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Redemption in the Presence of Widespread Criminal Background Checks

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ABSTRACT

Recent advances in information technology and growing concerns about employer liability have combined to increase the demand for criminal background checks. Also, since over 14 million arrests are made each year, many individuals will have criminal history records. As a result, many individuals who have redeemed by avoiding involvement in crime and are seeking employment will be haunted by the record of a crime committed a long time ago, a record that may well indicate a low probability of future crime risk. We know that the probability of recidivism declines with time "clean" since a last arrest, so that there is some T^* such that someone with no arrest for T^* years is of no greater risk than any demographically similar counterpart. The problem is that we have very little information on the appropriate value of T^*, and how that value varies with the crime type of the earlier event (C_1) and the offender's age at that event (A_1). Here we estimate the degree to which a past criminal record loses its relevance in terms of its ability to predict future offending. Data obtained from a state criminal-history repository allow us to estimate the hazard of rearrest. We look for its intersection with the demographically appropriate age-crime curve, representing the risk of arrest for the general population. The findings of this research can contribute to the development of relevancy guidelines for the users of background-checking services and for policy makers interested in enhancing employment opportunities in developing regulations regarding the dissemination of such records.

KEYWORDS: redemption, criminal background checks, criminal history records, employment

REDEMPTION IN THE PRESENCE OF WIDESPREAD CRIMINAL BACKGROUND CHECKS

"For 30 years I've lived a good life--so why should I have to tell a potential employer about my past?"(Scanlon, 2000: 10)

THE BASIC PROBLEM OF REDEMPTION

People like the one quoted above are not rare. Many people have made mistakes in their youthful past, but have since redeemed themselves and live a respectful life. Redemption, rooted in the religious concept referring to forgiveness of past sins,[1] is the process and attainment of "going straight" for those who have a mark of crime. Until recently, the society had a natural redemption process at work in a sense that a person who committed a crime could prove to be redeemed by leading a life as a productive member of society. In recent years, the possibility of redemption has been in serious question. Not only haunted by the question about their criminal background on almost every job application, those with a criminal record are faced with computerized criminal background checks that employers increasingly rely on. Criminal background checks can now reveal the person's (old) criminal record and constantly put the fact that crime occurred in the spotlight, thereby overshadowing the law-abiding life led since then. Computerized background checks can have long memories, and this paper is intended to provide some guidance for inducing some limits to that memory.

One issue of growing public concern derives from the confluence of two important trends related to criminal history records: the increasing demand for background checks for a wide variety of purposes, but most importantly for employment assessment, and the growing prevalence of individuals' interaction with the criminal justice system as reflected in criminal history records. As a consequence, a growing number of individuals are handicapped because of an event that may have occurred long ago and is of little relevance to any current assessment of their riskiness. There is considerable evidence that after an initial period the probability of recidivism declines monotonically with time free and clear of further contact with the criminal justice system. The current paper addresses the following questions: How long does it take for an individual with a prior criminal record and no subsequent criminal involvement to be of no greater risk than any other comparable person in the general population? How does this length vary with the characteristics of the prior record such as the crime type and the age of the prior arrest?

PREVALENCE OF CRIMINAL BACKGROUND CHECKING

With the recent advancement in information technology and the introduction of the Internet, individuals' criminal records have never been more easily accessible. The background-check

industry is burgeoning. There are numerous companies that acquire and compile criminal justice information obtained from police and courts and assemble a database for commercial purposes (Barada, 1998; Munro, 2002). SEARCH, (the National Consortium for Justice Information and Statistics) reports, "in addition to a few large industry players, there are hundreds, perhaps even thousands, of regional and local companies" that compile and/or sell criminal justice information to the end users" (SEARCH, 2005: 7). They provide background- check services to private employers at their convenience in a highly timely manner. The information is normally in electronic form and the transaction is processed online. As part of the screening process, employers, not only traditional government agencies, but also a wide variety of service sectors are therefore able to check into their potential employees' criminal records. A recent survey of firms from multiple cities in the U.S. reveals that about 50% of them check the criminal background of job applicants (Stoll, Raphael, and Holzer, 2006). Another survey finds that 80% of the large employers in the U.S. now run criminal background checks on their prospective employees (Society for Human Resources Management, 2004).

The process is reasonable for employers in order to minimize the risk of injury to the organization, its customers, vulnerable populations such as children, the sick, and the elderly, and also the risk of liability for negligent hiring (Hahn, 1991; Harris and Keller, 2005; Stoll, Raphael, and Holzer, 2006). It is likely that the more accessible and more inexpensive the criminal background checking service becomes, the more expansive the practice of screening job applicants for criminal history will become. Indeed, though prices vary depending on the cost of searching methods, the simplest and therefore most inexpensive criminal background checking service available costs as low as $5 for a single state criminal database search (SEARCH, 2005). The growing ubiquity of background checking and the recognition that the information does become stale after some reasonable period of time results in the realization that a growing number of people who have a criminal record but currently pose no or little risk will be adversely affected.

PREVALENCE OF CRIMINAL RECORDS

In 2006, according to the Uniform Crime Report (UCR), law enforcement agencies across U.S. made over 14 million arrests (U.S. Department of Justice, 2007). On December 31, 2003, over 71 million criminal history records were in the state criminal-history repositories (Bureau of Justice Statistics, 2006).[2] Prior research suggests that the general public's chance of being arrested in their life time is rather high. Forty years ago, fifty percent of the U.S. male population was estimated to be arrested for non-traffic offense in their lifetime (Christensen, 1967); that rate is undoubtedly appreciably higher today. For only the seven FBI Part I or Index offenses, the estimated lifetime arrest probability among males is still over 0.2, and among nonwhite males the probability is strikingly over 0.5 (Blumstein and Graddy, 1982). Among those who have an arrest record, some have an offense they committed years ago and have never been involved in crime or the criminal justice system since then. When state-level criminal-history repositories or commercialized vendors of criminal-history records disseminate them to employers and other

recipients, they do so regardless of how long ago the accused offense took place (Bureau of Justice Statistics, 2001). Therefore, the evidence of the contact with the criminal justice system, even if it was in the distant past, could have a critical impact on individual lives. This is of special concern for those who are from minority populations that are overrepresented in the nation's criminal justice system.

There are multiple ways in which criminal history records haunt ex-offenders who try to leave their past behind by leading law-abiding lives. "Invisible punishment" or collateral consequences of interaction with the criminal justice system mostly "operate largely beyond public view" and affect ex-offenders "outside of the traditional sentencing framework" (Travis, 2002: 16). Lingering effects of having criminal records can be felt by ex-offenders via extensive avenues and include restrictions on possibly the most essential means for ex-offenders to succeed in living a law-abiding life. Among them are restrictions or bans on professional and occupational licensing (in, for example, occupations ranging from healthcare, nursing, and education to plumbing and barbering), denial of governmental benefits such as welfare and public housing, termination of parental rights and revocation or suspension of driver's licenses (Kethineni and Falcone, 2007; May, 1995; Petersilia, 2003; Samuels and Mukamal, 2004; Wheelock, 2005). Particularly for employment, prior studies have shown that many employers not only check criminal background of employment applicants, but also show great reluctance to hire those with criminal records (Holzer, Raphael, and Stoll, 2003; Pager, 2003; Schwartz and Skolnick, 1962; Stoll, Raphael, and Holzer, 2006), which is consistent with the general findings that having a mark of crime leads to poor prospects of employment (e.g., Bushway, 1998; Grogger, 1995; Nagin and Waldfogel, 1995; Western, Kling, and Weiman, 2001)

RELEVANCE OF CRIMINAL HISTORY

The rationale behind the practice of checking the criminal background of job applicants is that the employers recognize the strong positive relationship between past criminal conduct and future criminal involvement. The belief is validated to some extent by a variety of studies. For example, those who commit a crime in the past are more likely to commit crimes in the future than non-offenders (Nagin and Paternoster, 2000). In general, people who commit offenses at a high rate are less likely to cease offending in the future (Piquero, Farrington, and Blumstein, 2003). And those who have past official criminal records are likely to have more records in the future (Brame, Bushway, and Paternoster, 2003; Farrington, 1987).

While these studies support employers who would avoid any potential employees with criminal history, the employers would also be well advised by some interlinked streams of research in criminology, which present equally strong evidence of desistance from crime in a subpopulation of those with past offenses. One stream argues for the effect of changes in the life course of offenders on their risk of future involvement in crime. For example, it is well established that stable marriage and employment are powerful predictors of desistance from crime (Sampson and Laub, 1993; Sampson, Laub, and Wimer, 2006; Uggen, 1999; Wallman and Blumstein, 2006;

Warr, 1998). Another one is on the general effect of aging on offending. It has been confirmed that age is one of the most powerful explanations of desistance (Farrington, 1986; Hirschi and Gottfredson, 1983; Sampson and Laub, 1993; Sampson and Laub, 2003). The age-crime curve demonstrates a steady decline in criminal activity after the peak in the late teens and early young-adult periods. Yet another series of studies on recidivism consistently demonstrate that those who have offended in the past will have the highest probability of reoffending within several years, and the probability will decline steadily afterwards (Maltz, 1984; Schmidt and Witte, 1988; Visher, Lattimore, and Linster, 1991). A study released in 1994 that tracked two-thirds of all U.S. prisoners for 3 years shows that the two-thirds of the released offenders who were arrested within the first 3 years, were in fact, arrested during the first year (Langan and Levine, 2002). Another study examined the effects of sentences on 962 felons convicted between 1976 and 1977 in Essex County, New Jersey, following their recidivism (rearrests) for over 20 years (National Institute of Justice, 1999). Similar to the results above, this study shows that while half of those rearrested were arrested within 2.2 years, 30 % of the offenders remained arrest-free after the original sentence. The calculation based on the Essex data reveals that among those felons who stayed free of crime for 10 years after the original conviction, only 3.3 % were reconvicted within the next 10 years (Community Legal Services, Inc., 2005).

As discussed above, there have been numerous studies finding that recidivism occurs relatively early. However, little attention has been paid to the admittedly smaller population of ex-offenders who stay crime free for an extended period of time. Recent papers by Kurlychek and her colleagues have shed some light on the population characterized by long-time avoidance of crime (Kurlychek, Brame, and Bushway, 2006, 2007). Examining the hazard rate, they show that the risk of offending for those with criminal records approximates the risk for those without a record as substantial time passes.

