A COST BENEFIT ANALYSIS OF PRISON, JAIL, AND PROBATION

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CHAPTER I

INTRODUCTION

How great are the benefits and costs of punishments? Specifically, does one type of punishment have a more favorable relationship of benefits to costs than other punishments? To answer these questions, this dissertation examines the costs and benefits of the three most common forms of punishment prison, jail, and probation

There is a long-running debate concerning the relative merits of incarceration and probation This study uses cost benefit analysis to compare these alternatives Cost benefit analysis has been applied sparingly to the issue of expenditures for crime control, but it is a technique that is well suited to the issue

Incarceration and probation differ with respect to the relevant costs and benefits For probation, the costs include the value of resources used in the correctional system as well as the reduced productivity of the probationers, if any For incarceration, the costs include the above costs as well as the foregone value of inmate labor On the benefit side, probation generates deterrence and rehabilitation while incarceration generates these benefits as well as incapacitation benefits The above terms are defined as follows

Prison sentence — a criminal sentence of confinement, usually for one or more years

Jail sentence — a criminal sentence of confinement, usually for less than one year

Probation sentence	a criminal sentence which suspends confinement and requires the probationer to report regularly to a court officer and to obey certain rules concerning everyday conduct
Deterrence	the reduction in crimes committed by potential criminals due to the threat of punishment
Rehabilitation	the reduction in crimes committed by convicts following sentencing (for probationers) or release (for inmates) due to their punishment
Incapacitation	the reduction in crimes committed by inmates during their incarceration due to their physical removal from society

I Methodology

There are significant problems to be solved with respect to measuring both costs and benefits On the cost side, it is difficult to measure the cost of the foregone earnings of inmates The measuring of benefits is even more difficult Measuring deterrence requires the use of cross-sectional or time-series data because deterrence "is inherently an aggregate phenomenon since it is reflected in the behavior of the entire population" (Nagin, 1978, 99) Unfortunately, a cross-sectional or time-series approach is not the best approach for measuring either the rehabilitation or the incapacitation benefit For these benefits, individual data are superior because the researcher needs to know

(1) the rate at which convicts commit crime,

(2) the rate at which they get apprehended, and

(3) the type and cost of the crimes they commit

Therefore, a decision had to be made as to whether to use cross-sectional (or time-series) data or individual data The decision was made to use individual data and to focus on the study of the rehabilitation and incapacitation benefits This decision was partially justified because much economic research has been done on deterrence while very little has been done on the other benefits Phillip Cook (1977) and others point out that cross-sectional and time-series studies have examined rehabilitation and incapacitation only in combination with deterrence, rather than separately from it That is, cross-sectional and time-series studies show that increased levels of punishment are accompanied by lower levels of crime These studies generally attribute the lower crime level to deterrence However, less crime can result from rehabilitation or incapacitation as well as deterrence This study examines each of these benefits, as distinct from the others

The question becomes, "How can one best measure the rehabilitation and incapacitation benefits?" To measure the incapacitation benefit, one wants to know the counterfactual cost of crime the inmate would have committed during the period of incarceration, had the inmate been free instead of incarcerated In this study, the cost of the counterfactual crime is estimated using the cost of crime committed by the inmate prior to incarceration This method requires a knowledge of the frequency and types of crime committed, whether or not an arrest was made As discussed in the literature review, such information is best attained from interviews with convicts Therefore, individual data gleaned from interviews are used to estimate the incapacitation benefit

Individual data are also used to estimate the rehabilitation benefit Again, information concerning the frequency and types of

crimes committed is needed In the case of rehabilitation, this information is needed both before and after sentencing

The use of individual data is not without disadvantages As mentioned before, the deterrence benefit cannot be measured using individual data In this study, the deterrence literature and its results are assessed for their usefulness in cost-benefit analysis and in comparing alternate types of punishment An estimate of the deterrence benefit is taken from the literature and included in this study

This dissertation estimates the benefits and costs of prison, jail, and probation for burglars in Arizona Although these empirical results are derived from a small sample of criminals, it is hoped that the methodology developed here will help pave the way for additional research using the cost benefit framework

II Contributions to the Literature

This dissertation contributes to the literature by improving the existing methodology for the cost benefit analysis of corrections The meaning of each of the costs and benefits of corrections is discussed New measures for the rehabilitation and incapacitation benefits are developed These measures rely on the cost of crimes committed by each convict, including the cost of crimes for which no arrest was made These measures allow the researcher to compare correctional programs, even though the convicts in them are not randomly assigned to the programs or "matched "

The deterrence benefit is estimated using estimates from the literature, which are translated into dollar values On the cost side,

the traditional measure for the cost of the foregone labor of inmates is challenged and replaced Since each of the costs and benefits is measured in dollar terms, the sum of the rehabilitation, incapacitation, and deterrence benefits for prison, jail, and probation can be compared to the cost of these programs

III Outline of the Dissertation

This dissertation is developed as follows Chapter II is a review of the literature Chapter III presents a methodology for a correctional cost benefit analysis Chapter IV contains an application of the methodology while Chapter V analyzes the results of that application The summary and the conclusions of the dissertation are presented in Chapter VI

CHAPTER II

LITERATURE REVIEW

In this chapter, the literature that is relevant to a cost benefit analysis of corrections is reviewed First, previous cost benefit analyses of corrections are discussed Second, studies which have examined one or more of the benefits of corrections are discussed

I Correctional Cost Benefit Analyses

The literature contains at least two cost benefit analyses of a single corrections program William McGuire (1978) developed theoretical measures for the rehabilitation, incapacitation, and deterrence benefits of correctional institutions He derived estimates of the incapacitation benefit but he stressed that his estimates were of suggestive magnitude only and concluded that a reliable "quantitative measure of incapacitation benefits is not currently possible" (1972, 148) McGuire thought that it was not possible to measure incapacitation benefits without better estimates of the crime multiplier, or the ratio of crimes actually committed to the number of arrests for each convict (1972, 140) For the same reason, McGuire did not attempt to measure the rehabilitation benefit

Next, McGuire derived estimates of the social costs associated with the Federal correctional institutions He measured the production costs of these institutions as well as the opportunity costs resulting from

the foregone labor of prisoners who were removed from society He concluded that production costs are much higher than inmate opportunity costs, mainly due to the low job skills and the high rates of unemployment of inmates

Finally, McGuire compared his estimates of the incapacitation benefit to his estimate of costs His results suggest that the incapacitation benefit is not large in relation to punishment costs Rather, the incapacitation benefit is less than 20 percent of the total cost (McGuire, 1978, 143)

Another cost-benefit analysis was done by John Holahan (1971) concerning Project Crossroads in Washington, D C He solved for the benefit-cost ratio of this Department of Labor program which offered counseling, job training, and placement to a select group of first offenders These offenders were between 16 and 25 years old, they had no record of narcotics use and were without full time employment They were placed in the Project Crossroads before being sent to trial Those who made satisfactory progress were diverted from the criminal justice system Holahan measured this diversion benefit and added it to the employment benefit and the reduced recidivism benefit He then estimated that the benefit-cost ratio of the Crossroads Project was two (Holahan, 1971, 201)

Clark Larsen (1983) examined the costs associated with two correctional programs incarceration and probation He drew a random sample of 112 burglars from the 450 burglars who were sentenced in Maricopa County in the first six months of 1980 The convicts in this sample were not matched, that is, burglars who were considered the least serious offenders were usually put on probation To compare

correctional programs per se, it is necessary to "match" convicts in some way Since this was not done, Larsen is careful to note that his study compared the costs of the incarceration decision with the cost of the probation decision, rather than the programs per se That is, Larsen added the cost of corrections and the cost of crimes committed during the 2 25 years following sentencing He tested the null hypothesis "There is no difference in terms of cost between the various correctional alternatives" (Larsen, 1983, 40)

As stated earlier, Larsen approached this hypothesis by adding the cost of corrections to the cost of recidivistic crimes for each group of convicts He uses the cost of recidivistic crimes of the probationers to estimate the potential incapacitation benefit, or what would have been saved by incarcerating the probationers For the prisoner, the absence of crime during incarceration is the incapacitation benefit The average prisoner in the study is incarcerated 19 of the 27 months in the study This means that the dominant cost for prisoners is the cost of prison For probationers, the correctional cost is low so the dominant cost is the cost of recidivistic crimes

The cost of probationers' recidivistic crimes greatly exceeded the cost of prison Therefore, Larsen found that probationers cost society 2 3 times as much as prisoners (Larsen's work was summarized in an article by Haynes and Larsen (1984))

Reading this study, one wonders if the cost of recidivistic crimes is a good measure of the incapacitation benefit It would be a good measure if the cost of crimes of the convicts were the same before and after punishment That is, if there were no rehabilitation or dehabilitation effect If punishment changes the cost of crime

commission, Larsen's results have two problems First, they do not accurately reflect the incapacitation benefit Second, they do not estimate the rehabilitation benefit These are two issues which are addressed in this study This study also adjusts more fully for the lack of a "matched" set of probationers and inmates These changes will allow this study to better compare the correctional programs per se

II Rehabilitation Studies

In addition to cost benefit analyses, there are other studies which are relevant to this study, such as the studies of rehabilitation, incapacitation, and deterrence These studies will be examined in turn, starting with the rehabilitation studies

The word "rehabilitation" can encompass any improvement in convict behavior It is standard to use the word to refer to reductions in criminal behavior This meaning of "rehabilitation" is used in this study because crime commission is the aspect of the criminal's behavior which is of interest here The corrections system is designed to reduce crime the crime of convicts as well as the crime of potential criminals This study examines the extent to which the different correctional programs achieve this goal

Most of the rehabilitation studies have examined the effects of prison The most famous review of prison rehabilitation studies was done by Robert Martinson (1974) Martinson reviewed 231 studies of prison rehabilitative programs and concluded that, "With few and isolated exceptions, the rehabilitative efforts that have been reported so far have had no appreciable effect on recidivism" (1974, 25)

It is easy to imagine the uproar which followed such a statement, even though the rehabilitation goal is increasingly unpopular. See Ted Palmer (1975) or Halleck and Witte (1977) for a critique of Martinson's article. While Martinson did not establish that no rehabilitative program ever worked, one thing is clear: few authors have confidence in the ability of the average corrections program to generate any rehabilitation whatsoever. Consequently, the possibility of a dehabilitation effect has also been considered. For a review of the rehabilitation (dehabilitation) literature, see Levin (1971), Lipton (1975), or Cook (1977).

Though most of these studies examine prison only, the studies which compare incarceration to probation are of most interest here. Martin Levin (1971) summarizes these rehabilitation studies.

> The studies of factors affecting recidivism all indicate that offenders who have received probation generally have significantly lower rates of recidivism than those who have been incarcerated. They also indicate that of those incarcerated, the offenders who have received a shorter term of incarceration generally have a somewhat lower recidivism rate than those who receive longer terms. With few exceptions, these differences persist when one controls for factors such as type of offense, type of community, the offender's age, race, and number of previous convictions (Levin, 1971, 24).

These studies compare the rates of recidivism of prisoners and probationers. Using this approach, convicts who are arrested for a crime following punishment are counted as failures, while those who are not arrested are counted as "rehabilitated." The studies say nothing about the number or types of crimes committed by those arrested.

