceration rate per reported victimization for the following crimes: robbery, assault, burglary, larceny-personal theft, and motor vehicle theft. Victimization costs (including property lost) are taken from Miller, Cohen, and Wiersema[30]. To calculate the total net cost of each crime, we add the incarceration cost and the total victimization

costs less 80% of the lost property (which is assumed to be a rough estimate of the value of the stolen good to the perpetrator). Finally, the estimated cost reduction attributed to high school graduation is calculated by multiplying those costs per crime times the estimated mean effect for the appropriate crime from Table 8.[29] These figures are reported in panel A of Table 12. The final column reports the estimated cost reduction for each crime, as well as the one year total savings, and savings over ages 19-22 (assuming an annual discount rate of 5%). Our estimates suggest that the total social savings from reductions in incarceration costs and costs to victims are approximately $7,000. These should be viewed as extremely conservative, as a number of crimes affected by high school graduation are not included (drug sales, for example) due to the difficulty in estimating their costs.[30] These estimates also do not include any effects on crime beyond age 22. More importantly, our effects on crime measure the probability that someone commits a crime (at the extensive margin). We implicitly assume that the marginal criminals we attribute costs to are deciding between zero and one crime, so that if high school graduation prevents someone from committing a crime it only prevents one crime. Savings due to reductions in crime at the intensive margin among those who commit some crime regardless of their graduation status are not considered here.[31] Finally, a number of other costs are unmeasured, including criminal justice and law enforcement costs (other than the direct cost of incarceration), private security costs, and the overall benefits from feeling safe.

Panel B reports estimated savings from incarceration reductions using our estimates in panel B of Table 10. They simply multiply the estimated effect on incarceration by the cost of incarceration. The predicted one year savings is $308, not far from the one-year predicted savings attributed to reduced incarceration costs in panel A ($355). Total savings amount to more than $1,100 over four years. Since the impact of graduation on subsequent incarceration does not appear to fade with age, these are likely to be substantial under-estimates of the total savings from reduced prison costs, much less under-estimates of the total savings resulting from the costs described above.

This evidence suggests that substantial savings from reductions in crime are likely to accrue from raising high school graduation rates. The social benefit of high school graduation is at

[29] The mean effect on "use of force to get something" is used to measure the effects on robbery; "injure someone" is used in place of assault; and "steal something worth more than $50" is used to measure the effects on burglary, larceny-personal theft, and motor vehicle theft.

[30] On the other hand, these effects are overstated if our estimated impacts of education on crime are biased upward due to unobserved heterogeneity.

[31] Three potential problems prevent a more detailed analysis of crime at the intensive margin: (1) categories for the number of crimes become very coarse above 5 crimes committed (those categories include 6-10, 11-50, and more than 50); (2) it is difficult to determine how many crimes should be assigned to non-respondents; and (3) under-reporting is likely to be a more serious problem for measuring the extent of criminal activity than it is for measuring the criminal participation rate.

least $7,000 (on the margin) higher than the private benefit accruing to the student, justifying government intervention that encourages graduation. For a 10% rate of return to schooling, the discounted private return to finishing high school (vs. finishing 11th grade) in terms of higher earnings is around $40,000,[32] making the social savings from reduced crime total to almost 20% of the private return. Annual expenditures per pupil are also about $7,000 for public elementary and secondary schooling. So, from the taxpayers point of view, it is worthwhile paying for the final year of high school (for a student on the margin of graduating) in terms of future savings from reduced crime alone.

4 State Variation in Education and Crime

The model presented in Section 2 suggests that states with higher education levels should have lower index property crime rates. Differences in white collar crimes should be smaller or of the opposite sign, assuming they require skill and education. We examine those predictions using data from the 1997 CPS and UCR. Using the March CPS, we calculate the high school graduation rate for 20-30 year old males, percent of the population that is black, percent male, percent ages 15-20, and percent ages 21-25 for each state. From the UCR, we calculate the state punishment rate as the total population incarcerated divided by the total index crime rate for that state. State arrest rates for robbery, property index crimes, burglary, larceny-theft, motor vehicle theft, forgery and counterfeiting, fraud, and embezzlement are tabulated as well.