Kurlychek, Brame, and Bushway (2006) used the longitudinal data from the Second Philadelphia Birth Cohort Study (Tracy, Wolfgang, and Figlio, 1990). The major advantage of such longitudinal samples is that they have a representative population of non-offenders, which would make it possible to evaluate the hazard of those with records, and those without. However, longitudinal samples are often limited in size and the follow-up might not be as complete as we desire, especially when the question involves the examination of hazard by the offense type and age at the prior offense, which are of considerable importance in providing practical policy implications (Pager, 2006).

While acknowledging the appropriateness of employers' interest in the criminal history of applicants because they recognize that past wrongdoings are a reliable sign of future trouble, we also recognize the decreasing value of past criminal records to predict future risk of offending because the risk of recidivism decreases monotonically with time clean. If we characterize the time since the last contact with the criminal justice system as T, there is some point, interval T^*, where an individual with a prior criminal record poses no greater risk than any other demographically similar individual. The problem here is that we have very little empirical

evidence on the value of T^*. Many employers might recognize that a stale record should not indicate a serious impediment to employment but due to the lack of reliable guideline as to the length of T^* they would have no choice but setting their own arbitrarily selected cut-off point based on some intuitive sense of how long is long enough. For example, the Transportation Security Administration (TSA) requires maritime workers to obtain a Transportation Worker Identification Credential (TWIC) to access secure areas of port facilities. Individuals are disqualified from getting a TWIC if they have been convicted for certain disqualifying criminal offenses within 7 years of the TWIC application (Transportation Security Administration, n.d.).[3] To the best of our knowledge, the choice of 7 years is arbitrary and not based on any empirical analysis. Indeed, 7 years seems to be a common restorative period, and we know of no analyses supporting that choice other than perhaps, a view that 5 years is too short and 10 years is too long.[4]

Given the importance of this issue, particularly for those with other employment vulnerabilities, it becomes important to develop empirical estimates of T^*. It is entirely possible that T^* will vary with a crime type of the earlier arrest, denoted as C_1. Some crime types are more serious, others are more recidivism-prone. T^* could also vary with the age of the first arrest, A_1, recognizing that that criminological research consistently indicates that an earlier onset in the criminal career is a good predictor of a longer career duration (Piquero, Farrington, and Blumstein, 2007).

We are interested in developing estimates of T^* as a function of these characteristics of the earlier record. This approach is related to the more familiar approach of estimating recidivism probability. It is more complicated, however, because one must examine the record over an appreciably more extended period of time. In recidivism studies, it is usually sufficient to track individuals for as short as five years because the large majority of individuals who will recidivate will do so within the first several years (e.g., Beck and Shipley, 1997; Langan and Levine, 2002). However, measurement of T^* requires observation over a much longer time interval, long enough for the recidivism probability to approach sufficiently close to zero. Moreover, we also need larger samples than the past studies (Kurlychek, Brame, and Bushway, 2006, 2007) so that we can precisely estimate the recidivism probability sufficiently well after the large majority of any initial cohort have already recidivated.

RESEARCH APPROACH

DATA

Our research approach requires criminal history records initiated long enough ago that we can be confident that the individuals with those records who have been free and clean of arrests have a low residual risk of recidivism. On the other hand, we would like records from a time when the computerization of rap sheet information was sufficiently advanced so that the computer records would represent an appropriate sample. Thus, we contacted the criminal history repository in

New York State asking for a sample of individuals arrested for the first time as adults in 1980. This provided an interval of 27 years to follow the individuals and assess their recidivism probabilities. This also provided a large enough population to disaggregate by a reasonable number of interesting crime types and age of the first arrest and still have an adequate number of individuals who have remained clean of crime 10, 20, and even 25 years later.

Over 88,000 individuals were recorded as experiencing their first arrest in 1980 in New York State. From this total population of arrestees, we focus on individuals with the age at first arrest 16,[5] 18 and 20. The crime types we focus on here have to be sufficiently numerous, serious (e.g., we avoid DUI), and less than permanently damning (e.g., murder). Our analysis here focuses on three offenses: robbery, burglary, and aggravated assault. This selection of offenses is based on their prevalence in arrest records and the fact that a first adult arrest for one of them is relatively unlikely to lead to incarceration, and especially to a long period of incarceration, which would complicate our analysis; but at the same time they are relatively serious offenses.[6] This selection left us with 5,226 individuals, about 5% of the initial population. Table 1 provides the distribution of the sample by age and crime type at first arrest.

[Insert Table 1 about here]

ESTIMATION MODELS

Modeling of time to recidivism naturally enables us to use survival analysis methods. Survival analysis is a set of statistical methods developed to study the occurrence (if any) and the timing of events. Since the methods are flexible and generic, they have been used for studying a wide variety of events, such as deaths, marriages, cancer cures, unemployment, militarized disputes, earthquakes, equipment failures, and so on. Criminologists have long been utilizing the methods, in particular, to study recidivism (e.g., Maltz, 1984; Schmidt and Witte, 1988; for review, see Chung, Schmidt, and Witte, 1991). Our analysis utilizes two quantities in survival analysis methods to examine the timing of redemption and how it varies with conditions at first arrest, namely the offense type and the age. One is survival probability, $S(t)$, which is calculated as

$$S(t) = \frac{\text{\# of arrestees who have not had a new arrest by the end of time period } t}{\text{Total \# of arrestees in 1980}}$$

Survival probability $S(t)$ is the probability of surviving beyond time t without a second arrest, and this is simply the proportion of arrestees who survive longer than t years. Survival probability can be translated intuitively to be the potential for redemption at time t. After t years, it describes how likely those who survived up to that point in time can be viewed as "redeemed".

The other quantity is hazard (or hazard rate), $h(t)$, which is calculated as

$$h(t) = \frac{\text{\# of arrestees who have a new arrest in time period } t}{\text{\# of arrestees who have not had a new arrest before } t}$$

Hazard, *h(t)*, is equal to the conditional probability of a new arrest given surviving without an arrest up to time *t*. This is precisely the quantity employers and others would use to evaluate the offending risk of a person, who has been revealed to have committed a crime t years ago by the background check (Kurlychek, Brame, and Bushway, 2006).

In calculating both quantities, we count a new arrest (after their initial arrest in 1980) for any offense type except DUI. Thus, for example, a new arrest is marked when a person whose first arrest in 1980 was for burglary, is rearrested, not only for burglary, but also for any non-burglary offense.

We estimate the survival probability and the hazard given conditions at first arrest, namely the age A_1 and the crime type C_1 of the first arrest. Figure 1 displays *S(t)* for age at first arrest (A_1) of 16 for the three values of C1 (robbery, burglary, and aggravated assault). Figures 2 and 3 do similarly for $A_1 = 18$ and 20. Figures 4-6 present the corresponding graphs for the hazard function, *h(t)*.[7] As expected, *S(t)* and *h(t)* vary with A_1 and C_1. Survival for robbery and burglary tend to be fairly close and generally higher than for aggravated assault, but all three are very close when $A_1 = 20$. The hazard curves differ primarily in the first 10 years, with robbery tending to have the highest conditional rearrest probability and burglary and aggravated assault following a similar trend; again, all three hazard curves follow a similar path for $A_1 = 20$. These results have important implications in estimating T^*, which we will turn to next.

[Insert Figures 1-6 about here]

COMPARISON TO THE AGE-CRIME CURVE

We are next interested in finding T^*, the value of t where the risk of a new arrest matches the risk of arrest for the general population of similar demographics. We estimate the risk of arrest for the general population by the age-crime curve whose horizontal axis is age (A) and whose vertical axis is the probability of arrest of a person of age A. In constructing the age-crime curve, we calculate the probability of arrest by age from 16 to 45 as the number of arrests in 1985 (Federal Bureau of Investigation, 1986) divided by the projected national population of 1985 (U.S. Census Bureau, 2000).[8] Here, we count arrests for any offense except DUI, Suspicion, and "Other" offenses so that the range of offenses for which an arrest is made is comparable with the range of offenses considered for a new arrest for redemption candidates.

An intersection at T^* years is expected for two reasons. First, the age-crime curve includes, among the larger population, those who recently offended and thus have a reasonably high risk of reoffending. In contrast, the redemption candidates have been arrest-free for T^* years, during which time the risk, or hazard rate, should have fallen substantially and should have a reasonably steep negative slope.

RESULTS

Table 2 shows the values of T^* by offense type at first arrest (C_1) and age at first arrest (A_1). In general, there is a reasonable difference in values of T^* across offense types and ages at first arrest. Overall, those who were arrested for robbery take the longest time, about 11 years for 16 and 18 year olds, and about 8 years for 20 year olds, to "look like" someone drawn from the general population in terms of the probability of an arrest. Interestingly, the probability of a new arrest at T^* is relatively consistent across different ages at first arrest and offense types, being in the range of 0.05 and 0.07.

Across different values of A_1, the younger A_1 is associated with the larger value of T^*. Across the three offense types, the earlier the age at first arrest, the longer it takes for the probability of a new arrest to become comparable with the probability for the general population. This is consistent with general findings in criminology that younger starters persist longer in their criminal careers (Piquero, Farrington, and Blumstein, 2007).

Across offense types, one can notice that T^* is relatively similar (10-11 years) for 16 year olds. However, as A_1increases, T^* declines fastest for aggravated assault less so for burglary, and still slower for robbery.

For illustrative purpose, figure 7-9 show three hazard curves (C1 = Robbery, A1 = 18), (C1 = Burglary, A1 = 16) and (C1 = Aggravated Assault, A1 = 20) and the comparable age-crime curves (i.e., for the t years following the first arrest) and the resulting intersection, T^*.

[Insert Figures 7-9 about here]

Table 3 presents the offense transition matrix, which displays the combination of crime type of first arrest (the rows) and the probability of different crime types of second arrest (including the possibility of no second arrest). This allows us to examine what proportion of those who were arrested for each of three crime types examined in 1980 were rearrested for the same crime type, for a different crime, or never rearrested. The first thing to notice is the relatively higher proportion of committing the same crime type as the first one, which are represented by the diagonals of the matrix (thick borders).[9] Most notably, over 20% of those who committed a robbery were rearrested for a robbery. If one looks at the off diagonals, one would notice that there is a tendency to commit a second crime similar to the first one in nature of the offense. For example, burglars, if not committing another burglary, tend to commit other property crimes. Similarly, those who were initially arrested for aggravated assault tend to be rearrested for other violent crimes. Another observation from the table is the relatively low percentage of no second arrest, 9.6 percent for robbery and somewhat higher, 15.6 percent for burglary and 20.5 percent for aggravated assault.