Rehabilitation studies need to examine the number and types of crimes committed by convicts. These crimes need to be weighted for their seriousness. Without such weights, it is impossible to determine

whether or not a convict's crime is becoming more or less serious If the convict's criminal behavior is less serious following punishment, rehabilitation has occurred If not, dehabilitation has occurred In this study, the dollar cost of crimes committed prior to punishment will be compared to the cost of those committed after punishment Since this weighting system is based on dollars, this study has the advantage that the rehabilitation benefit of each correctional program can be compared to its costs

III Incapacitation Studies

Besides the work of Larsen (1983) which was discussed earlier, there are four major studies of the incapacitation benefit Jacqueline Cohen's (1978) review of the incapacitation literature points out that the first four of these articles had no data for individuals concerning three important variables the rate of crime commission prior to incapacitation, the probability of arrest given a crime, or the average sentence served Instead, estimates of these variables were based on aggregate data

Cohen argues that, because the authors make different assumptions concerning the variables listed above, they get different estimates of the incapacitation benefit For example, Clarke (1974) estimates that the incarceration of juveniles prevents 1 to 4 percent of all known index crimes Greenberg (1975) estimates that incarceration prevents 1 to 8 percent of index offenses Shinnar and Shinnar (1975), however, estimate that incapacitation reduces all crime, and not just the index crimes, by 20 percent

Cohen (1978) argues that these results differ because of the differing estimates of the three critical variables listed above, especially the average crime rate while free She argues that these authors have underestimated the true crime rate while free since they use the estimated rate for criminals, rather than for inmates

Once this problem is corrected, the estimates of the reduction in crime due to the incapacitation benefit rise The Clarke (1974) and Greenberg (1975) models would predict that index crime is reduced by 18 percent and 24 percent, respectively The Shinnar and Shinnar (1975) model would predict that all crime is reduced by 25 percent

Cohen summarizes her article by writing that

> A recurrent theme in this review has been the inadequacy of current estimates of the individual crime rate Clearly, the most pressing research for estimating the incapacitative effect is to provide adequate estimates of the individual crime rate Such estimates will require better data on criminal careers than are presently available For the level of detail outlined, self-reports by acknowledged criminals are probably the best source However, these will have to be augmented by estimates from official arrest and crime statistics in order to deal with the inevitable response biases in the self-reports
>
> Two main shortcomings in existing official statistics will also have to be overcome First, they fail to document time served, so that the recorded arrests and convictions can be attributed only to the time an individual is at large This is crucial to estimating individual arrest and/or conviction rates while free Second, the statistical relationship between an individual's crime rate and his probability of apprehension is unknown The exact nature of this dependency is crucial to estimating unobserved crime rates from the observed arrest or conviction rates There is no hope of resolving this issue using only official statistics (Cohen, 1978, 229)

Cohen concludes her statement by calling for research using self-report data Larsen (1983) made one such effort In this study, Larsen's data are used to derive the individual crime rate and the probability of apprehension (The probability of apprehension is the

inverse of the crime multiplier) This data set also contains information which makes it possible to estimate the time spent incarcerated throughout each convict's career As a result, this study's estimate of the incapacitation benefit will contribute to the literature

IV Deterrence Studies

According to many economists, economic theory unambiguously predicts that punishment will deter crime "This is a necessary and obvious implication of the law of demand--as the price of something increases, people demand less of it, whether the good be apples or crime" (Rubin, 1980, 14) In other words, crime and legitimate activities (such as work) are substitutes As the price of crime increases, people substitute legitimate activities for crime Much of the discussion which follows turns on a disagreement over the extent to which legitimate activities are substituted for crime Rubin asserts that

> The results of all the studies that have been performed are consistent, and all agree with the theory That is, in all cases, increased costs of crime in terms of higher sentences or higher probabilities of conviction are associated with reduced crime rates (Rubin, 1980, 15)

Rubin's position is not the only one emanating from a careful review of the deterrence literature Economist Jan Palmer notes that sociologists as well as economists have studied deterrence She concludes that

> it is probably safe to say that many economists have concluded that an increase in the expected punishment does reduce crime, while many sociologists have concluded such an increase does not deter crime or has too small an effect to be considered a useful instrument of social policy Therefore, to some

> extent, the debate about the deterrence hypothesis is a debate between disciplines

Palmer goes on to note that

> The deterrence hypothesis is supported by many but certainly not all of the economic studies Generally, the research of economists is more successful at establishing the effects of unemployment and income inequality than the effect of punishment Nevertheless, many economists have concluded that punishment deters crime (Palmer, 1977, 15)

Palmer explains why the regression studies which confirm the deterrence hypothesis should be taken seriously Regression analysis of deterrence has the advantage that

> it can be used to test models where the dependent variable (the crime rate) is determined by several independent or explanatory variables (unemployment rate, certainty of punishment, severity of punishment, age distribution of the population, income inequality, and so on) (Palmer, 1977, 14)

Regression analysis considers all the independent variables at the same time Therefore, the researcher can examine the deterrence effects of punishment in the context of a larger model of criminal behavior (Palmer, 1977, 14)

Second, regression analysis assigns coefficients to each of the independent variables The relative importance of these variables can be gleaned by analyzing the coefficients Therefore, the researcher can decide whether the certainty or the severity of punishment is more important and whether the unemployment rate or the punishment rate is more important in reducing the crime level (Palmer, 1977, 14)

"Third, regression analysis generally understates the effect of an independent variable when the data are of poor quality" (Palmer, 1977, 14) This is an important feature of regression analysis given that crime data are of notoriously poor quality

A Policy and the Deterrence Studies

Palmer (1977) contends that what is needed for policy planning is an understanding of how much crime is deterred by punishment and a knowledge of whether increased spending on punishment is the best use of resources She concludes that while punishment may reduce crime, this fact alone is not enough to suggest that more money should be spent on punishment "Few economists have concluded that punishment is the socially optimal response to crime" (Palmer, 1977, 15) Palmer states that, in contrast,

> the work of Tullock is important because it has received such widespread attention from non-economists and because it comes the closest to asserting that increases in the certainty or severity of punishment is optimal (Palmer, 1977, 16)

1 Severe Punishment vs Certain Punishment

Tullock (1974) contends that society needs to increase the certainty or severity of punishment and it does not matter which

> The sociologists were very much interested in a problem that had also concerned the economists, but not so vitally This is the question whether the severity of the sentence or the likelihood that it will be imposed is more important in deterring crime In my opinion, this is not a very important question Suppose a potential criminal has a choice between two punishment systems one gives each person who commits burglary a one-in-100 chance of serving one year in prison, in the other there is a one-in-1,000 chance of serving 10 years It is not obvious to me that burglars would be very differently affected by those two punishment systems, although in one case there is a heavy sentence with a low probability of conviction, and in the other a lighter sentence with a higher probability of conviction (Tullock, 1974, 107)

Tullock goes on to suggest that one should measure the expected value of punishment by the certainty (or probability) of punishment times the severity He argues that for equal values derived this way, the punishment is equal (Tullock, 1974, 107) In later works, this

point has been contested Block and Lind (1975) present the view that if potential criminals discount the future, then the one-in-100 chance of a one year prison sentence will deter more criminals than a less likely one-in-1,000 chance of serving a longer (10 year) sentence

Tullock concedes that, "More often than not the researchers have found that the frequency with which the punishment is applied is of greater importance than its severity" (1974, 108) Nevertheless, it is Tullock's view that, the statistics are not "accurate enough for the results obtained to be of much value" (1974, 107)

In contrast, many sociologists are convinced that the empirical studies have shown that certain punishment is an efficient deterrent whereas severe punishment may or may not be Sociologist James Levine contends that

> It is relatively easy to increase severity by simply amending penal laws and building more prisons, but this tactic may not deter more crime The United States uses longer prison sentences than most other countries Going farther in that direction is pointless according to most theory and research on deterrence (Levine, 1980, 371)

Further, Levine argues that certainty and severity may even be inversely correlated Raising the severity of punishment may actually reduce certainty

> If prescribed penalties are excessively high, juries may be loath to convict at all and may bend over backward to find exculpating evidence In eighteenth- and nineteenth-century England, for example, over 200 crimes carried the death penalty (including pick-pocketing), but juries failed to convict--in which case the criminal received no punishment whatsoever One study comparing severity of sanctions to certainty of sanctions in different states actually found a modest inverse correlation as severity went up, certainty went down (Levine, 1980, 370)

In economists' terms, Levine argues that the demand for punishment on the part of jurors is negatively dependent on the severity of

punishment inflicted on prisoners He implies that the welfare of jurors is dependent on the welfare of defendants In this case, if punishment were perceived by jurors to be relatively stiff now, then few persons would be convicted Making the punishment for all crimes more severe could only reduce conviction rates Alternately, if there is a modern day negative relationship between the certainty and severity of crime in the United States, it may result from a technical constraint in many states prisons are filled to their legal capacity In these states, longer sentences can only mean fewer sentences or earlier releases in the short run In any case, more research is needed to establish whether or not the relationship between the certainty and the severity of punishment is currently negative

2 Increasing the Certainty of Punishment

There is more interdisciplinary agreement that certain punishment deters crime than that severe punishment does While economists are concerned with finding the extent to which the certainty of punishment deters, sociologists seem more concerned with the policy question, "How can we increase the certainty of punishment?"

Phillip Cook (1977) notes that the many correlational studies done by economists and others

> typically are not concerned with the technology of producing threats, and hence are not directly relevant to policy Knowing that an increase in the probability of imprisonment for robbery will reduce the robbery rate is helpful background information to a policymaker, but it carries no direct implication about the potential effects of varying the available criminal justice policy instruments, after all, the probability that offenders will be arrested and jailed is not a variable which can be directly manipulated by any criminal justice agency How much can this probability of imprisonment for robbery be increased by expanding or redeploying the police force, soliciting citizen cooperation with the police,

> expanding the prosecutors staff or instituting a mandatory sentence law? The correlational studies are not designed to answer such specific questions, but are focused instead on measuring the potential efficacy of a general approach to crime control (Cook, 1977, 181)

Sociologists who turn their attention to the policy issue of increasing the certainty of punishment quickly become discouraged

> What is needed is more punishment, and obtaining that is no mean feat Raising levels of arrest, conviction, and incarceration of criminals requires a set of finely tuned and coordinated policies implemented by a variety of agencies and entailing the active cooperation of the public There are no shortcut solutions (Levine, 1980, 395)

> There are many instances in which "get tough" programs have failed to reduce crime, not because of a failure in the deterrence mechanism but simply because the programs never succeeded in increasing the objective or perceived threat of criminal sanction (Cook, 1977, 181)

One such program attempted to increase the number of police patrolling in an area in order to increase the arrest rate and therefore the certainty of punishment The results of this Kansas City study were frustrating

> In Kansas City the police achieve one felony conviction per 14,720 patrol hours--or one conviction for the equivalent of seven years of patrol for one person--notwithstanding the fact that the department is considered one of the most professionalized in the country With many inclined to commit crime at one time or another, police are grossly outnumbered The presence of an extra officer here or there makes relatively little difference (Levine, 1980, 385)

Levine notes that many sociological studies have reinforced the above conclusion He also notes that "some economists using alternative methods of statistical analysis reached opposite conclusions " However, "even their findings suggest only modest gains in crime reduction" (Levine, 1980, 385) Levine argues that while increasing the certainty of arrest would reduce crime, it would not be cost effective to try to increase it by this or any other known policy This is because the

increases in expenditure necessary to reduce crime on a large scale are so great Instead, cost-effective ways of increasing the certainty of punishment or otherwise reducing crime are needed

Rather than concentrating on the difficulties associated with the task of increasing the certainty of punishment for all crimes, some economists have focused on cases in which there has been an increase in the certainty of punishment for one crime For example, Timothy Hannan (1982) showed that a visible guard in a bank reduces the probability of bank robbery more than any other variable Perhaps it is fair to say that economists tend to point to instances where deterrence works, while sociologists tend to expound upon the difficulties of implementing an effective deterrence policy on a large scale In more technical terms, Hannan showed that deterrence worked when the price of a specific crime (bank robbery) was raised relative to other crimes Sociologists have been frustrated by their attempts to show that deterrence works when the price of all crime is raised relative to the price of other activities The combined meaning of these results is clear many crimes are better substitutes for each other than they are for other activities

B Summary of Deterrence Literature

In summary, this section discussed the theoretical and empirical views of the deterrence hypothesis as held by many economists and sociologists To illuminate the differences between the disciplines, the work of Gordon Tullock was compared to that of James Levine While making the differences between the groups clearer, this approach exagerated the differences between the groups Many economists and sociologists support the idea that the certainty of punishment deters

crime Economists seem more absorbed by the promise of this idea, while sociologists seem more disturbed by the difficulties of implementing it Both groups seem less confident in the deterrent value of the severity of punishment Some sociologists even wonder if severe punishments may undermine certain punishment