Regression results for the log of each crime rate on the state demographic measures, graduation rates, and punishment rates are shown in Table 13. As predicted, most property crimes (and robbery, which is considered a violent crime) show a negative impact of graduation rates. The estimates suggest that a 1 percentage point increase in a state's high school graduation rate reduces robbery by 4.3%, burglary by 2.4%, larceny-theft by 1.4%, and motor vehicle theft by 2.1%. The overall property index crime rate is expected to fall by 1.6%. Estimated impacts of high school graduation rates on forgery, fraud, and embezzlement are all statistically insignificant, although point estimates are negative for forgery and embezzlement. These estimates are consistent with the variation in age - crime profiles discussed earlier: both suggest that fraud is the most skill intensive and embezzlement the least skill intensive of the white collar crimes (and that all are more skill intensive than other index property crimes). The table also shows that the state punishment rate is negatively correlated with all index property crimes and fraud. Effects are quite small, however, when compared with the effects of high school graduation rates.

[32]This calculation assumes that annual earnings for men with a high school education are $20,000, that they work for 47 years, and face an interest rate of 5%.

5 Conclusions

Crime is primarily a problem among young uneducated men. Individuals with low skill levels are more likely to participate in criminal activities, because the returns they can earn from work or school are low. Both high school graduation and ability directly lower criminal propensities. While much of the correlation between education and crime is caused by differences in ability, high school graduation substantially lowers criminal participation rates (by as much as 60% for 19 year old men) even after controlling for heterogeneity in ability. Reductions in incarceration rates are even more substantial. Policies which raise the skills and abilities of children and adolescents as well as encourage them to finish high school can have sizeable impacts on crime. Our estimates suggest that the social benefits from reduced crime attributed to high school graduation are at least $7,000, and probably much more.

Wage subsidies can also be used to encourage work over crime. However, it is important to consider the dynamic effects of a policy which targets wage subsidies to younger workers. Such a policy can discourage skill formation and raise crime rates among older workers.

Nearly all previous research on crime reduction has focused on the deterrent and incapacitation effects of stricter law enforcement. This study suggests that increases in spending on enforcement will also lead to increases in skill investment and legitimate earnings. Furthermore, policies which promote skill investment and work will also reduce crime. The optimal mix of enforcement, skill investment, and wage subsidy policies has yet to be determined. All three programs are likely to be important components of an effective crime-fighting strategy.

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Table 1: Crime Rates of Men Ages 20-23 by Education (1980 NLSY)

Education Level	Percent with Positive Income from Crime	Percent with $> 1/2$ Income from Crime	Sample Size
$<$ 10th Grade	22.8%	3.7%	192
10-11th Grade	28.3%	4.0%	353
12th Grade	19.1%	1.6%	1098
>12th Grade	13.8%	0.9%	692

Table 2: Self-Reported Criminal Participation Rates by Age
(1980 NLSY – Young Men)

Age	Any Income from Crime	$> 1/2$ Income from Crime
15	21.7%	4.2%
16	24.4%	4.1%
17	29.5%	4.5%
18	23.3%	2.7%
19	19.6%	1.8%
20	19.2%	2.2%
21	17.6%	2.1%
22	17.1%	1.1%

Table 3: Percent of Men Involved in Crime, Work, and School
(Based on NLSY 1980 Survey)*

Involved in:					
Crime	Work	School	Ages 16-23	Ages 16-19	Ages 20-23
Y	Y	Y	8.8	13.3	5.6
Y	Y	N	9.7	6.3	12.1
Y	N	Y	0.9	1.9	0.1
Y	N	N	0.7	0.9	0.6
N	Y	Y	41.5	53.4	33.3
N	Y	N	32.2	15.3	43.8
N	N	Y	4.3	7.2	2.3
N	N	N	1.9	1.6	2.1
Sample Size			3,081	1,393	1,688

* Individuals are considered to be involved in crime if they reported that any of their income came from crime, working if they reported at least $100 income from work, and in school if they reported being enrolled in any type of school during the previous year.