[Insert Table 3 about here]

COMPARISON WITH THE "NEVER-ARRESTED"

One important feature of our previous analysis is the fact that our comparison is of people with a prior record who have stayed "clean" (as revealed by a background check) with demographically similar members of the general population who have not undergone any background checks. It would be desirable also to make a more symmetric comparison of our population with a prior record against those with no prior record (as would be reflected in a background check). This is an inherently less risky comparison group, whom we designate as the "never-arrested". Information about such individuals is not directly available in our criminal-history data because, as with any repository-based data set, we have data on the criminal history records of only those who were previously arrested. We would like to be able to compare the hazard of those who were first arrested in 1980 with those who are demographically comparable but who have never been arrested. Kurlychek, Brame, and Bushway (2006) pursued this issue using a cohort data set, but we find such data sets, typically numbering less than 2500, unreasonably small for establishing the estimates we need for the relatively small fraction who remain clean for a reasonable time. We expect that the hazard of the 1980 arrestees will never be lower than the hazard of the never-arrested, but they can come quite close over a 10- to 20- year period and at some point could become statistically indistinguishable.

One approach to work around the limitation of lack of the never-arrested in our data is estimating the hazard of never-arrested using the population of first-time arrestees by age from 1980 and the population of New York. Assuming stationarity, we can approximate the population of the never-arrested at age A ($P_{na(A)}$) as follows:[10]

$$P_{na(A)} = \text{Population of New York of age } A \text{ in 1980} - \Sigma(\text{Number of first-time arrestees in 1980 for } A_1\text{: } A_1 < A).$$

As a result, the hazard of the never-arrested at age A ($h_{na(A)}$) is calculated as:

$$h_{na(A)} = \frac{\text{Number of first-time arrestees for A1} = A}{Pna(A)}$$

Figure 10 displays $h_{na(t)}$.[11] It is evident that the younger ages are associated with higher risk of arrest; this observation is consistent with the pattern of the hazard for the redemption candidates. We also note that even at age 16, the hazard is less than 0.03, clearly much lower than the risk of rearrest of those with a prior arrest Once we obtain the estimates of hazard of the never-arrested, there are several ways to compare their hazard with the hazard of redemption candidates. The choice of comparison method depends on the specific situations in which the comparisons are necessary. We discuss some of the methods and their statistical issues in the context of the possible situations where each method might be appropriate.

COMPARISON WITH THE HAZARD OF THE NEVER-ARRESTED

This comparison might be appropriate in a situation where there are two individuals of the same age (and similar in other demographic respects), one with a prior criminal record and the other

without. One wants to evaluate when the hazard of individual with a criminal record is sufficiently close to the other, and we designate that point as T**. Let the hazard of the redemption candidate be denoted as $h(t)$ and for the never-arrested $h_{na}(t)$. Figure 11 shows those two hazards for the case of $A_1 = 16$ and C_1 = Burglary, (16, Burglary). Figure 12 shows the same figure with the vertical axis expanded from [0.00, 0.50] to [0.00, 0.10]. There are two important points to observe here. First, $h(t)$ declines at a considerably faster rate than $h_{na}(t)$. Second, despite the rapid fall of $h(t)$, $h_{na}(t)$ comes very close to but is still consistently lower than $h(t)$ even at $t >$ 20, as is clear from figure. 12. Given the observations, the question that we are interested in is when the redemption candidate's risk is deemed "close enough" to that of the never-arrested.

Approach 1

One approach is the hypothesis testing using confidence intervals. Using the estimated risk of the never-arresteds, we can carry out a hypothesis test with the null hypothesis stating that the fixed risk of the never-arrested is equal to the risk of the redemption candidate. Then T^{**} can be denoted as a point at which we fail to reject the null hypothesis and cannot distinguish statistically the risk of the redemption candidate from the risk of the never-arrested. This is equivalent to calculating confidence intervals around $h(t)$ and denote as T** the intersection of the confidence interval with $h_{na}(t)$. The conventional standard error of $h(t)$ can be calculated by the formula

$$\sqrt{(h(t) \cdot (1 - h(t))/n(t)}.$$

However, this relies on the asymptotic normality of the estimate of $h(t)$ that is provided by the central limit theorem. Since both h(t) and the sample sizes defining $h(t)$ become quite small when t is large, the standard errors calculated by the formula above are questionable. Moreover, in that case, the symmetric confidence intervals can include negative lower endpoints. Since we are trying to estimate the proportion of those who are rearrested at t, those estimates have to be bounded between 0 and 1, and so cannot go negative. Given the limitations of the conventional method of constructing confidence intervals for $h(t)$, we turn to the bootstrap.[12] Using this approach, we performed the hypothesis tests (one-sided 0.05 level tests) and estimated T^{**} = 17.3.

This approach to estimate T^{**} is reasonable in general, but there is a concern that a large enough sample is needed for this approach to produce a meaningful estimate of T^{**}. We illustrate this problem in figure 13, which shows the hazard for (18, Robbery) along with the hazard of the never-arrested. Compared to $h(t)$ for (16, Burglary), this hazard curve is noticeably more noisy, reflecting smaller sample sizes (for instance, n(15) = 53 for (18, Robbery) in contrast with n(15) = 261 for (16, Burglary)) and increased uncertainty of the hazard. If one carries out hypothesis tests to estimate T^{**} as described above, the confidence interval would be sufficiently wide that the estimate of T^{**} would be 10.6. Since the hazard for (18, Robbery) is higher than that for (16, Burglary), the smaller value of T^{**} for those with (18, Robbery) can lead to an inappropriate

conclusion re T^{**}. Thus, in order to produce a meaningful estimate of T**, it is advisable to have a sample size of at least 150, preferably 200 at a value of t when $h(t)$ and $h_{na}(t)$ are close.

Approach 2

There is a possible way to avoid the limitation described above. The problem that we are faced with is that the hypothesis tests that we performed (and consequently the estimates of T^{**}) are strongly affected by small sample sizes. In hypothesis testing, one usually constructs an alternative hypothesis that states what we wish to show (evidence of some sort of effect) and a null hypothesis that claims that contradicts the alternative. One will reject the null hypothesis in favor of the alternative by inferring that the observed effect is not likely to occur by chance (i.e., due to sampling variation). By specifying the level of type I error (rejecting the null when in fact it's true) a priori, we place a strong burden of proof on those who would attempt to reject the null hypothesis. Then, failing to reject the null hypothesis should not be treated as evidence for the null hypothesis; rather, it means that there was not enough evidence (or statistical power) to reject the null. This is why the null is not rejected easily when the sample size is small. Thus, a stronger hypothesis test for our purpose would be setting a null hypothesis that states that the difference between the two risks ($h(t)$ and $h_{na}(t)$) is greater than a predetermined margin δ instead of a conventional null hypothesis of no difference.[13] The alternative hypothesis would be that the difference is less than or equal δ. Thus, δ represents a risk difference between a person with a prior arrest and a never-arrested that an employer is willing to tolerate. The drawback as well as the flexibility of this approach is the need to specify the tolerance risk difference. While we cannot provide a standard risk-tolerance difference applicable to every situation, employers can choose an acceptable risk difference between the two applicants We illustrate this approach using $h(t)$ for (18, Robbery) The hypothesis tests are in the following form:

$$H_0: h(t) - hna(t) > \delta$$

$$\Leftrightarrow \quad H_0: h(t) > \delta + hna(t) \quad \text{versus} \quad H_1: h(t) \leq \delta + hna(t)$$

Suppose that am employer sets $\delta = 0.05$, which means that the employer is willing to accept a redemption candidate whose hazard is 0.05 higher than the hazard of a never-arrested of the same age. Then we will reject the null hypothesis at $T^{**} = 14.5$. If the same hypothesis test is carried out for $h(t)$ for (16, Burglary), T^{**} would be 13.5. The finding that the estimate of T^{**} for (16, Burglary) is smaller than that for (18, Robbery) is consistent with the observation that the hazard for (18, Robbery) is higher than that for (16, Burglary).

Approach 3

A third approach to comparing redemption candidates to the never-arrested is to recognize that the comparison need not be of two candidates of the same age. Since the hazard declines with age, there could well be a younger-age never-arrested individual whose hazard is no less than

that of an older individual with a prior arrest but who has stayed clean for a long period. In fact, it can well be more common for a redemption candidate who is, say, 38, to compete for a job with a person who has never been arrested who is younger than one of matching age. For example, a redemption candidate with $A_1 = 16$ and C_1= Burglary who has stayed clean for 21 years would be of higher risk than a 26 year old never-arrested, but would be of lower risk than a 21 year old never-arrested.

Approach 4

It could also be the case that some employers might have a specific risk level, γ, below which the risk is tolerable or acceptable for the purpose at hand (e.g., a particular job position in a particular industry). In this case, one can use h(t) to test whether the risk of the redemption candidate is no greater than the specified tolerance level.[14] For example, if the employer is comfortable with a hazard of $\gamma = 0.03$, then a candidate from (16, Burglary) would be acceptable if he had stayed clean for 14 years or more (See figure 11).

[Insert Figures 10-13 about here]

CONVICTION AS AN ALTERNATIVE MEASURE OF COMMISSION OF CRIME

A third issue that warrants further analysis is the distinction between arrest information and conviction information. In many settings, it is considered either inappropriate or illegal to ask about an arrest record in the absence of a following conviction. We intend to pursue this analysis using only conviction information. Of course, the initial sample will become smaller since many of our arrests were not followed by convictions. But of those convicted, we would anticipate that T^* would be larger based on the fact that people who were convicted ("true" offenders) would be more likely to have subsequent arrests that those who were acquitted or whose cases were dismissed ("ambiguous" offenders).[15]

Figure 12-14 show *h(t)* by disposition category (i.e., whether or not the initial arrest led to a conviction). Overall, there is little difference between the hazard of those who were convicted and those who were not. For $A_1 = 18, 20$ the hazards for the convicted and the not convicted largely overlap. For $A_1 = 16$ (figure 12), those who were not convicted have a higher hazard in the very beginning, but those convicted continued to be of greater risk until about 10 years after the first arrest. The largest differences are seen in the interval $t = \{2, 10\}$, where the hazard is highest for those convicted (albeit with a smaller fraction of the total group of arrestees) and lowest for those who received a known disposition other than convicted (including acquittal). The middle group represents the total population of arrestees, including the other two groups as well as the arrestees whose disposition was unknown. The hazards become indistinguishable at about $t = 10$. Since those with $A_1 = 16$ in general have the largest T^* (~ 10), this assures us that the conviction status does not greatly affect the estimates of T^*. Of course, the population of those convicted is smaller than the total number of arrestees.