In short, there is much that remains unknown about deterrence, let alone the deterrence offered by different forms of punishment For instance, if the certainty of punishment is more important than the severity, a dollar spent on probation may yield higher benefits than a dollar spent on prison This statement is open to question, little research has examined the deterrence benefit of probation The one study that compared the deterrence benefit of prison to that of probation (and probation with jail) found no significant differences between the punishments (Phillips and Votey, 1975) More research needs to be done in this area since this information is critical for an intelligent comparison of these three punishments

CHAPTER III

A MODEL OF CORRECTIONAL COSTS AND BENEFITS

I An Overview of the Model

"Is probation or incarceration more efficient?" In this chapter, the framework for discussing this question is presented Presumably, corrections reduces the social cost of crime by reducing the amount of crime committed Crime is reduced through rehabilitation, incapacitation, and deterrence

A Definitions of Terms

In order to compare probation to incarceration in terms of social costs and benefits, definitions of these terms are needed They are as follows

Social costs	the value of goods and services foregone due to a certain policy
Social benefits	the value of goods and services attained due to a certain policy
Rehabilitation benefit	the value of reduced criminal behavior by convicts following sentencing (for probationers) or release (for inmates) due to their punishment
Incapacitation benefit	the value of reduced criminal behavior by inmates during their incarceration due to their physical removal from society

Deterrence benefit	the value of reduced criminal behavior by potential criminals due to the threat of punishment

Though often listed as a benefit of corrections, retribution is noticeably missing from this list Retribution is the "infliction of punishment on criminals to make them pay for their crimes" (Levine, 1980, 589) It is based on the idea of justice--the notion of "an eye for an eye " Retribution may generate utility for non-criminals when they see that justice is done Though retribution yields utility to non-criminals, it reduces the utility of the criminal

Many criminologists do not include the criminal's loss of utility in their studies Instead, they define society to exclude the criminal Alternately, a researcher might elect to define social benefits to exclude utility gains derived from seeing others (convicts, in this case) worse off In short, whether or not retribution is regarded as net utility producing is a philosophical question which requires interpersonal comparisons of utility

B A Partial List of Social Costs and Benefits

It is useful to know all the social costs and benefits associated with the policies of probation and incarceration While it is impossible to measure all the costs and benefits, it is important to know which ones are being measured and which ones are not being measured A list of the various costs and benefits are given in Table I

TABLE I

SOURCES OF SOCIAL COSTS AND BENEFITS OF CORRECTIONS

SOCIAL COSTS	SOCIAL BENEFITS
Dehabilitation •Increased bitterness against society and 'the system •Increased criminal knowledge and skills •Reduced non-criminal job opportunities •non-criminal knowledge/job skills deteriorate •social skills deteriorate • ex-con stigma makes job search harder Agency Costs •Criminal justice system •Other governmental and private agencies' costs Reduced Productivity of Convicts During and Following Punishment	Direct Benefits •Rehabilitation •Deterrence •Incapacitation (applies to incarceration only) Indirect Benefits •Lower victimization costs because fewer crimes are committed due to rehabilitation, deterrence, and incapacitation •less stolen or damaged property •less physical and emotional injury •less loss of life •less time lost due to crime both work and leisure •Lower criminal justice system costs because fewer crimes are committed due to rehabilitation, deterrence and incapacitation •lower investigation and arrest costs •lower prosecution and defense costs •lower correctional costs •Lower private crime prevention costs because fewer crimes are committed due to rehabilitation, deterrence and incapacitation •Members of households •go out at night more often •use the subway or walk more often •use cash more often •buy less insurance, which reduces overhead costs •buy fewer security devices •Businesses •buy fewer security devices and hire fewer guards •terminate fewer night operations

The social cost of corrections is the value of the resources used in the production of corrections which could be used elsewhere in the absence of corrections The social benefit of corrections stems from the reduction in the amount of crime Why is a reduction in crime a social benefit? Some crimes destroy resources directly while others affect incentives and thus, the efficient allocation of resources The crime of theft, for example, involves a transfer payment from the victim to the thief This transfer causes resources which could be used to produce goods or services to be used to steal (or transfer) existing goods or services and to prevent such transfers In other words, criminals invest resources in theft and others invest resources in avoiding theft Neither activity is productive, both merely increase or decrease the transfer of property from one person to another Therefore, theft is an example of a crime that alters the efficient allocation of resources (Tullock, 1967)

On the right hand of Table I, the social benefits of corrections are shown Which benefits will be measured from the data base? When one knows the numbers and types of crimes committed by each convict before and after sentencing, it is possible to measure rehabilitation and incapacitation benefits from the data set This procedure will be explained later There are extreme difficulties associated with estimating deterrence from this or any individual data set A cross-sectional or time-series data set is needed With such data, one can compare two jurisdictions with different levels or types of punishment at the same time, or one jurisdiction with two different levels or types of punishment at two different times Since this study employs individual data, the deterrence benefit will not be measured from these

data However, an estimate of the deterrence benefit will be taken from the literature and applied to these data

II Measures for Social Benefits and Costs of Corrections

A Theoretical Measures for Social Benefits

In this section, the concepts of rehabilitation, incapacitation, and deterrence are discussed The ideal measures of these social benefits of corrections are explained Later, the measures used in this study are presented and compared to the ideal measures

Figures 1-4 are based on a figure developed by McGuire (1978, 8) They illustrate the social benefits of corrections in relation to the hypothetical criminal careers of four convicts For the sake of simplicity, it is assumed that each criminal was convicted only once This assumption could be relaxed without changing the concepts presented here

In each figure, the area under the curve shows the total social cost associated with the criminal career These costs are measured in 1981 dollars The vertical height of the curve shows the social cost of the convict's crime at any given age of the convict The age B is the convict's age when crime begins, while S is the age at sentencing, and R is the age at release from prison or probation The area BAS represents the cost of "priors," or crimes committed prior to sentencing

From the age of sentencing onward, there are two curves showing different levels of social costs One curve shows the actual cost of crime following sentencing The other curve shows the counterfactual