Table 4: Effects of Social Programs on Schooling, Earnings, and Crime					
Program/Study	Costs	Program Description	Schooling	Earnings	Pre-Delinquency/Crime
Houston PCDC		home visits for parents for 2 yrs; child nursery care 4 days/wk in year 2 (Mexican Americans)			rated less aggressive & hostile by mothers (ages 8-11)
Job Corps (Long, et al., 1981)	$11,000	7 months of educational & vocational training for 16-21 yr. olds (mostly male)		$10,000 increase in discounted present value of earnings	estimated reduction in crime valued at $4,500
Perry Preschool Program (Schweinhart, Barnes, & Weikart, 1993)	$13,400	weekly home visits with parents; intensive, high quality preschool services for 1-2 years	21% less grade retention or special services; 21% higher HS grad. rates	at age 27, participants earned $453 more per month	2.3 vs. 4.6 lifetime arrests by age 27; 7% vs. 35% arrested 5 or more times
Quantum Opportunities Program (Taggart, 1985)	$10,600	counseling; educ., community, and devp. services; financial incentives for participation (4 yrs. beginning in 9th grade)	34% higher HS grad./GED rates (2 yrs. post-program)		4% vs. 16% convicted; .28 vs. .56 avg. number of arrests (2 yrs. post-program)
Syracuse University Family Development (Lally, et al., 1988)	$38,100	weekly home visits for family; day care year round			6% vs. 22% had probation files; offenses were less severe
Yale Experiment	$23,300	family support; home visits and day care as needed for 30 months	better school attend-ance & adjustment; fewer special school services (age 12 1/2)		rated less aggressive & pre-delinquent by teachers & parents (age 12 1/2)

Sources: See Donohue & Siegelman (1996), Schweinhart, Barnes, & Weikart (1993), and Taggart (1995) for the impacts reported here.
All dollars are in 1990 values.

Table 5: Subsequent Incarceration Rates for Men by Criminal Self-Report Status in 1980

	All Men		Non-Whites		Whites	
Self-Reported Criminal Income	Percent Incarcerated*	Sample Size	Percent Incarcerated*	Sample Size	Percent Incarcerated*	Sample Size
None	3.0%	2402	10.4%	990	1.4%	1412
Very Little	6.5%	493	19.6%	207	3.7%	286
About 1/4	11.4%	57	9.0%	31	12.6%	26
About 1/2	22.8%	41	62.1%	20	2.2%	21
About 3/4	37.2%	19	57.6%	10	27.1%	9
Almost All	21.5%	25	21.6%	16	21.4%	9
Any Income	8.8%	635	23.1%	284	5.1%	351
Missing Value	14.2%	217	24.8%	127	8.8%	90
Any Income or Missing	10.1%	852	23.7%	411	5.8%	441
All	4.7%	3254	14.3%	1401	2.4%	1853

* Individuals are considered incarcerated if they were ever interviewed in jail or if they ever reported incarceration as a reason for not searching for work while unemployed. Post-1980 years were considered for all men ages 18 or older. Since oversamples of blacks and hispanics are included, sample weights are used to produce random population estimates.

Table 6: Predicting Subsequent Incarceration
Based on Criminal Self-Report Status
Probit Regressions
(Dependent Variable: Ever Incarcerated Post-1980)

Variable	(1)	(2)	(3)
Intercept	-1.366**	-1.743**	-1.749**
	(0.642)	(0.603)	(0.601)
Age in 1980	-0.006	0.013	0.013
	(0.031)	(0.029)	(0.029)
Pos. Criminal Income	0.401*	0.408*	
	(0.216)	(0.215)	
Criminal Income Missing		0.809**	
		(0.299)	
Pos. or Missing Criminal Income			0.514**
			(0.193)
Black	0.627**	0.637**	0.637**
	(0.139)	(0.138)	(0.138)
Hispanic	0.309	0.310	0.310
	(0.196)	(0.195)	(0.195)
AFQT	-0.014**	-0.014**	-0.014**
	(0.002)	(0.002)	(0.002)
Black*Criminal	-0.009	-0.027	
	(0.240)	(0.239)	
Hispanic*Criminal	0.053	0.059	
	(0.382)	(0.380)	
AFQT*Criminal	0.002	0.002	
	(0.004)	(0.004)	
Black*Missing		-0.469	
		(0.337)	
Hispanic*Missing		-0.607	
		(0.613)	
AFQT*Missing		-0.002	
		(0.006)	
Black*Criminal/Missing			0.144
			(0.215)
Hispanic*Criminal/Missing			-0.108
			(0.344)
AFQT*Criminal/Missing			0.001
			(0.004)

Notes:
Individuals are considered incarcerated if they were ever interviewed in jail or if they ever reported incarceration as a reason for not searching for work while unemployed. Post-1980 years were considered for all men ages 18 or older.
* Significant at 0.1 level. ** Significant at .05 level.