[Insert Figures 14-16 about here]

ISSUES STILL TO BE ADDRESSED

We believe that the results presented above represent a significant step forward in an area where so little is known empirically about the redemption process. As usual, however, some important efforts still remain. We have identified the duration of time clean in New York State that results in recidivism probability below the national norm for people with similar demographics. It is possible, however that an individual who stayed clean in New York was arrested or convicted in a neighboring state, such as New Jersey or Connecticut, or in any other state. Thus we have a lower bound on T^* and the recidivism probability. According to a study on the recidivism of prisoners, about 7.6 % of the released prisoners were rearrested out-of-state (Langan and Levine, 2002). Another report finds that, among the prisoners who were released from eleven state prisons in 1983, roughly 10% of them have out-of-state arrests within three years of their release (Orsagh, 1992). In order to address the concern about mobility, we intend to approach the FBI, which maintains a national index of rap sheet records in the Interstate Identification Index (III). If we present them with identification information of the individual who have stayed clean in New York we should be able to obtain information on their arrests elsewhere in the nation. That will raise the $h(t)$ curve and so increase the value of T^*. The correction could be reasonably large for a state like New York, where the large fraction of offenders from New York City could easily commit other offenses in a neighboring state. We would anticipate that the correction would be appreciably less in a state like California, where the major metropolitan areas are much more remote from neighboring states.

Our estimates of rearrest in New York State are based on all arrests. It turns out that a sizable number of arrest records in New York are regularly sealed. We found that such sealing is largely associated with young offenders (especially for those ages 16 and 17, which are "adult" ages in New York and typically treated as juveniles elsewhere). The other sizable group of sealed records is associated with criminal cases whose outcome is favorable to the defendant such as acquittal and dismissal or with the disposition of a misdemeanor or felony case to a non-criminal offense. We intend to examine the effect of sealing on our results.

Another small correction should be made for time in custody. The estimation of survival probability and hazard assumes that the initial sample of arrestees is all at risk of an additional arrest immediately after their prior arrest. However, those who are incarcerated as a result of the first arrest are at risk of a new arrest only after their release from incarceration. Thus, the estimation needs to be adjusted for the incarceration time. Unfortunately, identifying correction information from rap sheets is not easy. However, considering that the 1980 arrest is the first arrest for the sample of arrestees, it is not likely that any lengthy period of incarceration follows their first arrest (see note 6).

There is a possibility that conditions in New York are distinctively different from other states or that offenders first arrested in 1980 were different from those arrested more recently, so it is important that we generate robustness tests of the findings presented here. That will include collecting data from multiple states to examine how patterns of redemption vary across the states. This will provide an opportunity to look across the states in their offending patterns and to take into account different offending patterns as they vary across the states and as their redemption intervals vary.

We also intend to take subsequent draws of people whose first arrest occurred in 1985, 1990, and 1995. These samples will have a shorter observation period, especially for the 1995 sample, but we anticipate that what we lose in observation interval will be more than compensated with the richer quality of the records as we move into more contemporary computerization of records. Since National Criminal History Information Program (NCHIP) was initiated in 1995 to improve the quality of criminal history records in state repositories, it is expected that we will see increased accuracy and completeness in the criminal history of the 1995 or even the 1990 sample. Also, if our estimates of T^* roughly persist, then a 10 year observation interval should be quite adequate. Examining multiple cohorts of arrestees will also allow us to generate information on time trends in arrest pattern and in recidivism patterns as well as information on any period effect.

POLICY IMPLICATIONS

The information we generated in this research effort should be of considerable value in enhancing redemption opportunities and especially employment opportunities for individuals who made a mistake in the past but turned their life around, and have since lived a law-abiding life. There are many ways in which the knowledge of T^* or T^{**} could be used to facilitate the redemption process. Here some of them will be discussed in the order of aggressiveness with advantages as well as limitations.

INFORMING EMPLOYERS OF THE LOW RELEVANCE OF STALE RECORDS

Recipients of non-criminal justice background checks, specifically the employers who use commercial background checking services, could be given a short document informing them of the diminished value of records older than T^* or T^{**} years for risk assessment purposes.

PROTECTING EMPLOYERS FROM LIABILITY WHEN EMPLOYING SOMEONE WHOSE LATEST OFFENSE IS OLDER THAN T^* OR T^{**}

Since employers have a strong concern about liability suits, a statute could be passed protecting them from such due-diligence vulnerability in case they hire someone whose last arrest was longer than T^* or T^{**} years ago.[16] This would be a relief for employers who are otherwise willing to hire individuals with criminal records, and would add to the existing incentives for employers such as Work Opportunity Tax Credit (WOTC) and Federal Bonding Program (FBP).[17]

Such liability-protection statutes could also be applicable to employers that ask applicants about their criminal background, but would limit their inquiries to criminal involvements that occur within the last T^* or T^{**} years. This would be relevant to the concerns of the "ban the box" movement.[18]

INFORMING PARDON BOARDS OF THE HIGH RELEVANCE OF EXTENDED LAW-ABIDING PERIOD

The governor of each state is empowered to grant a pardon as an act of clemency and forgiveness. Most typically, a pardon board reviews relevant information about the individual seeking clemency and makes a recommendation to the governor. Although the length of the law-abiding period is considered one of the most important factors in pardon applications, it is not clear whether pardon boards have reliable guidelines as to how long a law-abiding period is long enough for the individual to be deemed appropriate for redemption.[19] Despite the fact that pardons are hard to obtain, especially for the poor, pardons have a significant restorative effect that signals that the pardoned individual is rehabilitated (Love, 2003).

REPOSITORIES NOT DISSEMINATING STALE RECORDS

State record repositories could adopt a policy not to disseminate criminal record information older than T^* or T^{**} years. This could apply specifically to the states that make their criminal-history information publicly available on the Internet.[20] This could be accompanied by process of requiring those old records to be erased from commercial databases.[21] States are clearly moving in the direction of making individual criminal records more publicly accessible (Jacobs, 2006).[22] However, given the profound and lasting consequence of disseminated records on a large number of individuals, limiting the dissemination would be a realistic approach to the problem.[23]

STATES SEALING OR EXPUNGING STALE RECORDS

The state could adopt a policy to seal records of events older than T^* or T^{**} years in response to a request from a non-criminal justice agency. Such sealed records could still be accessible for a criminal justice purposes. A more aggressive approach would be to expunge records older than T^* or T^{**} years.

Even though these judicial procedures tend to be more accessible and reliable than pardon, the popularity of sealing and expungement peaked in the 1970s and have severely declined since then in most jurisdictions (Love, 2003, 2006). Moreover, Love (2003, 2006) reports that there is no one standard in terms of what it means to have a record sealed, expunged, set aside, vacated, or annulled. A record being expunged does not necessarily mean that the record is literally destroyed; rather, the expunged records "almost always remain available for use by law enforcement agencies and the courts, and in some states they may be accessible to other public agencies and even to private investigative services hired to perform criminal background checks

for employers" (Love, 2003). Critics of sealing and expungement argue that the concealment of records would mean denying the truth, which is hard to be reconciled with the legal system founded on the principle of truth seeking. In a related vein, some argue that the concealment of records and the denying of past wrongdoing are not compatible with the objective of offender rehabilitation and the correctional system (Franklin and Johnsen, 1980; Kogon and Loughery, 1970).[24]

Despite these criticisms, concealment and denial of criminal records after some "rehabilitation period" are common in many countries. For instance, in the UK, according to the Rehabilitation of Offenders Act 1974, those who are convicted of certain crimes, after specified rehabilitation periods, are treated as though the crime never happened and are not obligated to reveal the record when asked at employment settings[25] (for more on the sealing and expungement of criminal records in EU, see Louks, Lyner, and Sullivan, 1998).

ENHANCE THE USE OF CERTIFICATES OF REHABILITATION

The main criticism of sealing and expungement is the compromise of governmental transparency and the possible adverse effect on non-offenders due to statistical discrimination. Certificates of rehabilitation and other similar means can circumvent the problem. Certificates of rehabilitation are designed to remove certain collateral consequences for eligible ex-offenders and can potentially enhance the employment prospects of ex-offenders. [26] The certificates reward good behavior of ex-offenders by explicitly acknowledging them as being rehabilitated rather than erasing their contact with the criminal justice system. Thus, they are similar to pardons in spirit, but are relatively more accessible than pardons. Currently, only a handful of states issue such certificates (Love and Frazier, 2006; Samuels and Mukamal, 2004), but they could be used more widely by taking advantage of the empirical evidence of T^* and T^{**}.[27]

SUMMARY

Two trends characterize the current situation surrounding criminal history records: a growing demand in criminal background checks for employment purposes and the increasing number of people who have criminal records. The two trends coincide with the advancement in information technology, especially the introduction of the Internet and the start of online transactions. As a result, background checking has become a routine practice of a majority of employers, thousands of commercial background checking service providers have emerged, and those who made a mistake in the distant past, but have turned their life around, are now handicapped. The risk of recidivism declines over time clean, so we know that the person who has stayed clean for an extended period of time must be of low risk. The question is the extent to which the risk drops over time and what point in time the risk is deemed low enough. This paper addresses the questions by examining the hazard of those who were first arrested in 1980 and estimating the crossover point between the hazard and the risk of an arrest for similar individuals in the general population. The results indicate that the risk indeed monotonically declines over time and, at

some point T^*, becomes comparable with the risk of an arrest of the general public represented by the age-crime curve. The results also demonstrate that the crossover point varies with the age of the first arrest and the crime type of the first arrest. Earlier age at first arrest generally points to a longer time necessary to become comparable to a similar person from the general population; also, different first-arrest crime types are associated with different values of the intersection with the age-crime curve.

The findings have several important policy implications; potentially they are helpful in informing two broad categories of entities: those who are in a position to disseminate criminal history information (i.e., state repositories, commercial vendors of criminal records) and those who are responsible for determining the relevance of criminal records (i.e., judges, pardon boards, employers). All of the policy approaches discussed could be considered by the respective entities, but using any of them requires information and judgment about the value of T^*.

As we outlined in the section of future research plans, this research is clearly ongoing. Since there is no knowledge either about the variability of T^* across states nor across time, we will be conducting similar analyses on data from other states and on data from other arrest cohorts. This will allow us to be in a better position to provide more complete information about T^*, which will in turn allow us to make more precise policy recommendations.