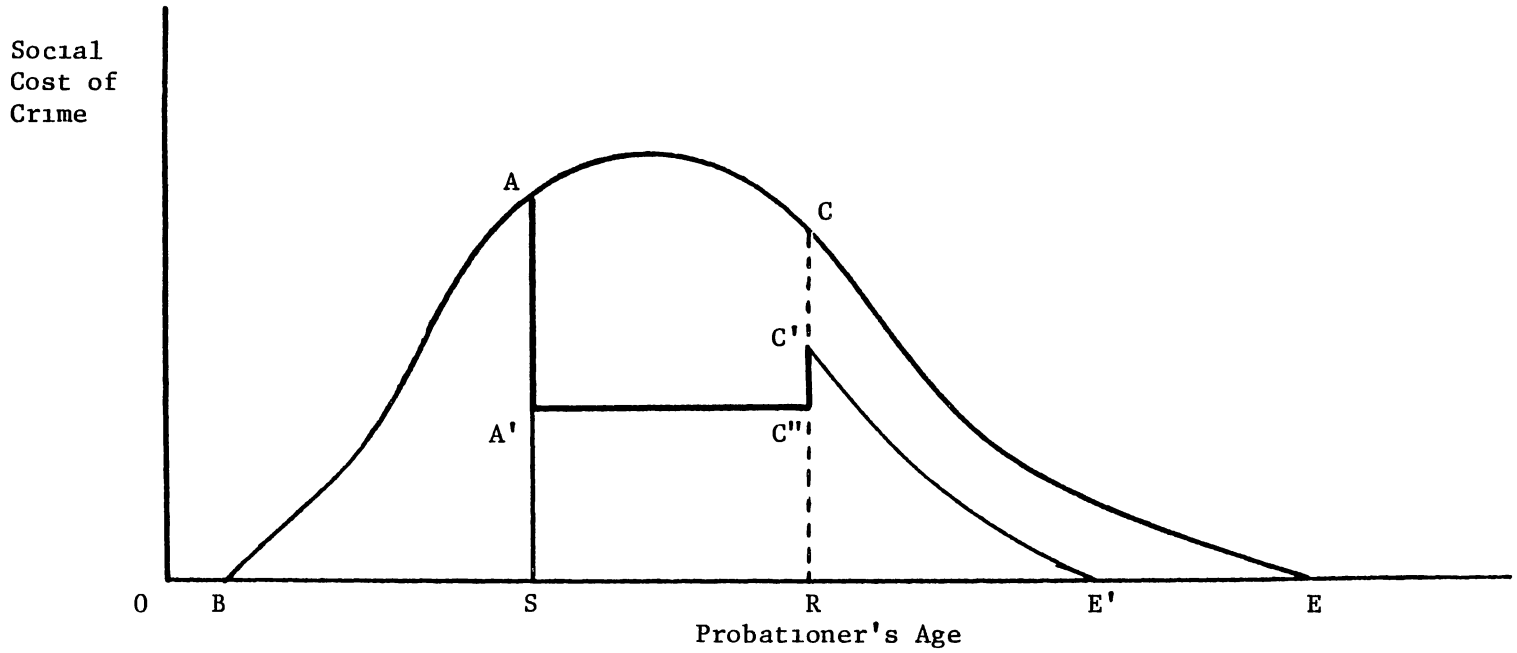


Figure 1. The Effects of Rehabilitation on a Probationer's Criminal Career

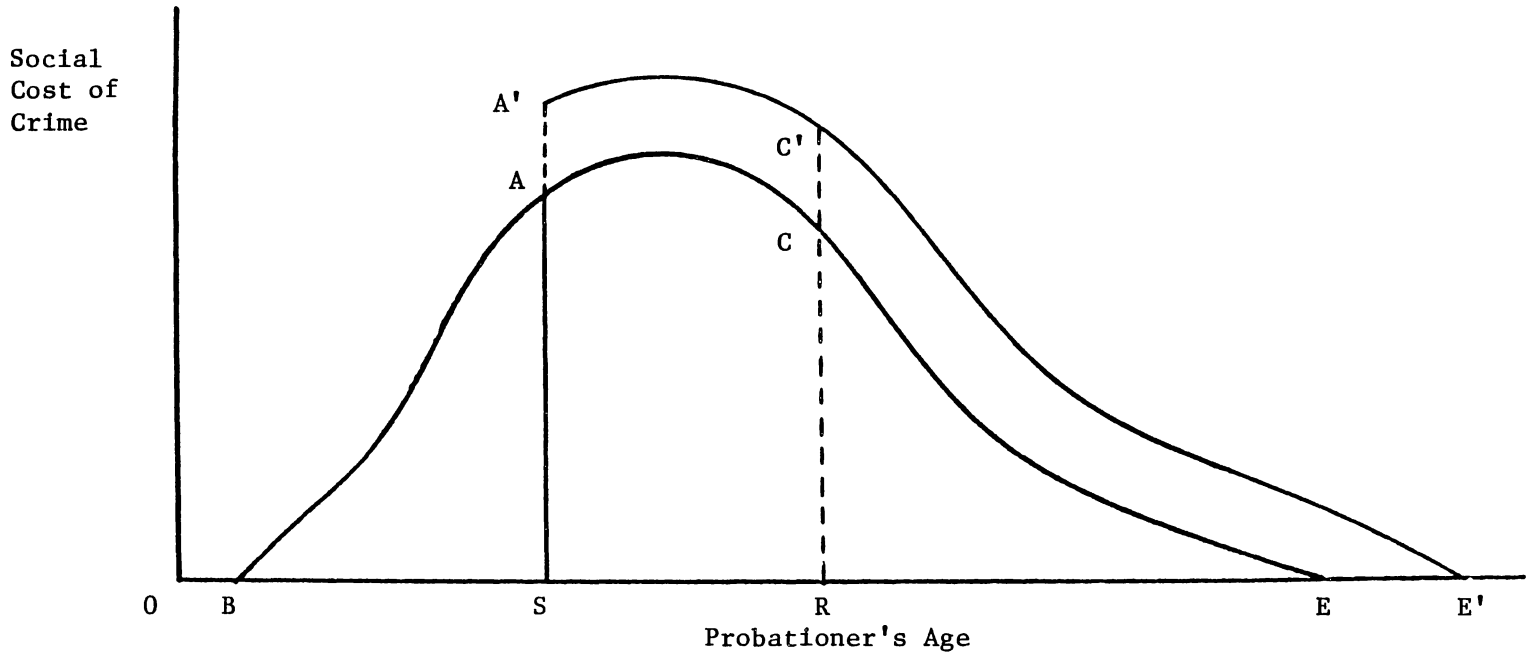


Figure 2. The Effects of Dehabilitation on a Probationer's Criminal Career

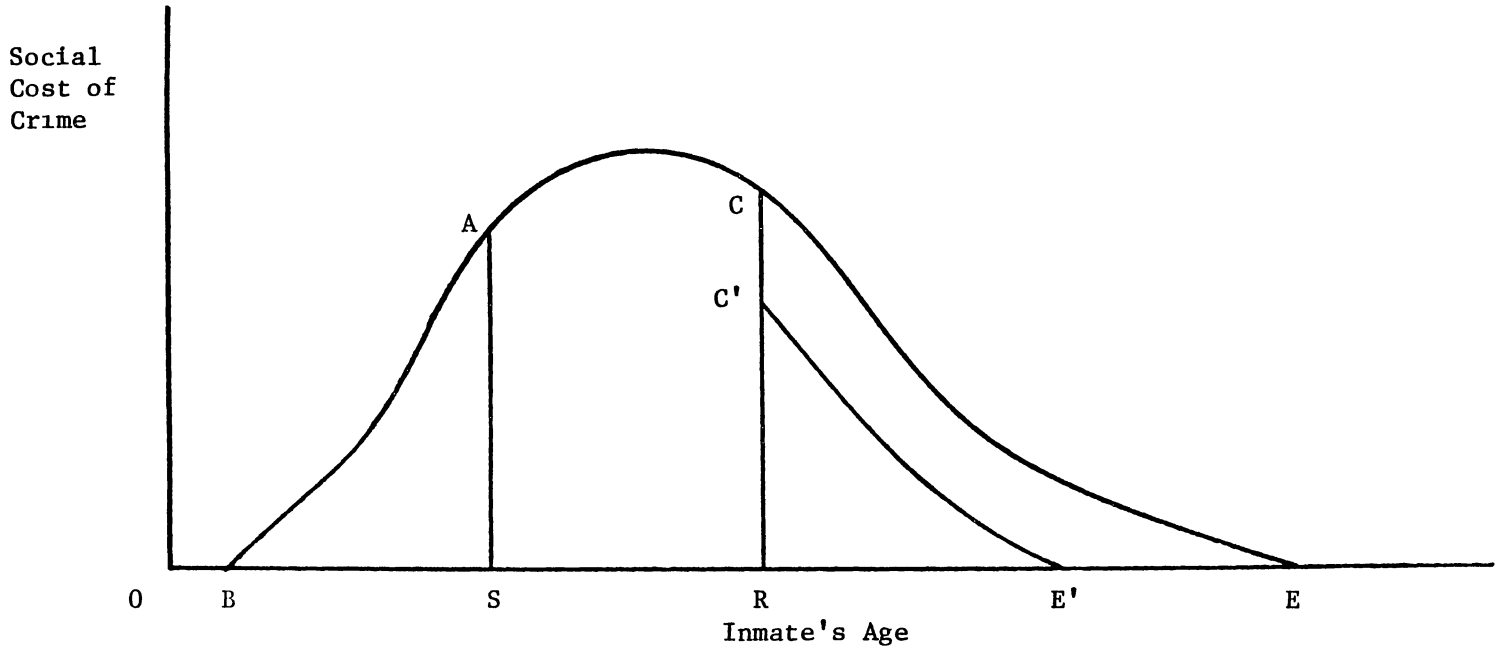


Figure 3 The Effects of Rehabilitation and Incapacitation on an Inmate's Criminal Career

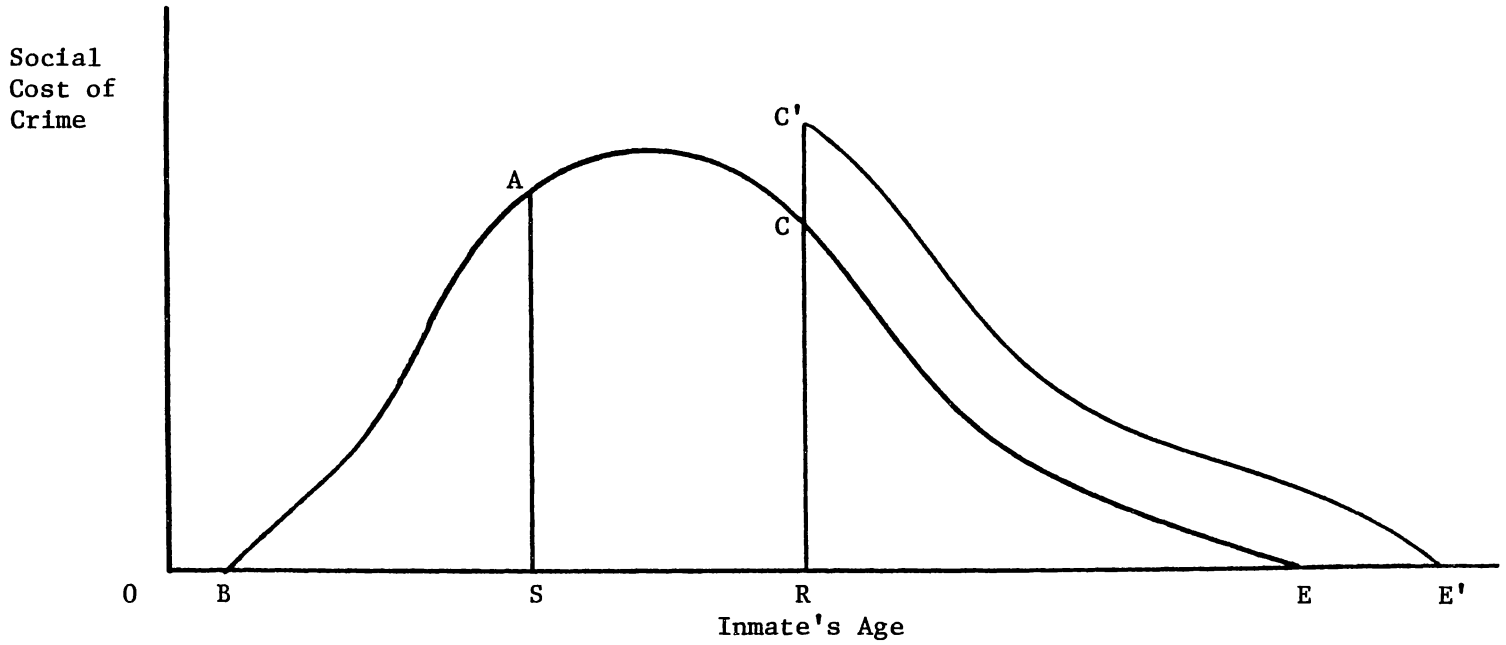


Figure 4 The Effects of Dehabilitation and Incapacitation on an Inmate's Criminal Career

cost of crime which would have occurred in the absence of punishment

1 The Probationer

Consider first the case of the probationer as shown in Figure 1 Notice that the curve ACE shows the counterfactual cost of crime throughout the period following sentencing The area under this curve shows the total cost of this crime In contrast, A'C''C'E' shows the actual cost of crime commission during and following probation, the area under this curve shows the total cost of this crime

The difference between these two areas, or AA'C''C'E'EC, is equal to the rehabilitation benefit In this example, the probationer is rehabilitated, since his or her crimes cost less during and after punishment than they would have in the absence of punishment For the probationer depicted in Figure 1, the rehabilitation benefit is especially pronounced during the period of probation This is a likely scenario since the probationer may feel he or she is being scrutinized by the authorities during the period of probation The actual crime cost curve, A'C''C'E', may have other shapes, however

In fact, the rehabilitation effect may not be positive Punishment may cause the convict's behavior to become more costly to society In this event, dehabilitation occurs Figure 2 depicts a probationer who is dehabilitated Here, the actual cost of crime A'C'E' is greater than the counterfactual level, ACE The actual total cost of crime, SA'C'E' is also greater than the counterfactual cost, SACE The dehabilitation effect is equal to A'ACEE'C'

Once again, the actual cost curve, A'C'E', might take other shapes The shape shown here is likely in the event that being placed on probation causes the probationer to lose his or her job Under these circumstances, the probationer may replace legitimate earnings with criminal earnings Other scenarios are also possible

2 The Inmate

The inmate's situation differs from the probationer's because there is an added benefit associated with incarceration the incapacitation benefit This is the benefit associated with the inmate's physical removal from society This benefit occurs during the inmate's incarceration

In Figures 3 and 4, it is assumed that the incapacitation benefit is complete, no crime is committed between the time of sentencing and release In this case, the cost of crime saved due to incapacitation is equal to SACR This assumption can be relaxed, if necessary

In Figure 3, the inmate is rehabilitated The post-release cost of crime is represented by C'E', which is less than the counterfactual cost, CE The rehabilitation benefit is equal to the value of CC'E'E In Figure 4, the inmate is dehabilitated The cost of recidivism is represented by C'E' which is greater than the counterfactual cost, CE The dehabilitation benefit is equal to the value of CC'E'E

Many inmates are released to parole rather than to no supervision Parole is a system of supervision much like probation Parolees may commit less crime during parole as the probationer did during probation in Figure 1 Alternately, the parolee's behavior may not be different

from his or her behavior when released from parole This scenario is similar to the probationer's behavior in Figure 2

So far, no mention has been made of the deterrence benefit All criminals engage in crime despite the existing corrections system However, the rational criminal engages in less crime than he or she would have in the absence of corrections Thus, the crime cost curves drawn in Figures 1-4 are lower than they would be in the absence of the correctional system Were this system to vanish, these curves would be further from the horizontal axis

B Rehabilitation Benefit

1 How Rehabilitation Works

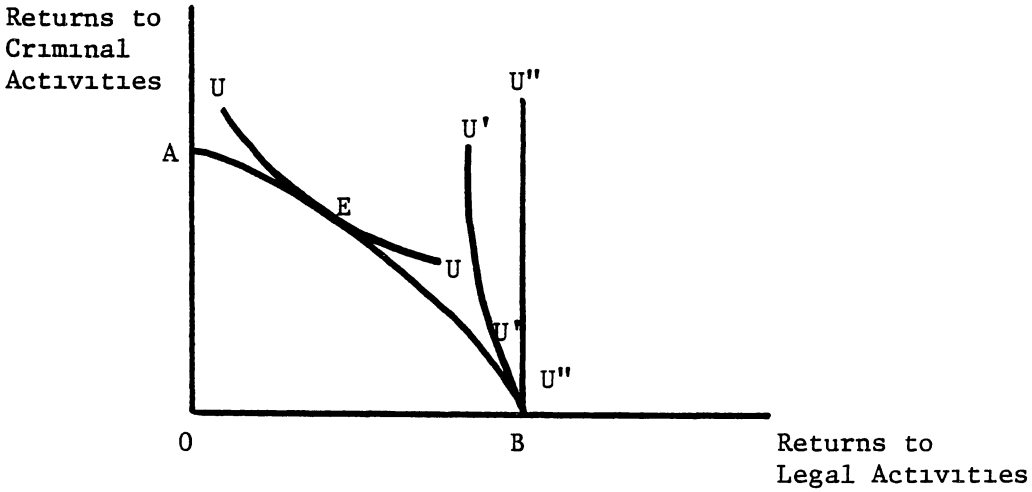
For each released convict, the rehabilitation benefit is the difference between the cost of the convict's post-release criminal career and the counterfactual cost in the absence of punishment For a correctional program, the average rehabilitation benefit in any period is equal to the sum of individual benefits arising from that period divided by the number of convicts These benefits are larger the greater the rehabilitative emphasis of the program, the more receptive to rehabilitation the convicts are, and the more expensive the crimes avoided are (McGuire, 1978, 20)

As McGuire has pointed out, rehabilitation (or dehabilitation) can result from a change in preferences of the convict, either because of an introspective change, an increased fear of punishment, or because of a change due to a rehabilitative program Also, rehabilitation may occur because there are changes in the convict's human capital due to a

rehabilitative program McGuire presented this model in a series of graphs as developed in this and the next section (McGuire, 1978, 22-31)