Table 7: Coefficient Estimates (Std. Errors) from Probits for Criminal Participation
Using Self-Reported Criminal Income Measure (Males Only, 1980 NLSY)

	All Males				Not Enrolled in School	Living in a Central City
Intercept	-7.2377	-3.7885	-3.8247	-0.8180	2.0652	27.0588*
	(6.8879)	(6.9649)	(6.9684)	(7.2272)	(13.4175)	(16.3191)
HS Graduate	-0.4451**	-0.3040**	-0.3032**	-0.2794**	-0.3263**	-0.3133
	(0.0839)	(0.0881)	(0.0882)	(0.0894)	(0.1255)	(0.2293)
Age (in Months)	0.0618	0.0339	0.0342	0.0114	-0.0036	-0.2155
	(0.0560)	(0.0566)	(0.0566)	(0.0584)	(0.1067)	(0.1320)
Age-Squared	-0.0001	-0.0001	-0.0001	0.0000	0.0000	0.0004
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0003)
Black	0.1164	-0.0788	0.0503	0.0786	0.1192	0.6352
	(0.1121)	(0.1185)	(0.1733)	(0.1743)	(0.2447)	(0.3690)
Hispanic	-0.4370**	-0.4802**	-0.6103**	-0.5826**	-0.5322	-0.2094
	(0.1691)	(0.1701)	(0.2714)	(0.2724)	(0.3697)	(0.4812)
Highest Grade Completed by Mother	-0.0478**	-0.0344**	-0.0350**	-0.0337**	-0.0297	-0.0028
	(0.0165)	(0.0168)	(0.0168)	(0.0169)	(0.0257)	(0.0316)
Highest Grade Completed by Father	0.0119	0.0248**	0.0243**	0.0259**	0.0253	-0.0106
	(0.0120)	(0.0124)	(0.0124)	(0.0125)	(0.0193)	(0.0243)
Intact Family	-0.2023**	-0.2007**	-0.2036**	-0.1986**	-0.2466**	-0.2952
	(0.0867)	(0.0871)	(0.0873)	(0.0874)	(0.1238)	(0.1916)
Teenage Mother (at Birth)	0.0937	0.0588	0.0588	0.0524	0.1493	-0.1646
	(0.0850)	(0.0859)	(0.0859)	(0.0861)	(0.1165)	(0.2052)
Family Income (in $1,000)	-0.0041*	-0.0041*	-0.0041*	-0.0040*	-0.0047	-0.0035
	(0.0022)	(0.0022)	(0.0022)	(0.0022)	(0.0035)	(0.0051)
Living in South	-0.0559	-0.0340	-0.0391	-0.0411	0.0592	0.0447
	(0.1265)	(0.1274)	(0.1274)	(0.1274)	(0.1964)	(0.3412)
Living in Northeast	-0.0060	0.0475	0.0459	0.0390	0.0317	0.1205
	(0.1095)	(0.1103)	(0.1104)	(0.1105)	(0.1744)	(0.2737)
Living in North Central	0.0525	0.0813	0.0807	0.0737	0.2828*	0.6039**
	(0.1117)	(0.1127)	(0.1127)	(0.1128)	(0.1708)	(0.3013)
Living in an SMSA	0.0922	0.0956	0.0978	0.1005	0.0474	
	(0.0840)	(0.0845)	(0.0846)	(0.0846)	(0.1203)	
Local Unemployment Rate	0.0060	0.0000	0.0000	-0.0012	-0.0403*	-0.0451
	(0.0156)	(0.0158)	(0.0158)	(0.0158)	(0.0222)	(0.0385)
State Punishment Rate	-0.9339**	-0.9433**	-0.9403**	-0.9352**	-1.5619**	-1.9990**
	(0.3461)	(0.3477)	(0.3477)	(0.3472)	(0.5042)	(1.0120)
AFQT		-0.0079**	-0.0077**	-0.0070**	-0.0048*	0.0050
		(0.0015)	(0.0015)	(0.0016)	(0.0025)	(0.0041)
AFQT*Black			-0.0051	-0.0054	-0.0019	-0.0138*
			(0.0049)	(0.0049)	(0.0086)	(0.0079)
AFQT*Hispanic			0.0039	0.0037	0.0082	-0.0017
			(0.0058)	(0.0058)	(0.0094)	(0.0093)
Enrolled in School				-0.1319		
				(0.0839)		
Sample Size	1901	1901	1901	1901	812	370
Log Likelihood	-962.74	-947.89	-947.04	-945.80	-437.95	-194.02