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TABLES AND FIGURES

Table 1. Initial Sample Size, n by First Offense (C_1) and Age at First Arrest (A_1)

First Offense	Age at First Arrest			
	16	18	20	Total
Robbery	937	382	197	1516
Burglary	1956	763	387	3106
Aggravated Assault	230	205	169	604
Total	3123	1350	753	5226

Table 2. Values of T^* by C_1 and A_1 (arrest probability at T^* in brackets)

First Offense	Age at First Arrest		
	16	18	20
Robbery	10.6 (.059)	10.4 (.054)	8.2 (.055)
Burglary	9.1 (.066)	8.1 (.062)	6.1 (.062)
Aggravated Assault	10.7 (.059)	5.6 (.072)	4.1 (.070)

Table 3. Offense Transition Matrix

First Offense	Second Offense								
	Robbery	Burglary	Aggravated Assault	Violent Offenses	Property Offenses	Drug Offenses	Other Offenses	No Second Arrest	**Total**
Robbery	311 (20.5%)	146 (9.6%)	68 (4.5%)	111 (7.3%)	211 (13.9%)	172 (11.3%)	351 (23.2%)	146 (9.6%)	1516 (100%)
Burglary	206 (6.6%)	534 (17.2%)	95 (3.1%)	270 (8.7%)	443 (14.3%)	237 (7.6%)	836 (26.9%)	485 (15.6%)	3106 (100%)
Aggravated Assault	50 (8.3%)	35 (5.8%)	49 (8.1%)	81 (13.4%)	73 (12.1%)	58 (9.6%)	134 (22.2%)	124 (20.5%)	604 (100%)
Total	567 (10.8%)	715 (13.7%)	212 (4.1%)	462 (8.8%)	727 (13.9%)	467 (8.9%)	1321 (25.3%)	755 (14.4%)	5226 (100%)

Note: Definitions of Offenses:

Violent Offenses = Murder, Non-negligent manslaughter, Forcible rape, and Simple assault

Property Offenses = Larceny, and Motor vehicle theft

Drug Offenses = Sale and possession of any kind of controlled substances

Other Offenses = Negligent manslaughter, Arson, Kidnapping, Dangerous weapons, Bribery, Extortion, Forgery, Prostitution, Stolen property, Coercion, Criminal mischief, Fraud, Gambling, Offense against public order, Embezzlement, Offense against family, unauthorized use of a motor vehicle, Possession of burglary tools, Other finger printable offenses, Liquor law violations, Disorderly conduct, Public narcotic intoxication, Loitering, All other offenses (except traffic), Runaways (juvenile), and Missing

Figure 1. Survival Probability *S(t)*: Age 16 Robbery, Burglary, and Aggravated Assault

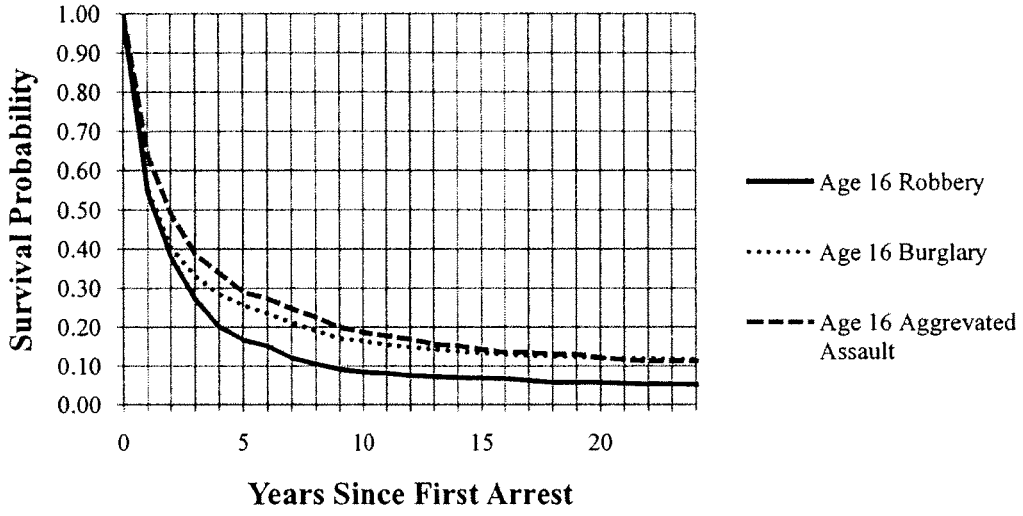


Figure 2. Survival Probability *S(t)*: Age 18 Robbery, Burglary, and Aggravated Assault

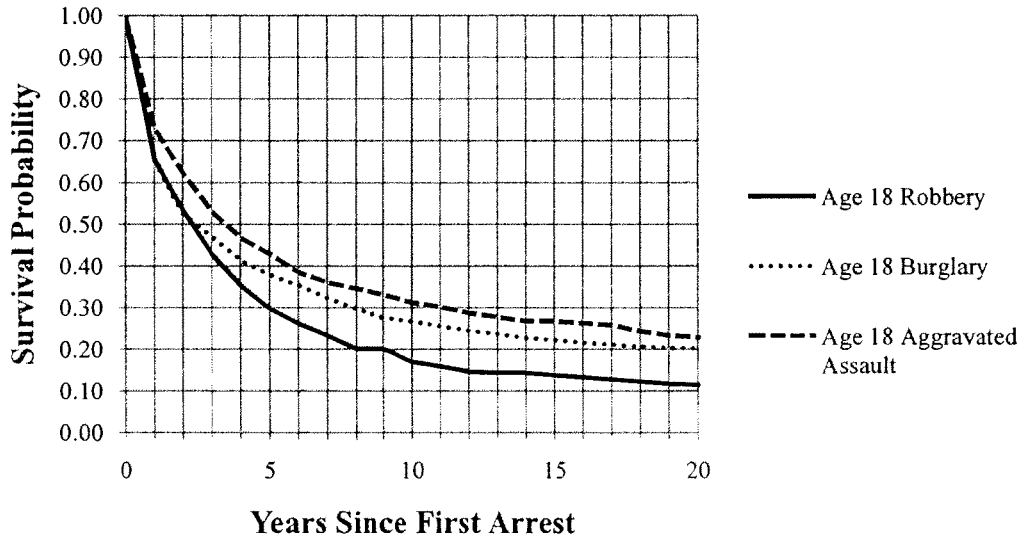


Figure 3. Survival Probability *S(t)*: Age 20 Robbery, Burglary, and Aggravated Assault