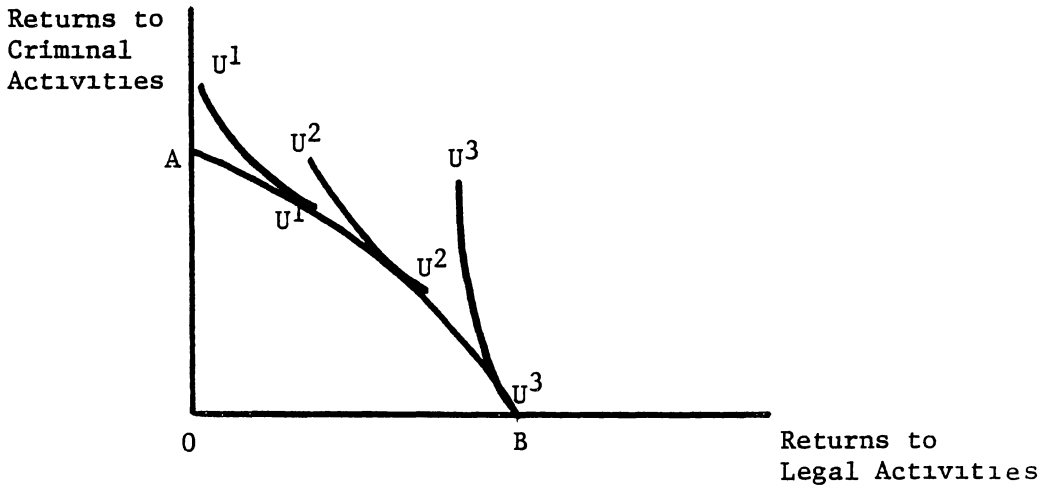
In Figure 5, the transformation curve AB shows an individual's tradeoff between legal activities and criminal activities The curve becomes flatter near the vertical intercept as more and more crimes are undertaken This is due to the falling marginal value of criminal activities and the rising cumulative probability of apprehension The indifference curve UU shows the highest utility level attainable for one individual given his or her preferences The point E shows the optimal level of legal and criminal activities given the preferences represented by UU and the tradeoff between abilities shown by AB Recognize that a person's preferences may be shown by an indifference curve like U'U' or even U"U" if the said person abhors criminal activity Both of these indifference curves yield a corner solution at B, with no criminal activity occurring (McGuire, 1978, 23)

a Changes in Preferences As stated earlier, rehabilitation may result from a change in the preferences of the inmate In Figure 6, this is shown as a shift from U^1U^1 to U^2U^2 or even to U^3U^3 in the case of complete rehabilitation Past studies frequently have made the mistake of counting rehabilitation only if rehabilitation is complete This means that in Figure 6, a convict would be considered "rehabilitated" only if his or her indifference curve shifted to U^3U^3, resulting in the corner solution B (McGuire, 1978, 27) Preference changes may cause dehabilitation as well For example, a convict may feel he or she has been treated unfairly and become bitter against society and the system The dehabilitation effect can also be shown on



Source McGuire, 1978, 22

Figure 5. Transformation Curve Showing Tradeoff Between Criminal and Legal Activities



Source McGuire, 1978, 23

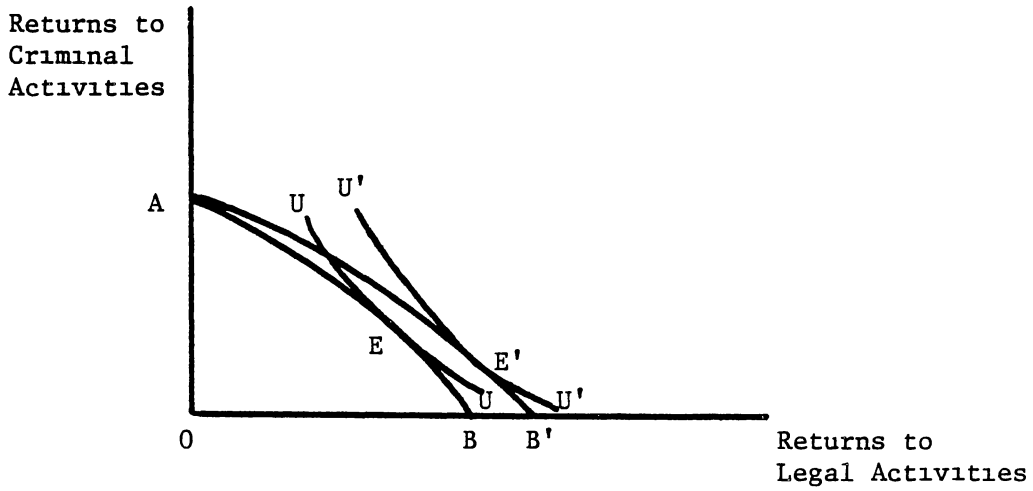
Figure 6. Transformation Curve Showing Rehabilitation Due to a Change in Preferences

Figure 6 where a curve like U^2U^2 shifts to a curve like U^1U^1 (McGuire, 1978, 24)

b Changes in Human Capital In addition, changes in the convict's criminal and legal human capital may cause rehabilitation If there are changes in the human capital of the convict, the transformation curve will shift For example, suppose there is an increase in legal human capital due to a job training program This is shown by a change in slope by the transformation curve AB to curve AB' in Figure 7 This change shows that during the period of punishment, the ability to earn legal wages has been expanded by BB' units This improved ability to earn wages is net of the negative effects of the convict now having a record Assuming that legal activities are a normal good, more such activities will be undertaken and the new equilibrium will be E' instead of E (McGuire, 1978, 25)

However, punishment may also reduce a convict's legal human capital The "ex-con" stigma makes it hard for convicts to find work Convicts may also lose job skills In either case, the results of a reduction in the convict's human capital can be seen in Figure 7 Assume that the appropriate transformation curve prior to punishment is AB', with E' as the equilibrium With punishment, and the resulting loss in human capital, the new transformation curve is AB The new equilibrium, E, is characterized by more criminal and less legal activity

As mentioned earlier, convicts may increase their human capital for criminal activities while being punished This happens partly because of the association of convicts with other convicts and the exchange of information which occurs Also, with increased criminal contacts, it is



Source McGuire, 1978, 25

Figure 7. Transformation Curve Showing Rehabilitation Due to a Change in Legal Job Opportunities

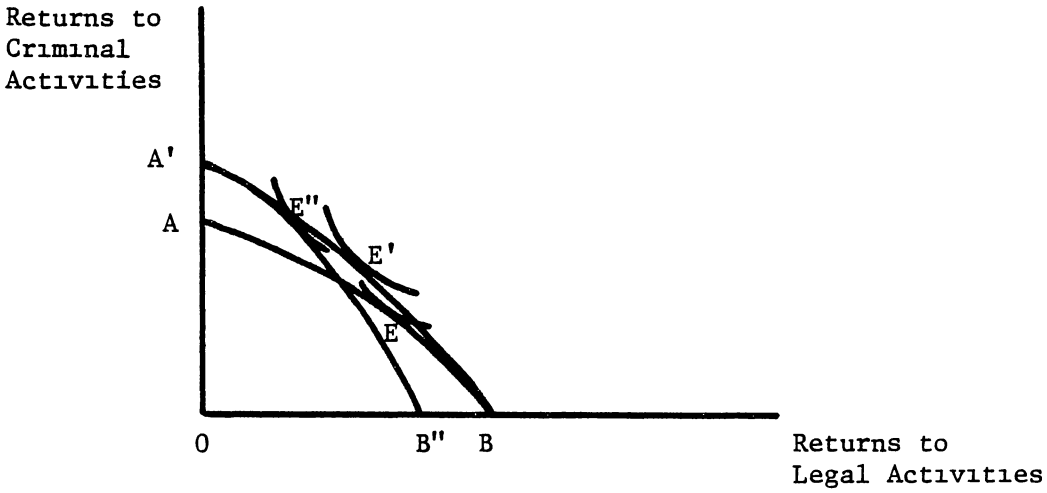
easier to obtain complementary criminal human capital whenever it is needed

In Figure 8, an increase in criminal abilities is shown by a shift in the curve AB to A'B If such a shift were coupled with a reduction in the returns to legal activities, then A'B would shift to A'B" From an initial equilibrium of E, the equilibrium moves to E' due to the increase in criminal human capital When the return to legal activities falls, the equilibrium shifts to E'' The two effects are complementary and the convict has a strong incentive to continue in crime (McGuire, 1978, 27)

It is worth noting that the returns to criminal activities can also fall as a result of punishment This reduction may occur because convicts are known to the police and their actions are watched more closely, giving them a greater chance of arrest Once convicted, repeat offenders are also punished more harshly Both of these effects reduce the returns to criminal activities However, these effects are thought to be dwarfed by the increases in the returns to crime brought about by punishment

2 How to Measure Rehabilitation

To measure rehabilitation, one should compare the cost of crime commission after punishment to the counterfactual cost without punishment In Figure 3, for example, this difference was shown by area C'CEE' Since no one can know how much cost is associated with the counterfactual level of crime, some proxy for this measure is needed One could use a carefully matched cohort, but such an approach requires a large sample from which to pick the cohort and a lot of confidence in



Source McGuire, 1978, 26

Figure 8. Transformation Curve Showing Dehabilitation Due to a Change in Criminal and Legal Job Opportunities

the similarity of the cohort and the sample In this study, the cost of crime committed prior to punishment is used as a proxy for the counterfactual cost of crime It is assumed that the convict's annual cost of crime would have been unchanged in the absence of punishment

Looking back at Figure 3, the area equal to the difference between part of the area BAS and part of the area RC'E' is measured The part of area BAS which preceeds age 18 cannot be estimated due to the lack of data on juvenile crimes Also, each convict was followed for 2 25 years following sentencing rather than for the rest of his or her criminal career So the adult part of the area BAS is compared to the first two years of the area RC'E'

Notice that the cost of criminal activity varies over a lifetime This is shown by the changing vertical height of BACE in Figures 1-4 Other things equal, the rate of recidivism is thought to start declining by the age of 18 This result is the finding of many studies including the FBI Careers in Crime Program (Uniform Crime Reports, 1968) This study followed 18,333 offenders released from the federal criminal justice system in 1963 The number of new arrests for these convicts were counted through 1968 Of the offenders under 20 years of age, 72 percent were rearrested Between the ages of 20-24, 69 percent were rearrested, 25-29, 67 percent, 30-39, 63 percent, 40-49, 54 percent, 50 and over, 50 percent (Uniform Crime Reports, 1968, 37)

In the data used in this study, each convict is followed for 2 25 years Increasing age does not greatly affect the individual's behavior over such a short period of time Neither is the average age of inmates so different from the average age of probationers that the difference causes a problem The average convict is 24 years old While the

probationer averages 22 years of age, the inmate averages 26 years This means that on the basis of age alone, the inmates would be expected to recidivate at a rate 1 5 percent lower than the rate for probationers Therefore, the age distribution in the sample is not responsible for greatly altering the results in this study

A more serious problem with measuring the annual rehabilitation benefit is this how long does the rehabilitation benefit last? In Figure 3, it was drawn as a constant value, for the rest of the life of the inmate This is probably an overstatement The rehabilitation benefit may even shrink to zero in a very short period of time There are no estimates of the time path of the rehabilitation benefit Various assumptions about the length of time the rehabilitation benefit lasts will be presented later

So far, only the problems associated with accurately measuring rehabilitation have been presented There are also advantages associated with the approach used in this study As pointed out earlier, the convicts in this sample were not assigned randomly to the various punishments That is, the convicts with the worst criminal records were put in prison The approach used here for measuring the rehabilitation benefit offsets this problem, rather than measuring the cost of recidivism, this study measures the change in the cost of criminal behavior due to punishment