Notes: All estimates use men ages 18-23 in the 1980 NLSY. Individuals are considered criminal participants if they reported any income from crime or do not respond to that question.
* Significant at 0.10 level. ** Significant at 0.05 level.

Table 8: Effects of HS Graduation and Punishment on Specific Crimes (1980 NLSY)[1]

		High School Graduation			State Punishment Rate		
Crime	Average Probability	Coefficient	Std. Error	Mean Effect	Coefficient	Std. Error	Average Derivative
Criminal Income	0.2243	-0.3032**	0.0882	-0.0901	-0.9403**	0.3477	-0.2632
Property Damage	0.2772	-0.2199**	0.0860	-0.0729	-0.2226	0.3214	-0.0716
Shoplifting	0.2782	-0.1775**	0.0859	-0.0592	-0.4563	0.3212	-0.1485
Steal Something < $50	0.2922	-0.2359**	0.0858	-0.0812	-0.0977	0.3132	-0.0327
Steal Something > $50	0.0919	-0.3128**	0.1113	-0.0524	-1.5735**	0.5016	-0.2415
Use Force to get Something	0.0926	-0.3772**	0.1092	-0.0656	-1.1679**	0.4625	-0.1828
Hit Someone	0.4534	-0.1252	0.0819	-0.0482	-0.4969*	0.2995	-0.1897
Injure Someone	0.1397	-0.3823**	0.0971	-0.0874	-0.9210**	0.3981	-0.1920
Sell Marijuana	0.1943	-0.2592**	0.0913	-0.0722	-0.9295**	0.3551	-0.2455
Sell Hard Drugs	0.0659	-0.4445**	0.1255	-0.0612	-1.8997**	0.5709	-0.2262
Involved in Gambling	0.0656	-0.1491	0.1221	-0.0191	-0.9938*	0.5180	-0.1215
Multiple Crimes[2]	0.1138	-0.2705**	0.1058	-0.0537	-1.0971**	0.4236	-0.2022

[1] Sample includes all men at ages greater than or equal to 18 in 1980. All regressions include the following regressors: age (in months), age-squared, high school graduation status, black and hispanic indicators, AFQT percentiles, interactions between AFQT and black and hispanic, whether the individual lived with both his natural parents at age 14, region of current residence, SMSA status, local unemployment rates, and state punishment rate (number of adults incarcerated / number of reported property and violent index crimes).

[2] Multiple crimes is an indicator that equals 1 if an individual committed more than 5 of at least one of the following crimes: shoplifting, stealing something worth less than $50, stealing something worth more than $50, selling marajuana, or selling hard drugs.

* Significant at 0.10 level. ** Significant at 0.05 level.

Table 9: Coefficient Estimates (Std. Errors) from Probits for Incarceration
(Males Only, 1980 NLSY)