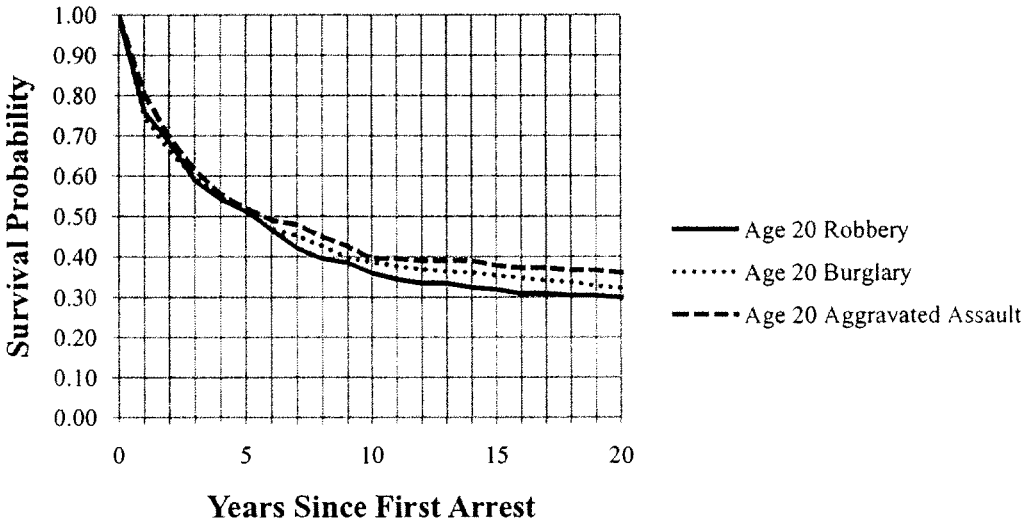


Figure 4. Hazard Rate *h(t)*: Age 16 Robbery, Burglary, and Aggravated Assault

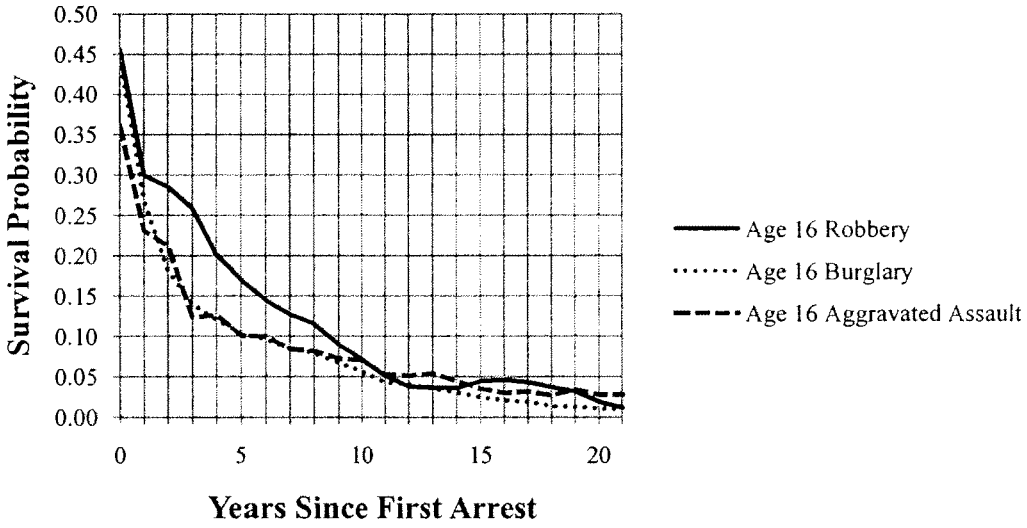


Figure 5. Hazard Rate *h(t)*: Age 18 Robbery, Burglary, and Aggravated Assault

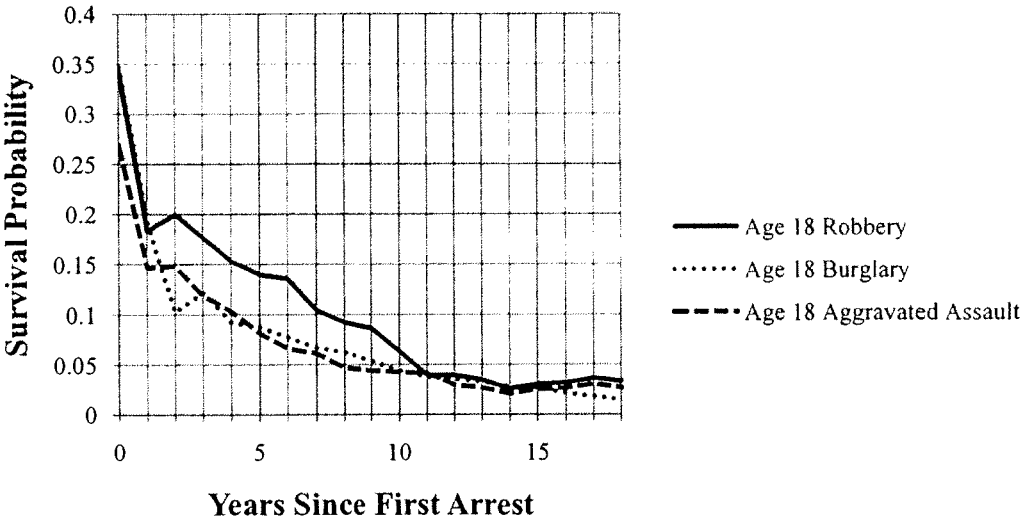


Figure 6. Hazard Rate *h(t)*: Age 20 Robbery, Burglary, and Aggravated Assault

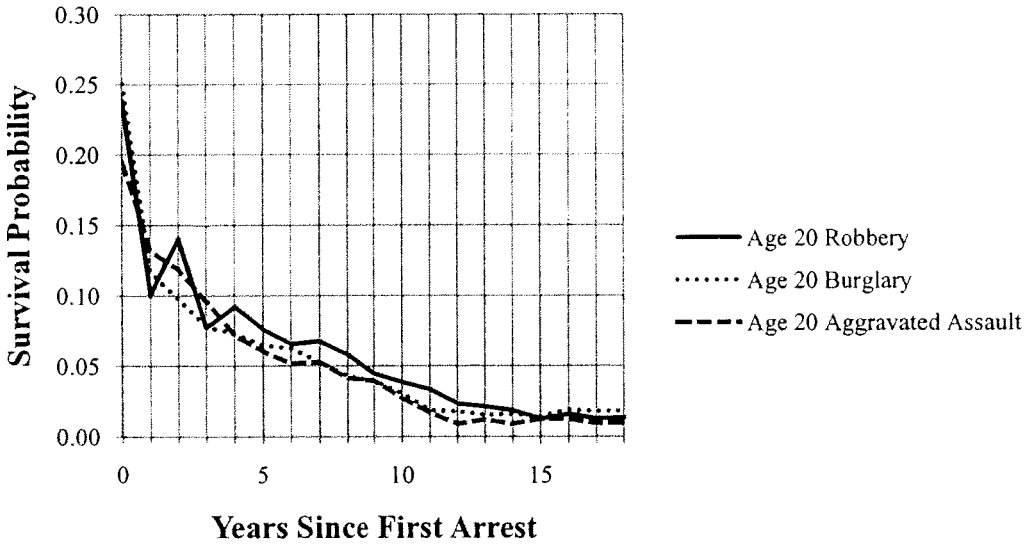


Figure 7. Comparison with Age-Crime Curve: Age 18 Robbery

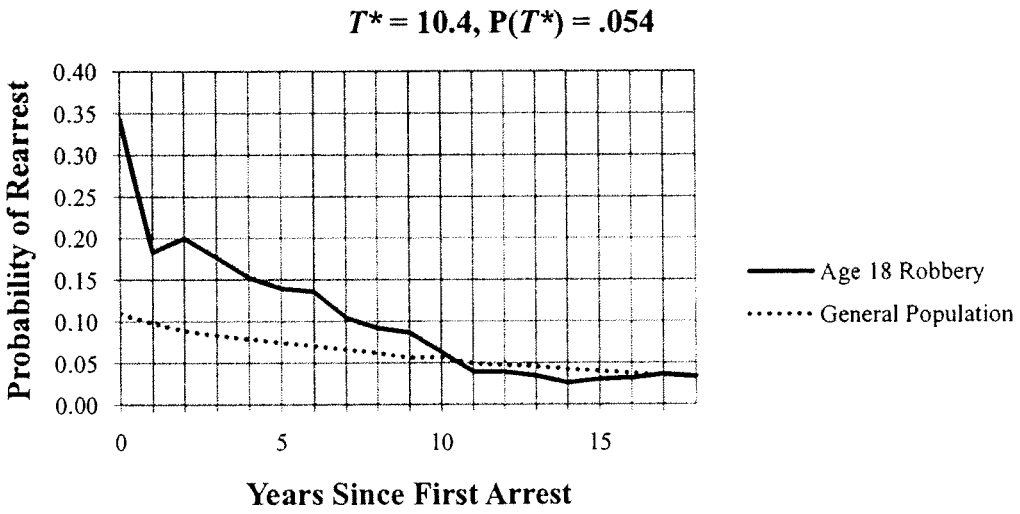


Figure 8. Comparison with Age-Crime Curve: Age 16 Burglary

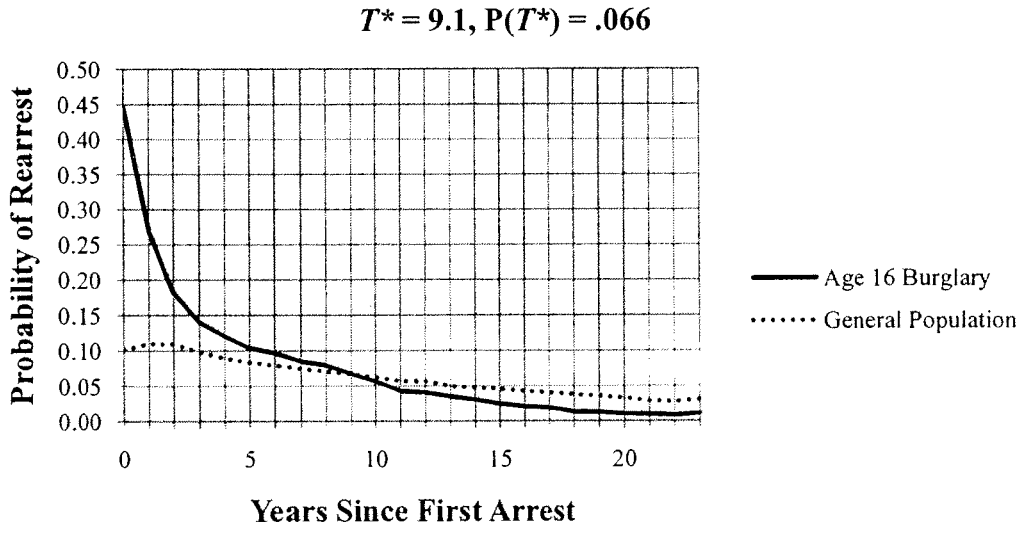


Figure 9. Comparison with Age-Crime Curve: Age 20 Aggravated Assault

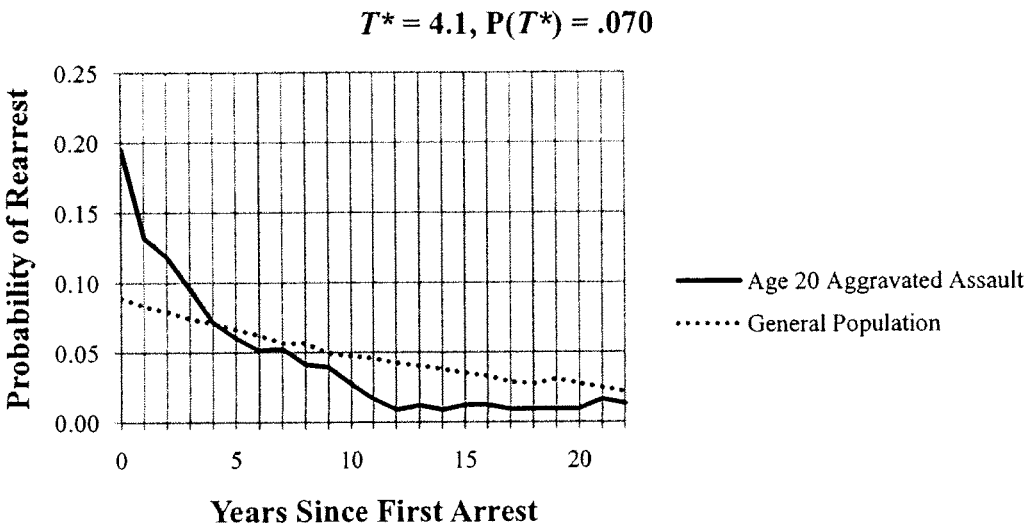


Figure 10. Hazard of the never-arrested

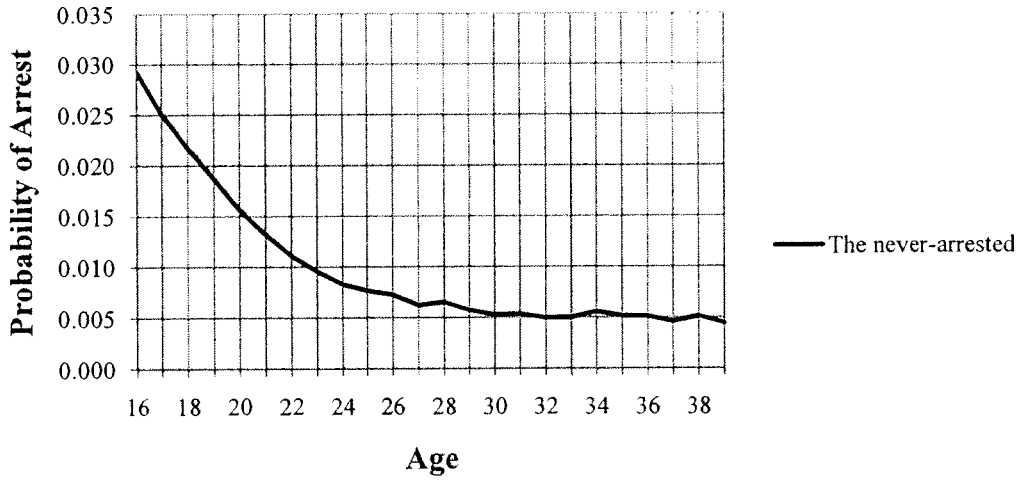


Figure 11. Comparison with the never-arrested (Age 16 Burglary)