The ideal measure of rehabilitation measures changes in the cost of criminal behavior Such a measure cannot rely solely on reported crime data because a knowledge of the severity and frequency of criminal behavior is needed For example, when a convict's rate of arrest is reduced following punishment, one does not know that rehabilitation has

occurred Instead, the convict's ability to escape detection may have increased For this reason, the researcher needs more information about convicts than is recorded Interviews are a possible source of more information and the data set used herein is unusual in providing information from interviews

a The Crime Multiplier In order to estimate rehabilitation, one must deal with the fact that each arrest represents the commission of more than one crime The ratio of crimes committed to arrests is called the crime multiplier How many crimes does an arrest represent? There are two main ways of answering this question One way is to use victimization survey information to estimate the aggregate ratio of crimes committed to arrests Using this approach, crime victims are surveyed and their victimizations are totaled for each index crime type These values are compared to the number of reported crimes of each type When applied to individual convicts, this approach has two disadvantages Convicts are not responsible for all crimes committed since some convicts are never caught Also, not all convicts have the same crime multipliers, since some criminals are more successful at escaping arrest than others There is an alternate approach which accounts for these problems With this approach, the number of crimes committed per arrest is estimated for each convict in one's sample Larsen's research makes this second approach possible Larsen is a Secret Service agent with much investigative experience He compiled recidivistic data based on personal interviews with the convicts, their friends, their family, and various criminal justice system employees (Larsen, 1983, 101) From this information, "crime multipliers" can be estimated for each crime type

b The Social Cost of Crimes There are social costs associated with crime because some crimes destroy resources directly while others affect incentives and therefore, the efficient allocation of resources These costs will be presented here

It is important to estimate the cost of each crime so that all crimes are not weighted equally in a measure of criminal activity

> FBI estimates of the index of crime are derived from an unweighted sum of the reported Index crimes This Index is dominated by the far more prevalent crimes against property and is relatively insensitive to changes in the serious crimes against the person Thus, murders could increase by 1,000 percent, but if auto theft fell by 10 percent, the Index would decline (Science and Technology, 1967, 56)

There are at least three ways to estimate the social cost associated with each crime One can solve for marginal costs by running a regression to find out how much criminal justice system costs rise when there is one more crime committed This involves using aggregate data to compare two time periods or several jurisdictions This approach has the advantage that the marginal cost is the relevant cost See Holahan (1971) for a development of this approach One can also solve for the average cost of each crime Average costs are not ideal because they are equal to marginal costs only when constant costs prevail However, they are available for the individual data in this study, while marginal costs are not

Additionally, one can survey public attitudes towards being a crime victim and then rank the disutility associated with each crime This method as well as the average cost method are discussed more fully in Chapter IV

c A Measure of the Rehabilitation Benefit Consider the following equation as a measure of the yearly cost of priors, or crimes committed prior to sentencing by a convict

$$\text{Yearly Cost of Priors} = \left(\frac{\sum_{i=1}^{I} (\text{Arrest}_i)\ (\text{Social costs}_i)\ (\alpha_i)}{(\text{Age}_s\text{-18-Prior Years of Incarceration})}\right) \quad (1)$$

where

Arrest_i = number of arrests for crime type i

α_i = the crime multiplier for crime type i, or crimes per arrests

i = an index for the type of crime

I = the total number of crime types

Age_s-18-Prior Years of Incarceration = the length of the adult crime career for this convict, or the years of adult freedom prior to punishment

The time of incarceration prior to sentencing has been deducted from the convict's age at sentencing because it is important to know the opportunity cost of having inmates free, instead of incarcerated One can estimate the crime that would be committed were the inmate free only by examining the opportunity cost of freedom, not the cost of some mix of freedom and incarceration Cohen (1978) notes that this distinction is important empirically and that data sets should include such data, but rarely do The data set used here does include such information for the convicts, although the information is imperfect

Next, the social cost of recidivism, or crimes committed after sentencing, is solved for

$$\text{Yearly Cost of Recidivism} = \left(\frac{\sum_{i=1}^{I} (\text{Arrest}_i)\ (\text{Social cost}_i)\ (\alpha_i)}{\text{Years of Post-Release Freedom}}\right) \quad (2)$$

Therefore, the

$$\text{Yearly Rehabilitation Benefit} = \text{Yearly Cost of Priors} - \text{Yearly Cost of Recidivism} \quad (3)$$

The total rehabilitation benefit is equal to the yearly rehabilitation benefit times the number of years of rehabilitation

$$\text{Total Rehabilitation Benefit} = \text{Yearly Rehabilitation Benefit} \times \text{Years of Rehabilitation} \quad (4)$$

Unfortunately, the years of rehabilitation is not known In the following chapters, an estimate of the yearly rehabilitation benefit will be multiplied by various estimates of the years of rehabilitation These products yield alternate estimates of the total rehabilitation benefit

Next, the rehabilitation benefit during each year in the study is estimated This benefit, or the annual rehabilitation benefit, is the total rehabilitation benefit divided by the years in the study

$$\text{Annual Rehabilitation Benefit} = \frac{\text{Total Rehabilitation Benefit}}{\text{Years in Study}} \quad (5)$$

Now the annual rehabilitation benefit for each group of convicts can be estimated This benefit is derived for each of three groups of convicts prison inmates, jail inmates, and probationers It is one measure of the effectiveness of the programs

$$\text{Annual Probation Rehabilitation Benefit} = \sum_{p=1}^{P} \frac{(\text{Annual Rehabilitation Benefit}_p)}{P} \quad (6)$$

where

p = an index for the probationer number

P = the number of probationers in the sample

$$\text{Annual Jail Rehabilitation Benefit} = \sum_{j=1}^{J} \frac{(\text{Annual Rehabilitation Benefit}_j)}{J} \quad (7)$$

where

j = an index for the jail inmate's number

J = the number of jail inmates in the sample

$$\text{Annual Prison Rehabilitation Benefit} = \sum_{a=1}^{A} \frac{(\text{Annual Rehabilitation Benefit}_a)}{A} \quad (8)$$

where

a = an index for the prisoner's number

A = the number of prisoners in the sample

C Incapacitation Benefit

Rehabilitation describes the extent to which punishment changes the convict's behavior Incapacitation describes the extent to which incarceration interrupts the inmate's behavior by physically removing the inmate from society Probationers are not physically removed from society, so probation does not generate an incapacitation benefit Probation may, however, reduce criminal behavior during or following the period of punishment This reduction is known as rehabilitation

For each inmate, the incapacitation benefit is the value of the crimes not committed during the period of incarceration For the correctional institution, the average incapacitation benefit is the sum of these benefits divided by the number of inmates The level of institutional benefits is directly related to the likelihood of the inmates to participate in crime were they not incarcerated and the level of losses associated with these crimes (McGuire, 1978, 17) To measure incapacitation benefits then, one needs to know the cost associated with

the counterfactual crimes the inmate would have committed if he or she had not been incarcerated Unfortunately, no such information is available

1 A Measure of the Incapacitation Benefit

There are at least two ways to estimate incapacitation One can use a cohort that is not incapacitated but is similar to the inmates in the sample in many ways This approach requires a large sample from which to draw the cohort and a lot of confidence in the similarity of the cohort and the inmates

In this study, the cost of crimes committed prior to incarceration is used to estimate the incapacitation benefit It is assumed that if the inmate's criminal career had been uninterrupted by incarceration, the inmate would have continued committing crime at the pre-incarceration rate This is not true in the long run because increasing age reduces a person's proclivity for crime, but it is a good assumption for a two year period During such a short period, increasing age does not slow the criminal activity of most convicts to any substantial degree

Cohen (1978) points out that past studies of incapacitation have used an average rate of crime commission for all convicts To the extent that convicts with higher rates of crime commission are more likely to get incarcerated, these studies have underestimated incapacitation benefits Therefore, individual estimates of criminal careers, to include crimes for which there were no arrests, are needed But how to get such data? Cohen concludes that,

> for the level of detail outlined, self reports by criminals are probably the best source However, these will have to be augmented by estimates from official arrest and crime statistics (Cohen, 1978, 229)

Cohen goes on to argue that it is important to learn about the ratio of crimes to arrests

> The exact nature of this dependency is crucial to estimating unobserved crime rates from the observed arrest or conviction rates There is no hope of resolving this issue using only official statistics (Cohen, 1978, 229)

Here lies the great advantage of the data used in this study, it includes self-reported data corroborated with official (and unofficial) records and information This represents an improvement over past studies of incapacitation

The total incapacitation benefit is equal to the yearly incapacitation benefit times the number of years of incapacitation

$$\text{Total Incapacitation Benefit} = \text{Yearly Incapacitation Benefit} \times \text{Years of Incapacitation} \tag{9}$$

where it is assumed that the

$$\text{Yearly Incapacitation Benefit} = \text{Yearly Cost of Priors} \tag{10}$$

The yearly cost of priors is used as a proxy for the yearly incapacitation benefit because of the assumption that in the absence of incapacitation, the inmate's criminal behavior would have remained unchanged

Next, the annual incapacitation benefit is solved for It is equal to the total incapacitation benefit divided by the years in the study

$$\text{Annual Incapacitation Benefit} = \frac{\text{Total Incapacitation Benefit}}{\text{Years in Study}} \tag{11}$$

The annual incapacitation benefit is derived for jail and prison, as follows It is another measure of the effectiveness of these programs

$$\text{Annual Jail Incapacitation Benefit} = \sum_{j=1}^{J} \frac{(\text{Annual Incapacitation Benefit}_j)}{J} \quad (12)$$

$$\text{Annual Prison Incapacitation Benefit} = \sum_{a=1}^{A} \frac{(\text{Annual Incapacitation Benefit}_a)}{A} \quad (13)$$

2 Problems With Measuring the Incapacitation Benefit

In the above description, the incapacitation benefit is oversimplified First, when a convict is removed from society, he or she may not cease to commit crime, but may commit it in prison instead In this data set, if the said crime is dealt with inside the prison, no additional cost is attributed to that crime Instead, the cost of the crime is assumed to be included in the prison budget If the crime were prosecuted, however, then the cost of the crime is estimated in the same way as for any other crime

Second, it is assumed that whenever one criminal does not commit a crime, no one else commits it either In some cases, the removal of one criminal from society results in the increased activity of others Ernest van den Haag has pointed out that researchers

> cannot be sure that a change in an individual convict's behavior is reflected in an equal net change in the total amount of crime His argument is that the amount of some types of crime may be limited by the number of profitable opportunities to commit the crime, rather than by the number of people who are prone to commit the crime (Cook, 1977, 169)

McGuire (1978) argues that the displacement effect varies greatly from one crime type to another The following factors are positively related to the displacement effect

(1) the economic motivation of the crime

(2) the extent to which there is no need for offense-specific physical or human capital

(3) the extent to which the type of offense is controlled by organized crime

The displacement effect is greater when an economic crime is involved because such crimes are a substitute for work, whereas violent crimes are not Likewise, if there is no offense-specific human or physical capital required, one criminal is a good substitute for another Finally, if the offense is controlled by organized crime, a ready supply of substitute labor (and capital) is available (McGuire, 1978, 144)

The displacement effect is clearly present

> for crimes which involve the production and sale of illicit commodities The sudden incapacitation or rehabilitation of 20 per cent of the prostitutes, numbers runners, and illicit drug dealers in New York City may cause a temporary disruption in these activities But we would expect that eventually they would be almost entirely replaced and/or that the remaining people in these occupations would step up their level of activity to make up the deficit because this is the normal supply response to the initial increase in price that would result from the withdrawal of some suppliers This reasoning has motivated a recommendation that law enforcement efforts to reduce heroin use be redirected to focus on the demand side rather than the supply hierarchy 'The key element in the heroin market will not be the poppy grower, the heroin smuggler, or the drug dealer There are any number of alternative ways to perform these functions The indispensible element is the heroin user' (Cook 1977, 169)