Intercept	-33.2650*	-33.3608*	-33.5392*	-21.4150
	(18.9479)	(18.9428)	(18.9862)	(20.2412)
HS Graduate	-1.0272**	-1.0409**	-1.0333**	-0.9442**
	(0.2127)	(0.2279)	(0.2278)	(0.2301)
Age (in Months)	0.2509	0.2515	0.2528	0.1600
	(0.1535)	(0.1534)	(0.1538)	(0.1630)
Age-Squared	-0.0005	-0.0005	-0.0005	-0.0003
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Black	0.6917**	0.7087**	0.8269**	0.8856**
	(0.2204)	(0.2421)	(0.3301)	(0.3367)
Hispanic	-0.5318	-0.5237	-0.5945	-0.5641
	(0.4525)	(0.4548)	(0.6553)	(0.6640)
Highest Grade Completed	-0.0107	-0.0113	-0.0116	-0.0089
by Mother	(0.0425)	(0.0426)	(0.0428)	(0.0438)
Highest Grade Completed	-0.0316	-0.0325	-0.0326	-0.0300
by Father	(0.0298)	(0.0302)	(0.0301)	(0.0311)
Intact Family	0.2761	0.2741	0.2693	0.2718
	(0.2351)	(0.2353)	(0.2362)	(0.2375)
Teenage Mother (at Birth)	0.1939	0.1962	0.1910	0.1525
	(0.2044)	(0.2049)	(0.2057)	(0.2091)
Family Income (in $1,000)	0.0002	0.0002	0.0004	0.0013
	(0.0059)	(0.0059)	(0.0059)	(0.0060)
Living in South	-0.3703	-0.3654	-0.3592	-0.3811
	(0.3027)	(0.3041)	(0.3037)	(0.3084)
Living in Northeast	-0.9968**	-0.9967**	-0.9803**	-0.9862**
	(0.3364)	(0.3362)	(0.3355)	(0.3374)
Living in North Central	-0.8082**	-0.8056**	-0.8034**	-0.8354**
	(0.3018)	(0.3021)	(0.3026)	(0.3075)
Living in an SMSA	0.1061	0.1058	0.1078	0.1458
	(0.2263)	(0.2264)	(0.2269)	(0.2313)
Local Unemployment Rate	0.0273	0.0279	0.0275	0.0239
	(0.0451)	(0.0453)	(0.0455)	(0.0457)
State Punishment Rate	-1.1182	-1.1250	-1.1115	-1.0108
	(1.0321)	(1.0343)	(1.0359)	(1.0396)
AFQT		0.0007	0.0013	0.0026
		(0.0041)	(0.0044)	(0.0046)
AFQT*Black			-0.0056	-0.0057
			(0.0105)	(0.0109)
AFQT*Hispanic			0.0035	0.0037
			(0.0159)	(0.0162)
Enrolled in School (1980)				-0.4495*
				(0.2461)
Sample Size	1901	1901	1901	1901
Log Likelihood	-113.4	-113.38	-113.19	-111.43

Notes: All estimates use men ages 18-23 in the 1980 NLSY. Individuals are considered incarcerated if they were interviewed in jail between 1981 and 1985. All other measures taken from the 1980 survey (for comparability with Table 10).
* Significant at 0.10 level. ** Significant at 0.05 level.

Table 10: Effects of HS Graduation and Punishment by Age, Race, and Ability (1980 NLSY)

Specification	Average Probability	High School Graduation			State Punishment Rate		
		Coefficient	Std. Error	Mean Effect	Coefficient	Std. Error	Average Derivative
A. Criminal Income:							
Full Sample[1]	0.2243	-0.3032**	0.0882	-0.0901	-0.9403**	0.3477	-0.2632
Age 19[2]	0.2912	-0.7662**	0.1740	-0.2303	-1.0267	0.7265	-0.2584
Age 20[2]	0.2334	-0.3705**	0.1836	-0.1153	-0.7345	0.5893	-0.2096
Age 21[2]	0.2077	-0.2785	0.2061	-0.0822	-0.0861	0.6253	-0.0234
Age 22[2]	0.1820	-0.0709	0.2269	-0.0181	-1.5928**	0.6481	-0.3970
Black[3]	0.3078	-0.0067	0.2345	-0.0022	0.0409	0.7931	0.0134
Hispanic[3]	0.1888	-0.2444	0.3526	-0.0636	-1.1514	1.2707	-0.2929
White[3]	0.2171	-0.3628**	0.0964	-0.1081	-1.0349**	0.3590	-0.2853
AFQT Quartile 1[4]	0.3171	-0.3189**	0.1451	-0.1095	-0.2440	0.5551	-0.0839
AFQT Quartile 2[4]	0.3037	-0.3266**	0.1448	-0.1137	-0.8704	0.5356	-0.2943
AFQT Quartile 3[4]	0.1920	-0.4308**	0.1618	-0.1258	-1.3383**	0.5578	-0.3510
AFQT Quartile 4[4]	0.1394	-0.0148	0.2543	-0.0032	-1.1998*	0.5698	-0.2597
B. Incarcerated from 1981-85:							
Full Sample[1]	0.0153	-1.0333**	0.2278	-0.0421	-1.1115	1.0359	-0.0339
Age 19[2]	0.0162	-1.1547**	0.5101	-0.0399	0.7614	1.7572	0.0235
Age 20[2]	0.0194	-1.0901**	0.4116	-0.0540	-2.6053	1.8870	-0.0929
Age 21[2]	0.0152	-1.0969**	0.4247	-0.0564	-0.8404	1.7615	-0.0250
Age 22[2]	0.0195	-0.8826**	0.4233	-0.0472	-1.0741	1.5587	-0.0405
Black[3]	0.0549	-0.7877*	0.4686	-0.0780	-2.3210	1.5995	-0.2171
Hispanic[3]	0.0157	-1.1101	1.0201	-0.0372	-1.6242	3.5221	-0.0517
White[3]	0.0107	-1.1337**	0.2808	-0.0394	-0.7101	1.0906	-0.0164
AFQT Quartile 1[4]	0.0372	-1.1603**	0.3971	-0.0622	-1.5511	1.3095	-0.1022
AFQT Quartile 2[4]	0.0171	-1.1013**	0.4056	-0.0486	-0.5377	1.4481	-0.0192
AFQT Quartile 3[4]	0.0085	-0.7275*	0.4312	-0.0205	-2.5624	2.1638	-0.0488
AFQT Quartile 4[4]	0.0057	-1.3343**	0.5296	-0.0613	-0.0591	2.0161	-0.0008