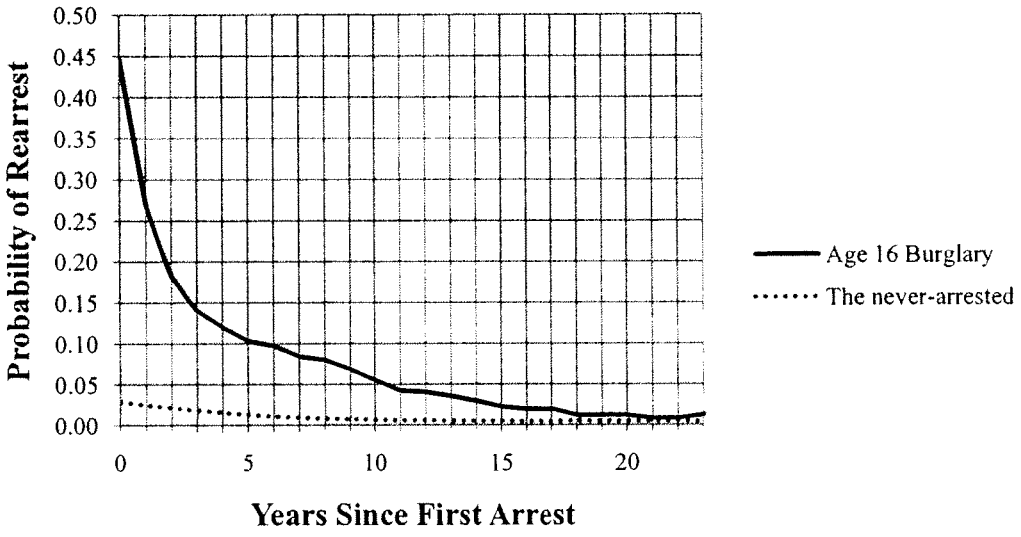


Figure 12. Comparison with the never-arrested (vertical-axis ≤ 0.1)

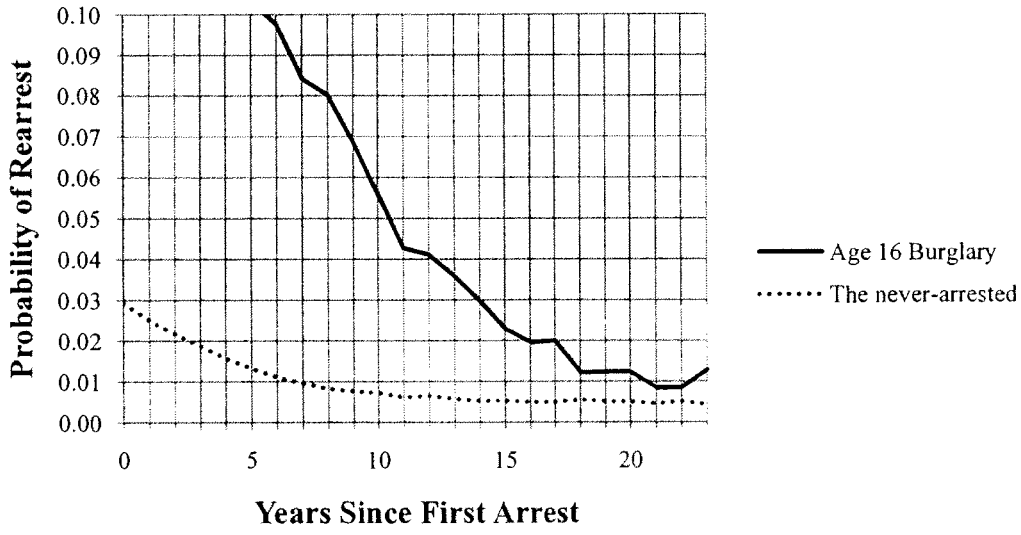


Figure 13. Comparison with the never-arrested (Age 18 Robbery)

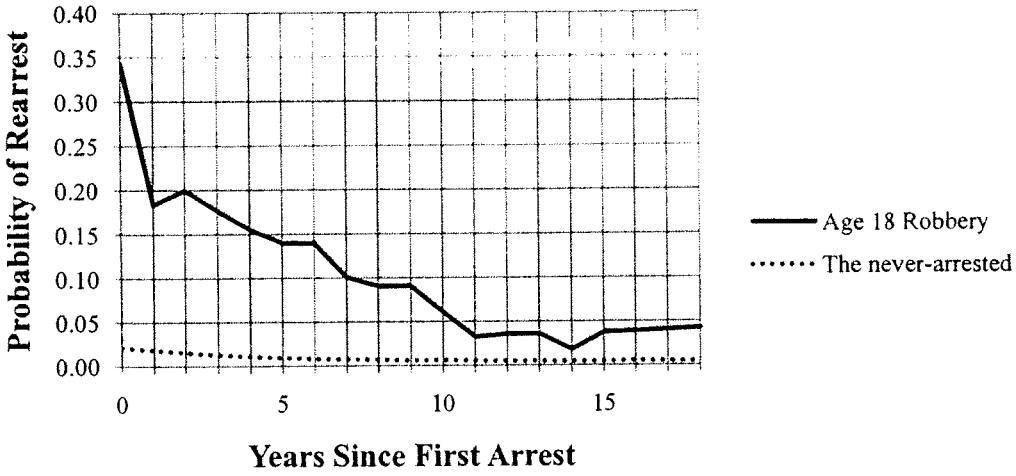


Figure 14. Hazard Rate *h(t)*: Age 16 by Disposition

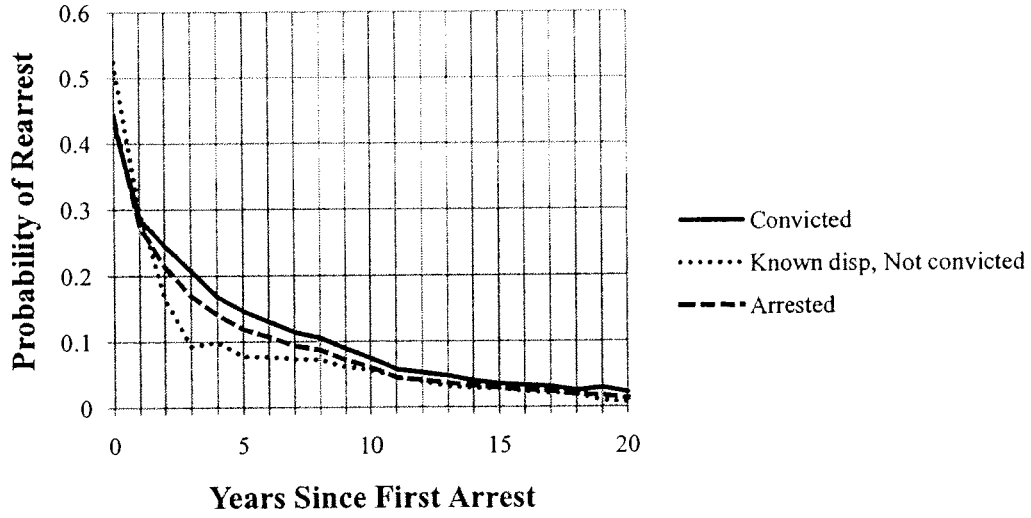


Figure 15. Hazard Rate *h(t)*: Age 18 by Disposition

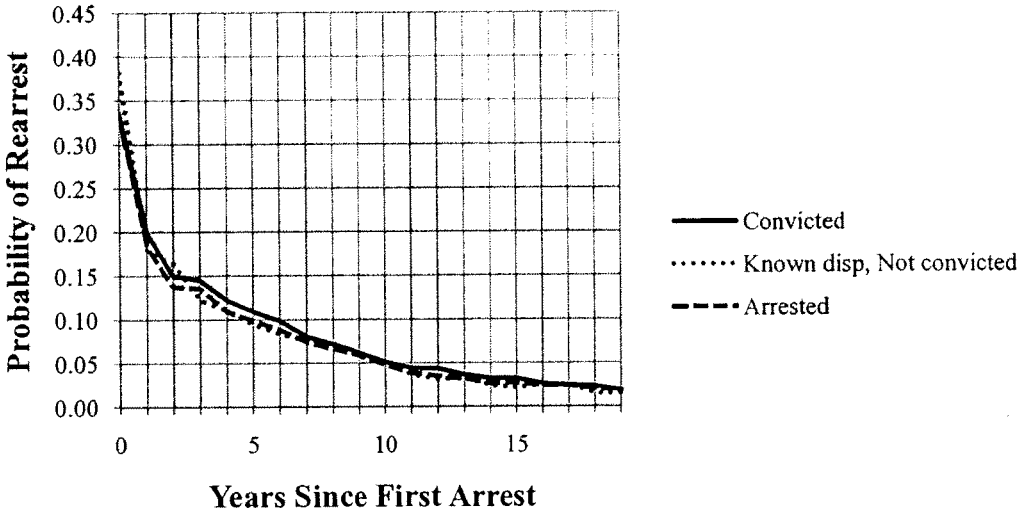
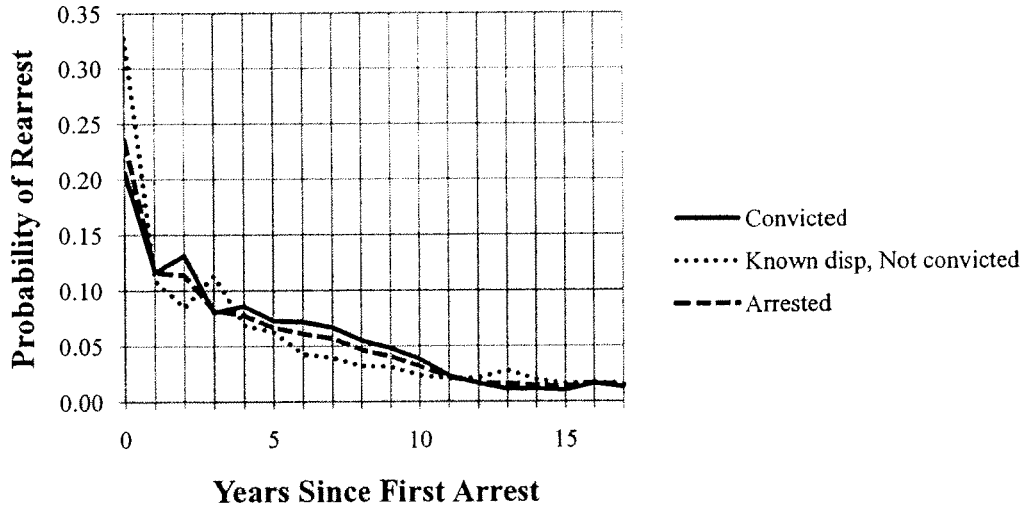
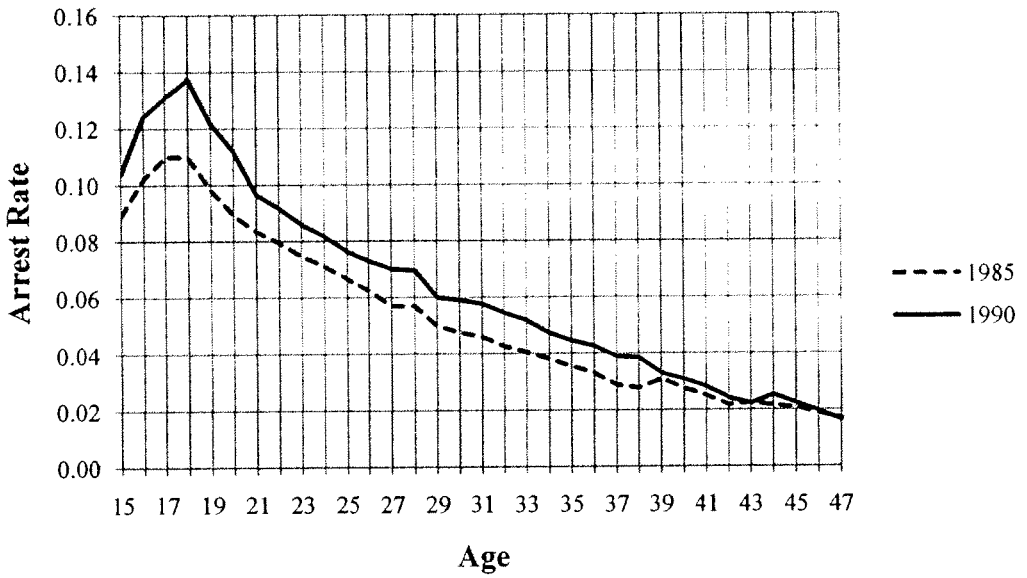