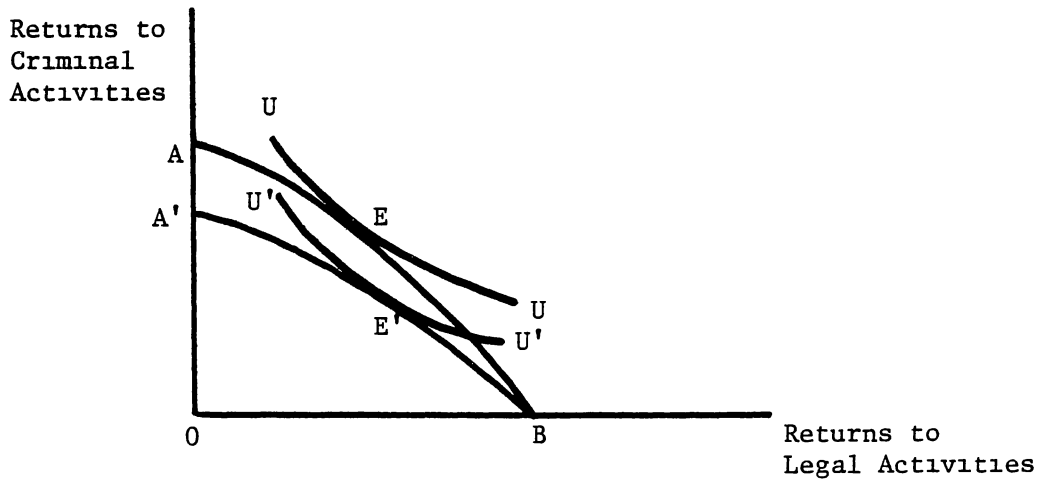
The same kind of reasoning applies to most of the crimes with an economic motive In contrast, aberrant crimes committed by psychopaths do not have a displacement effect Van den Haag argues that these crimes can be reduced on a one-for-one basis by incapacitation (Van den Haag, 1975, 53)

McGuire argues that large displacement effects are present for many crimes Therefore, he argues that the incapacitation effect is small (McGuire, 1978, 147) In this study, burglary, robbery, and theft are the most frequently committed crimes Ninety percent or more of all burglaries and robberies are committed within 1 5 miles of the criminal's home (Repetto, 1976, 174) Therefore, one may argue that there is a great need for offense-specific human capital namely, a good knowledge of the neighborhood As a result, the displacement effect for these crimes may be rather low, as is argued in Chapter V

D Deterrence Benefit

Deterrence results when potential criminals respond to the threat of punishment by committing less crime than they would have in the absence of punishment The deterrence benefit is equal to the value of the change in potential criminals' behavior due to the threat of punishment The deterrence benefit of a correctional program is the value of crime potential criminals restrain from committing due to the threat of punishment in that program The deterrence benefit is directly related to the public's perception of the certainty, the severity, and the speed of punishment It is assumed that the public's perception of punishment is positively related to the actual punishment

The deterrence benefit can be depicted on a transformation curve similar to that used earlier for the rehabilitation benefit In Figure 9, the transformation curve AB shifts to A'B in the face of correctional punishment The returns to criminal activity fall by an amount AA' and criminal activity will decrease as shown by a move from E to E'(McGuire, 1978, 31)



Source McGuire, 1978, 31

Figure 9. Transformation Curve Showing Deterrence

The level of analysis for the general deterrence benefit is different from that of the previous benefits This is because deterrence affects potential criminals rather than convicts Since this study uses a data set describing the behavior of a certain group of convicts, deterrence is not measured with this data set Rather, an estimate of deterrence is employed which was gleaned from the deterrence literature, using cross-sectional analysis This estimate is an estimate of the total deterrence benefit It is subsequently divided by the years in the study to yield the annual deterrence benefit

E Social Costs

The last three sections of this paper have concerned the rehabilitation, incapacitation, and deterrence benefits Each of these benefits results because, if crime is reduced, resources are released for alternate uses Likewise, if correctional programs are reduced, resources are released for alternate uses The value of these resources constitutes the social cost of corrections In this paper, the total cost of corrections is estimated and it is subsequently divided by the years in the study to yield the annual cost of corrections

To measure the social cost of corrections, one must examine the value of the resources used by the corrections system, as well as the opportunity losses of the convicts Social costs are incurred when goods and services are produced that would not be produced in the absence of corrections Food, shelter, and clothing are produced for convicts whether or not they are incarcerated Therefore, these costs should be classified as transfer payments However, they are rightfully classified as transfer payments only to the extent that they are

comparable to what the inmates would have purchased themselves Therefore, only a small part of the enormous expense associated with incarceration should be counted as a transfer payment rather than a social cost

Another important opportunity cost occurs when convicts are incarcerated The value of the inmate's free-world work, before taxes, less the value of prison work is a social cost To measure this loss, one wants to compare the value of what is produced in prison to the value of what would have been produced had the inmate been free Since it is impossible to know what would have been produced had the inmate been free, an estimate is needed

There are several ways to estimate this counterfactual value of foregone earnings One could use a carefully matched control group, for example Or, one could use estimates of the average earnings of workers in the same occupations as the convicts in the sample This was the approach of McGuire (1978) and Singer (1976) Or, one could follow the lead of Holahan (1971) and estimate foregone earnings on the basis of past earnings Whenever past earnings are known, this may be the best strategy Since inmates are rarely average earners, this last approach avoids the overestimation of foregone earnings that results from assuming that inmates are average earners In addition, this approach avoids the necessity of finding a suitable control group

All three strategies assume that lost earnings are a good proxy for lost production Under perfect competition, wages are equal to marginal productivity, but this is no longer true with market imperfections Examples of market imperfections are monopoly in the product or labor markets, any kind of employer discrimination (against convicts, for

example) or any externality In the imperfect markets which result, prices do not reflect social value and so wages do not reflect the social value of marginal products Though all of these imperfections lessen the extent to which earnings are a good measure of productivity, many studies use earnings to estimate productivity because they are the best measure available (Holahan, 1971, 173) This study is no exception

Singer (1976) thinks that earnings as an estimate of income have another problem He notes that the ratio of unearned income to total income is quite high for the lowest income earners He describes the various forms of unearned income

> In addition to earnings from wages, salaries, and self-employment, money income includes social security and other government pensions, dividends, rent, interest, and other property income, public assistance and welfare, unemployment and workmen's compensation, veterans' benefits, and private pensions and annuities (Singer, 1976, 8)

Singer proceeds to include unearned income in his estimate of the social cost of foregone earnings A careful look at the above list of income sources may convince the reader that the loss of these income sources should not be counted as a social loss This is because most of these income sources are transfer payments A transfer payment differs from earned income in that it is not paid for a good or service currently produced Instead, a transfer payment involves "robbing Peter to pay Paul " Therefore, only the overhead involved in the transaction, and not the transfer payment itself, is a social cost

Earnings from dividends, rent, and interest are not transfer payments However, these unearned sources of income should not be counted as foregone earnings for the inmate, since they are not necessarily foregone due to imprisonment

Another problem one must encounter when estimating foregone labor is how to deal with unemployment Both Holahan (1971) and Singer (1976) assume full employment Singer defends this assumption by writing that, "to postulate that labor would be wasted outside the institutions does not make it more defensible to waste it inside" (Singer, 1976, 10) Holahan agrees with Singer He writes that the inmate's situation immediately prior to incarceration

> may be one of a temporary low point in terms of employment and earnings level which would correct itself in the absence of the program [in this case, incarceration] As Cain and Hollister point out 'Using zero earnings as the permanent measure of earnings of an unemployed person is an example of attributing normality to a transitory status' (Holahan, 1971, 86)

Both Holahan and Singer proceed to estimate the value of foregone labor assuming full employment This assumption is faulty since one wants to look at the change in each inmate's earnings due to incarceration If the inmate were unemployed prior to incarceration, there is no change It is true that one should not assume that zero is a good estimate of permanent earnings However, last year's earnings may be a good estimate for next year's earnings or even each of the next two year's earnings (During this study, the average period of incarceration is 19 months and no inmate is studied for a period greater than 27 months)

On the other hand, one might argue that when an inmate loses his or her job, a non-criminal probably gets the job This is especially true when the unemployment rate is high In this case, there is no resulting social cost However, if both persons are thought to be equally important members of society, there is no social benefit either

There is another possible cost of foregone earnings to the inmate the cost of reduced earnings following punishment For example, there

may be a stigma associated with being an "ex-con " If so, the inmate may get a lesser paying job following incarceration than the counterfactual earnings he or she would have earned in the absence of incarceration It is not possible to know the level of counterfactual earnings Therefore, the level of earnings following incarceration will be compared to the earnings of the inmate prior to incarceration

This approach is not without problems First, the researcher must decide how long each inmate should be studied to determine whether or not he or she succeeded in getting a job upon release Second, the researcher must determine how long the change in earnings due to punishment will be in effect Finally, the researcher must account for changes in the inflation and unemployment rates, as well as changes in the inmate's age over the period of incarceration

Another approach for estimating the reduced earnings of inmates due to punishment is used by Holahan (1971) He compares the earnings of ex-inmates to the earnings of a group of non-inmates This is a viable approach when one has a large group of good potential cohorts from which to choose

The above discussion concerned inmates only While probationers suffer no income loss due to incapacitation, their earnings may also be reduced due to conviction The ideal study would examine this loss for probationers as well as for inmates

III Net Benefits

The net benefits for probation (PNB) is now easy to solve for The cost per probationer (PC) is subtracted from the sum of the

probation rehabilitation benefit (PRB) and the probation deterrence benefit (PDB) to yield

$$PNB = PRB + PDB - PC$$

The net benefits for prison (ANB) and jail (JNB) are formed similarly For example, the prison rehabilitation benefit (ARB), deterrence benefit (ADB) and incapacitation benefit (AIB) are summed Then the cost of prison, to include the cost of foregone labor, (AC) is subtracted from this total

$$ANB = ARB + ADB + AIB - AC$$

The equation for jail is

$$JNB = JRB + JDB + JIB - JC$$

where

JNB = Jail net benefit

JRB = Jail rehabilitation benefit

JDB = Jail deterrence benefit

JIB = Jail incapacitation benefit

JC = Jail costs

CHAPTER IV

AN APPLICATION OF THE MODEL

This chapter applies the methodology presented in the last chapter, beginning with a description of the sample and the methods of data collection Next, the rehabilitation and incapacitation benefits are discussed Rehabilitation and incapacitation benefit society by reducing the amount of crime, and therefore, the social costs of crime

Next, the costs of corrections are discussed That is, certain costs are incurred due to the existence of corrections Once derived, these costs are compared to the benefits of corrections (or the reduced costs of crime) In the following chapter, the results of this application are discussed

I The Sample

The sample used here comes from the work of Clark Larsen (Larsen, 1983) Larsen drew a random sample of 112 burglars from the 450 burglars convicted in Maricopa County, Arizona in the first half of 1980 He kept records on these convicts until June 30, 1982 This means that each convict was followed for an average period of 2 25 years, depending on when they were sentenced

Larsen defines burglary as entering or remaining in a structure to commit a felony or theft (Larsen, 1983, 19) It can involve a car, a home, or a business Burglary was chosen as the crime to study for several reasons (1) it encompasses a broad variety of behavior, (2)

the population of offenders is large, and (3) people are seriously concerned about the threat of burglary (Larsen, 1983, 19)

To be included in this population of burglars, a convict must have been convicted of burglary, but not of a more serious crime on the date of sentencing (Larsen, 1983, 21) Though the individuals in this group were selected because they were burglars, many of them committed other crimes before and after their burglary conviction During the study period following these convictions, burglary accounted for only 18 percent of their new violations

Prior studies indicate that certain factors are indicators of recidivism and are considered by judges in their sentencing decision See Table II for a list of these background characteristics The convicts were not sentenced randomly, that is, the more serious offenders were more likely to be incarcerated This fact is confirmed by Table III which shows the number of arrests for each type of crime prior to 1980 by probationers, prisoners, and those sent to jail Prisoners have the most serious criminal records followed by those sent to jail

The burglars in this study were sentenced as follows prison, 24 (21 percent), jail, 2 (2 percent), probation/jail mix, 23 (20 percent), probation, 59 (53 percent), and other, 4 (4 percent) The average period of punishment was 19 months in prison, three months in jail, and 13 months on probation These average periods include only the 24-30 months that were during the study period Some convicts were still incarcerated or on probation at the completion of Larsen's study