Notes: Sample includes all men at ages greater than or equal to 18 in 1980. All regressions include the following regressors: high school graduation status, black and hispanic indicators, whether the individual lived with both his natural parents at age 14, region of current residence, SMSA status, local unemployment rates, and state punishment rate (number of adults incarcerated / number of reported property and violent index crimes). Other regressors included as follows:

[1] Full sample specification also includes controls for age (in months), age-squared, AFQT percentiles, and interactions between AFQT and black and hispanic.

[2] Specification for age also includes indicators for age (in years), AFQT percentiles, and interactions of age indicators with high school graduation, AFQT percentile, and state punishment rates.

[3] Specification for race also includes indicators for age (in months), age-squared, AFQT percentiles, and interactions of black and hispanic with high school graduation, AFQT percentile, and state punishment rates.

[4] Specification for AFQT quartiles also includes indicators for age (in months), age-squared, AFQT quartile indicators, and interactions of AFQT quartile indicators with high school graduation and state punishment rates.

* Significant at 0.10 level. ** Significant at 0.05 level.

Table 11: Effects of Criminal Status in 1980 on Subsequent Hours Worked, Wage Rates, and Labor Income (1980-93 NLSY)

	Annual Hours Worked		Wage Rate		Log(Wage Rate)		Annual Labor Income		Log (Labor Income)	
Criminal (in 1980)	-123.31**	-73.97**	-0.51**	-0.32**	-0.053**	-0.033*	-5533.00	-4991.24*	-0.221**	-0.135
	(23.62)	(10.70)	(0.24)	(0.11)	(0.018)	(0.008)	(5901.87)	(2688.10)	(0.031)	(0.014)
Criminal (in 1980) * Experience	6.02**		0.02		0.002		66.99		0.011*	
	(2.57)		(0.03)		(0.002)		(649.66)		(0.003)	
Number of Observations	21,273	21,273	20,293	20,293	20,293	20,293	20,701	20,701	20,701	20,701

Notes: Sample includes all men at ages greater than or equal to 18 when they were no longer enrolled in school. All regressions include the following regressors: experience, experience-squared, high school graduation status, interactions between high school graduation and experience and experience-squared, black and hispanic indicators, AFQT percentiles, interactions between AFQT and black and hispanic, whether the individual lived with both his natural parents at age 14, region of current residence, SMSA status, local unemployment rates and population levels. Wages and income are in 1992 dollars. Observations were dropped if wages were less than $1 or greater than $100, annual labor income was less than $100, or hours worked were greater than 4,000. Individuals with zero hours worked were included in hours regressions.

* Significant at 0.10 level. ** Significant at 0.05 level.