Figure 16. Hazard Rate *h(t)*: Age 20 by Disposition



Appendix A: Age-Crime Curves 1985, 1990



Appendix B: Values of T^* by C_1 and A_1 (arrest probability at T^* in brackets) using 1990 age-crime curve

1990:

First Offense	Age at First Arrest		
	16	18	20
Robbery	9.9 (.073)	9.7 (.070)	5.0 (.076)
Burglary	6.8 (.087)	5.3 (.085)	2.4 (.089)
Aggravated Assault	6.9 (.087)	4.7 (.087)	3.5 (.084)

NOTES

[1]It appeared as *apŏlutrōsis* (a compound of *apŏ* "off" and *lutrŏn* "something to loosen with (i.e., ransom)") in the Greek New Testament (Strong, 2005). "In whom we have redemption through his blood, the forgiveness of sins, according to the riches of his grace" (Ephesians 1:7, King James Version).

[2] An individual offender may have had records in multiple states.

[3] Similarly, individuals are disqualified from obtaining a hazardous materials endorsement (HME) if they are convicted of specific disqualifying offenses (Transportation Security Administration, n.d.).

[4] Other evidence of arbitrary cut-off points include the "exclusion period" set by Public Housing Authorities (PHA) as the length of time that an applicant of public housing must stay crime-free to be eligible to apply for public housing. For example, in Pittsburgh, the exclusion period is 7 years for a felony and 4 years for a misdemeanor. Across the country, the exclusion periods "appear to have been arbitrarily chosen, and are frequently excessively long. PHA officials could rarely provide us with an explanation for the particular length of any exclusion period nor could we discern any empirical explanation for the great variance in exclusion periods" (Carey, 2004: 50).

[5] In contrast to most other jurisdictions, age 16 is considered "adult" in New York.

[6] Incarceration following the first arrest is almost nonexistent except for robbery. About 13% of those who were arrested for robbery in 1980 went to prison. Excluding them does not change our findings in any important way.

[7] Because of limited sample sizes at each value of $t \geq 4$, all hazard curves ($h(t)$) for $t \geq 4$ are smoothed using five-point smoothing (i.e., $h(t') = [h(t-1) + h(t-2) + h(t) + h(t+1) + h(t+2)] / 5$).

[8] T^* and the arrest probability at T^* are calculated using 1990 age-crime curve and are reported in Appendix A and B. Late 1980's through early 1990's witnessed a significant increase in crime rate (Blumstein and Wallman, 2006). Age-crime curve of 1985 represents a typical age-crime curve (very similar to the 2006 age-crime curve), while age-crime curve of 1990 represents a rather anomalous age-crime curve. Since the redemption candidates of 1980 arrestees have $T^* \sim 10$, they were experiencing an anomalously high crime period. Thus, the values of T^* using the 1990 age-crime curve can be treated as the lower bound of the estimates of T^*, while the values of T^* using the 1985 age-crime curve can be treated as the upper bound of the estimates of T^*.

[9] In some cases, we find that an arrest is followed quickly by another arrest. We are concerned that what appears to be a new "arrest" might be related to the same crime event as the prior arrest (e.g., transfer to a different jurisdiction), so we counted an arrest as a new arrest only if it occurs at least 30 days after the prior arrest.

[10] We only consider arrests at adult ages in NY ($A_1 \geq 16$).

[11] $A = (t + A_1)$ where t is the number of years since the first arrest at age A_1.

[12] The bootstrap provides a reliable method to estimate the uncertainty of an estimator via resampling, without relying on the asymptotic properties of the estimator. In order to construct the confidence intervals for h(t), we used the bias-corrected and accelerated (BCa) bootstrap intervals, with the number of bootstrap samples, B = 4999. Here we refer to Efron and Tibshirani (1993) for the formulation of the BCa intervals. The BCa interval is similar to the percentile interval based on the histogram of B replications of the statistic (h(t)). The difference is that the percentiles of the BCa interval are adjusted for the possible bias (bias-correction) and also for the possible standard deviation of the bootstrap replications (acceleration). The percentiles α_1 and α_2 for the BCa interval of intended coverage $1 - 2\alpha$ are given by

$$\alpha_1 = \Phi\left(\hat{z}_0 + \frac{\hat{z}_0 + z^{(\alpha)}}{1 - \hat{a}(\hat{z}_0 + z^{(\alpha)})}\right)$$

$$\alpha_2 = \Phi\left(\hat{z}_0 + \frac{\hat{z}_0 + z^{(1-\alpha)}}{1 - \hat{a}(\hat{z}_0 + z^{(1-\alpha)})}\right)$$

where $z^{(\alpha)}$ is the 100αth percentile of the standard normal distribution, and $\Phi(\cdot)$ is the CDF of the standard normal. The bias-correction is $\hat{z}_0$ and the acceleration is$\hat{a}$ (for the exact formula to calculate these two adjustment factors, see Efron and Tibshirani, 1993). The BCa intervals have some important advantages over other methods (e.g., student-t intervals) such as transformation-respecting and range-preserving. The range-preserving property prevents the confidence intervals from containing negative lower endpoints.

[13] This approach is motivated by the literature on (bio)equivalence tests where the studies want to show that the effectiveness of new treatments (drugs, vaccines, diagnoses, etc) is no worse than the standard, existing treatment by a specified margin (e.g., Barker et al., 2001; Westlake, 1976).

[14] One might base the tolerance level on some existing base rates for workplace deviant behaviors including violence and thefts (e.g., Bachman, 1994; Slora, 1989).

[15] Conviction includes conviction by verdict or plea or of unknown type. It also includes Youthful Offender adjudication by verdict or plea or of unknown type. Not convicted includes acquittal, dismissal, no true bill (disposition in which a grand jury voted to dismiss it), prosecution declined, unknown favorable disposition, removed to family court, covered by / consolidated, other, and interim disposition information only. Those denoted as "arrested" are the total population of arrestees, including the other two groups as well as the arrestees whose disposition was unknown.

[16] While such legal protections would most likely be welcomed by employers, their major concern over the possible damage to the organization's reputation would not be eliminated by the protection of legal liability (Fahey, Roberts, and Engel, 2006).

[17] For more details about WOTC, see http://www.doleta.gov/business/incentives/opptax/. More details about FBP are available at http://www.bonds4jobs.com/index.html.

[18] The "box" refers to a question on job applications that asks prospective employee whether they have ever been convicted of a crime. So far, the movements to "ban the box" haven been largely limited to employments for city governments (Henry and Jacobs, 2007; National Employment Law Project, 2008)

[19] For example, in Pennsylvania the Board of Pardons (2005: 1) publicly states the following:

> How much time has elapsed since the commission of the crime(s)? Obviously, this factor, coupled with being crime free after the offense, is one of the best indicators of whether the applicant has been successfully rehabilitated. Further, the more serious, or numerous, the crime(s), the greater the period of successful rehabilitation that the applicant should be able to demonstrate.

[20] In 2001, 13 states (out of 38 that responded to the survey) provide public access to criminal history records through the Internet (SEARCH, 2001). (Samuels and Mukamal (2004) report that 28 states allow internet access to criminal records)

[21] Given the discrepancy between the records from official sources (state repositories) and the records from commercial databases (Bushway et al., 2007), it is important that any update (i.e., sealing / expungement) that take place on the official records is reflected on the records in the commercial sources.

[22] This is possibly facilitated by the increasing automation of criminal history records stored in state repositories. At the end of 2003, about 90% of the records were automated, the growth of the automation rate increased 57% from 1995 (Ramker, 2006).

[23] Since employers might statistically discriminate based on individual characteristics of job applicants correlated with criminal activity such as race and ethnicity, limiting the employers' access to criminal records might have an adverse consequence for those with and without criminal records (Bushway, 2004; Finlay, forthcoming; Holzer, Raphael, and Stoll, 2006; Pager, 2003; Raphael, 2006).

[24] Kogon and Loughery (1970: 385) stated,

> To enable an offender to deny that he has a criminal record when in fact he has one is to help him deny a part of his identity. In encouraging him to lie, the society communicates to him that his former offender status is too degrading to acknowledge, and that it is best forgotten or repressed, as if it had never existed at all. Such self-delusion and hypocrisy is the very model of mental ill health – the reverse of everything correctional philosophy stands for.

[25] The Rehabilitation of Offenders Act of 1974 followed a report, *Living It Down: The Problem of Old Convictions*, a report of a committee chaired by Lord Gardiner (1972). The report shows that the longer a convicted person remains crime-free, the less likely that the person will commit another crime.

[26] Criminal history records are regarded as "negative credentials" that signify "social stigma and generalized assumptions of untrustworthiness or undesirability" (Pager, 2007: 33), whereas certificates of rehabilitation attempt to emphasize the progress made by the ex-offender. Regarding more fair representation of riskiness by taking into account the positive factors, Bushway et al (2007) mention that it is conceivable for the government to devise some score (like a credit score) that indicates the risk of offending and can be affected by positive factors such as the length of crime-free time, completion of a drug treatment program, and completing vocational training, as well as negative factors such as committing a further crime.

[27] Bushway and Sweeten (2007) discuss policy implications regarding the diminished value of old criminal records in the context of collateral consequences.