Table 12: Reductions in Social Costs (1996 Dollars) of Crime (Victim & Incarceration Costs) Attributed to High School Graduation (Based on 1980 NLSY Estimated Effects)

	Incarceration Cost per crime[1]	Victim Costs[2]	Property Loss[2]	Total Net Cost of Crime[3]	Estimated Mean Effect (NLSY)	Estimated Cost Reduction
A. Specific Crime Estimates (Table 8)						
Robbery (Use Force)	3,538	8,687	814	11,573	-0.0656	759
Assault (Injure Someone)	515	10,207	42	10,687	-0.0874	934
Burglary (steal > $50)	796	1,520	1,053	1,474	-0.0524	77
Larceny--Personal Theft (Steal > $50)	117	402	293	284	-0.0524	15
Motor Vehicle Theft (Steal > $50)	570	4,018	3,583	1,721	-0.0524	90
Total One Year Savings						1,876
Total Savings in Crime Reductions Over Ages 19-22[4]						6,983
B. Incarceration Estimates (Table 10B)						
Incarceration Savings for One Year	20,100	-	-	-	-0.0153	308
Total Incarceration Savings Over Ages 19-22[4]						1,145

[1] Per inmate operating expenses in a state prison ($20,100) taken from Stephan, J., *State Prison Expenditures, 1996*, U.S. Dept. of Justice, 1999. In panel A, per inmate costs are multiplied by the ratio of prisoners (from Beck, A., and C. Mumola, *Prisoners in 1998*, Dept. of Justice, 1999, and Harlow, C., *Profile of Jail Inmates 1996*, Dept. of Justice, 1998) to number of victimizations (National Crime Victimization Survey, 1996).

[2] From Table 2, Miller, T., M. Cohen, and B. Wiersema, *Victim Costs and Consequences: A New Look*, National Institute of Justice, 1996.

[3] Total net costs = incarceration costs + victim costs - .8*property loss

[4] Present value calculation for four years of annual crime reduction discounted at annual rate of .05.

Table 13: Effects of Education on Crime
State Regressions from the 1997 CPS and UCR

	Log(Crime Rate):							
Variable	Robbery	Property Crime	Burglary	Larceny-Theft	Motor Vehicle Theft	Forgery & Counterfeiting	Fraud	Embezzlement
Intercept	0.1954	2.1434	-1.0358	1.7319	2.4160	-6.3479	4.2512	4.6769
	(5.14312)	(2.1172)	(2.4031)	(2.3061)	(4.4974)	(6.5041)	(7.8000)	(13.5733)
HS Graduation. Rate	-4.3000**	-1.6462**	-2.3833**	-1.3988*	-2.0796	-1.2308	1.2546	-3.7554
	(1.6687)	(0.6870)	(0.7797)	(0.7482)	(1.4592)	(2.1103)	(2.5308)	(4.4039)
Punishment Measure[1]	-0.0105	-0.0146**	-0.0085**	-0.0156**	-0.0151**	-0.0175**	-0.0128	0.0130
	(0.0064)	(0.0027)	(0.0030)	(0.0029)	(0.0056)	(0.0082)	(0.0098)	(0.01701)
Proportion Black	5.9020**	1.2896**	2.5438**	1.1753**	0.8577	2.0919	3.9642**	-0.0558
	(1.2036)	(0.4955)	(0.5624)	(0.5396)	(1.0525)	(1.5221)	(1.8253)	(3.17632)
Proportion Male	8.4222	1.8664	7.6537	1.1374	-2.8530	10.6581	-12.2626	-9.5397
	(9.7450)	(4.0116)	(4.5533)	(4.3693)	(8.5213)	(12.3236)	(14.7789)	(25.7178)
Proportion Ages 15-20	-16.6130*	9.1665**	1.8753	11.5017**	5.7387	10.7498	7.9649	-27.4137
	(9.8475)	(4.0538)	(4.6011)	(4.4153)	(8.6110)	(12.4532)	(14.9343)	(25.9883)
Proportion Ages 21-25	-6.6057	1.2167	-7.7333	3.0702	2.1443	12.9841	0.8454	25.4419
	(10.3770)	(4.2718)	(4.8486)	(4.6527)	(9.0740)	(13.1229)	(15.7375)	(27.3858)

[1] Punishment measure = (total population incarcerated)/ (total index crime rate from UCR) for each state.

Figure 1: Arrest Rates for Fraud, Index Property, and Index Violent Crimes by Age (UCR, 1997)