TABLE II

BACKGROUND CHARACTERISTICS OF SUBJECTS

Age	range 18-44, median 23 years
Race	white, 53%, Mexican, 25%, Black, 18%, Indian, 4%
Sex	male, 93%, female, 7%
Education	range, 0-15 years, median, 10 years
Employment	unemployed, 57%, unskilled, 30%, skilled, 13%
Marital Status	single, 76%, divorced, 11%, separated, 6%, married, 18%
Addiction	none, 28%, marijuana, 50%, amphetamine, 6%, cocaine, 2%, heroin, 14%
Prior Arrests	
Misdemeanor	mean, 2, range, 0-17 (30% had 0)
Juvenile	mean, 1, range, 0-24 (68% had 0)
Felony	mean, 2, range, 0-12 (35% had 0)

Source Larsen, 1983, 23

TABLE III

PRIOR ARRESTS BY CRIME TYPE AND CONVICT TYPE

Crime Type	24 Prisoners	25 Jail Inmates	25 Probationers
Marijuana Use	11	0	6 75
Marijuana Sale	0	0	40
Drug Use	7	4	0
Drug Sale	4	0	40
Burglary	67	12	12 30
Robbery	12	8	1 59
Probation Violation	2	1	0
Driving While Intoxicated	8	10	1 98
Assault	7	1	1 59
Aggravated Assault	6	4	1 98
Grand Theft Auto	5	2	79
Theft	16	6	4 37
Grand Theft	4	1	79
Fraud and Forgery	16	2	1 19
Escape	4	1	0
Shoplifting	4	2	1 19
Trespassing	1	6	1 59
Disorderly Conduct	2	2	2 38
Receiving Stolen Property	4	1	1 19
Rape	0	1	0
Total	180	64	41 27

*Though there are 63 probationers in this sample, these numbers were adjusted for 25 probationers so that the number of crimes for prisoners, jail inmates, and probationers can be meaningfully compared

In this study, the convicts are grouped into three groups, according to the nature and length of their punishment This is because this study approaches the question, "How is criminal behavior affected by the type of punishment?" The first group of convicts is the prisoners who spent an average of 19 months in prison, during the study period The second group includes those who had a straight jail sentence and those who served a jail sentence followed by probation The former group spent an average of 4 months in jail, while the latter spent only 3 months in jail Nevertheless, 3 months of jail is a more similar experience to 4 months of jail than it is to straight probation Finally, the 4 convicts receiving fines or no further punishment at the time of sentencing are grouped with the 59 probationers Once again, these treatments are more similar to each other than to the other punishments

II Methods of Data Collection

The process of data gathering was a lengthy one In addition to gathering background information, Larsen also wanted to know the extent of each convict's criminal behavior, both before and after punishment He turned first to the records maintained by the clerk of the court Once this information was obtained, Larsen regarded each subject as a separate investigation (Larsen, 1983, 30) He sought information about each person wherever it could be found Larsen got information from the convicts themselves as well as their families, friends, and acquaintances Then this information was checked against at least one, independent separate source whenever possible (Larsen, 1983, 31)

The fact that Larsen did not rely solely on official data is important because official records do not document all crime

Therefore, Larsen tried to get better information concerning criminal behavior than is available in official records The method he turned to was the personal interview Though fraught with problems, the information gathered in this way is better than the very inadequate information available otherwise

Greenwood and Abrahanse point out that self-reported data are not perfect While there is

> considerable variation between self-reports and official records, there is no systematic bias toward either over- or under-reporting across different types of offenders as categorized by age, race, or conviction offense (Greenwood and Abrahanse, 1982, 13)

In these interviews, the convict was asked to describe criminal actions which Larsen then classified by crime type Since over-reporting can be a problem, Larsen tried to avoid recording crimes which convicts claimed they had committed but had not He asked the convict how each crime had been committed and if the approach described was not realistic, the crime was not recorded Under-reporting is also a problem and so convicts were given a letter from the County Attorney stating that the information provided was confidential and was being gathered only for academic reasons

During the interview, the information given was checked for accuracy compared to known data and for internal consistencies throughout the interview If data were questionable on either of these counts, an attempt was made to confirm it by additional investigation When a confirmation was not possible, the data were disregarded

An effort was made to locate each of the 112 convicts in the sample for an interview However, 23 were out of the area, 10 were transient or their whereabouts unknown, 10 had outstanding warrants and one was

dead The remaining 68 were invited for an interview but 7 declined, leaving only 61 interviews (Larsen, 1983, 32)

Since not all of the subjects were interviewed, a regression analysis was done to compare the background information of those who were and were not interviewed Of the ten variables tested, only education significantly predicted whether or not a person would be interviewed The higher the level of education, the greater the chance of being interviewed (Larsen, 1983, 32)

III Rehabilitation Benefit

In the last chapter a measure of the rehabilitation benefit was presented For each group of convicts, it compared the cost of prior and recidivistic crimes To the extent that the cost of recidivistic crimes is less than the cost of prior crimes, rehabilitation has occurred The formulae for prior and recidivistic crimes follow

$$\text{Yearly Cost of Priors} = \left(\frac{\sum_{i=1}^{28} (\text{Arrests}_i)\ (\text{Social Cost}_i)\ (\alpha_i)}{\text{Age}_s\text{-18-Years of Prior Incarceration}}\right) \tag{14}$$

$$\text{Yearly Cost of Recidivism} = \left(\frac{\sum_{i=1}^{28} (\text{Arrests}_i)\ (\text{Social Cost}_i)\ (\alpha_i)}{\text{Years of Post-Sentence Freedom}_c}\right) \tag{15}$$

where Crime_i = number of arrests of type i

α_i = the crime multiplier for crime i, or crimes per arrests

i = an index for the type of crime

28 = the total number of crime types committed by these convicts

$\text{Age}_s - 18$ = the longest possible adult crime career for this convict, or years of adult pre-sentence freedom

The yearly rehabilitation benefit is

$$\text{Yearly Rehabilitation Benefit} = \text{Yearly Cost of Priors} - \text{Yearly Cost of Recidivism} \qquad (16)$$

The number of arrests serves as a proxy for the number of crimes committed This estimate is later adjusted upwards since more crimes are committed than arrests are made The number of arrests is available for each convict in the sample for the period prior to sentencing, but following his or her eighteenth birthday It is also available for the 2 25 year period following sentencing Before solving for the rehabilitation benefit, one needs to know how the social cost and the crime multipliers were derived for each crime type

A The Social Cost of Each Crime Type

How much does each crime cost? There are at least two ways to estimate the social cost of each crime in this study One method is to measure public attitudes toward being a victim of different crimes Presumably, the resulting scale provides a measure of the disutility associated with each crime Ideally, these values can be translated into the dollar amount people would be willing to pay to avoid the different crimes

Unfortunately, the scales which criminologists regard as the best do not employ any kind of budget constraint They yield very large numbers for crimes like murder Few individuals would be able to spend sums as great as these to avoid murder For example, Table IV shows the disutility associated with each index crime, as presented by Sellin and Woolfgang in the most famous study of this type (Science and Technology, 1967, 56) These numbers can be interpreted as follows a person is

TABLE IV

SELLIN-WOOLFGANG MEASURES OF CRIME DISUTILITY

Type of Crime	Average Disutility
Murder	400,000,000
Rape	10,000,000
Aggravated Assault	20,000
Robbery	10,000
Auto Theft	900
Burglary	200
Grand Larceny	100
Petty Larceny	90

Source Science and Technology, 1967, 56

as worried about a 1/900 probability of an auto theft as a 1/400,000,000 probability of murder Alternately, a person would be willing to pay 444,000 times as much to avoid a certain muder as a certain auto theft Using this scale, a person who would be willing to pay $8,000 to avoid a certain auto theft, would be willing to pay $3 5 billion to avoid certain death

Despite this unlikely prediction, this approach has the advantage of measuring the nonpecuniary costs of crime Other approaches measure the dollar costs associated with crime, but ignore costs like the cost of pain and suffering

Larsen provides one such estimate of the cost of crime Larsen has measured the social cost of each crime type in Arizona by summing some of the major costs associated with the crimes This approach omits other costs of crime which were deemed too difficult to measure For example, no estimate was made of the value of victims' time lost nor their psychological loss For some of the crimes listed here, each of these costs may be great Consider the person who is raped, robbed, or assaulted and subsequently requires extensive counseling Even in the absence of counseling, the person's life may be clouded with fear The failure to measure such costs here does not denigrate their importance This study also includes incomplete measures of some of the costs that were estimated Therefore, these estimates can only be thought of as underestimates of the full cost (Larsen, 1983, 97) Larsen breaks costs down into the following types of costs (These cost values are listed in Table V)

TABLE V

COMPARATIVE COSTS OF CRIMES (IN 1981 DOLLARS)

	Police	Target Hardening	Loss to Victims	Arrest	Court	Prosecution	Defense	Total
Rape	264			132	1493	881	463	3233
Armed Robbery	184	551	642	92	1467	848		3784
Drug Sale	264			132		692	530	1618
Marihuana Sale	248			124		727	444	1543
Burglary	172	516	1818	88	1141	686	477	4898
Aggravated Assault	146			73	1301	634	660	3233
Grand Theft	175	526	242	88	755	659	303	2748
Grand Theft Auto	123	368	3117	62	793	543		4906
Rec Stolen Prop	269			135		878	384	1666
Robbery	161	484	190	81	1380	649	328	3273
Arson	76	228	8006	38		707		9055
Fraud and Forgery	203	609		102		662	361	1937
Drug Possession				126		502	421	1300
Vandalism	76	228	268	38		484		1094
Escape					2192			2192
Shoplifting	114	342	26	57		530		1069
Driving While Intox	28					39	213	280
Marihuana Poss				109		346	321	993
Reckless Endang.						567	686	1253
Trespassing	57	171		29		426		683
Petty Theft	108	323		54			256	741
Disorderly Conduct.	57			29			153	239
Assault	97			48			150	295
Indecent Exposure	114			57		811		982
Hit and Run	145			73		39		257
Immigration	225			140				365
Probation Violation						645	237	882

Figures taken from Larsen, 1983, 93

1 Police Investigation Costs

Here the costs of crime investigation to the police department were measured Both the costs of capital and the costs of labor were examined The cited study was done by Lawrence-Leiter and Company (1975) and the figures were converted to 1981 dollars To check for accuracy, the value of police labor per investigation was checked against a Phoenix Police Department study which considered labor costs only The estimates of labor costs by these two studies were consistent (Larsen, 1983, 95)

2 Target Hardening

Target hardening is defined as money spent to make a location or a person less likely to be a crime target These expenses include the cost of security guards, private watchmen, lights, fences, and so on On a national level, the cost of security guards and private watchmen has been estimated to be twice as great as the cost of police Also, the cost of security equipment is thought to be equal to the cost of police Therefore, target hardening costs were estimated to be three times as great as police costs for each crime (Larsen, 1983, 95)

3 Victim Loss

The estimates of the cost of victim loss due to crime came from the Arizona Department of Public Safety (1981) While these losses may be viewed as a pure transfer, resources were used by the criminal to attain them and by the victim to avoid them (see target hardening) Here, the value of the victim loss is used as an estimate of the value of foregone legitimate labor involved in the commission of the crime This is an

approach which was championed by Gary Becker in the early 1970s Becker argued that if theft is competitive, then

> the value of the criminal inputs will only equal the market value of the stolen property That is, if crimes such as theft were profitable, more people would become thieves As the supply of criminals expands, it becomes harder and harder for each criminal to find profitable thefts He or she has to spend more of his or her time searching for good theft opportunities and may need more sophisticated equipment Eventually, the supply of thieves expands enough so that the value of criminal inputs required just equals the value of the thefts If too many criminals enter the field, some will find theft an unprofitable enterprise and turn to some other activity where they can realize more for their efforts (Friedman, 1976, 13)

The above reasoning was based on an "average" approach to the issue rather than a "marginal" one More recently, research by Tullock (1980) and Jadlow (1985) suggests that the cost of rent seeking frequently will be much less in total than the transfer being sought Nevertheless, there is a positive relationship between victim loss and the value of legitimate foregone labor Some proxy is needed to estimate the value of this labor Therefore, victim loss is used as a proxy for the foregone legitimate labor of convicts This proxy yields an overestimate However, this study also includes underestimates of other costs of crime, like the cost of pain and suffering

4 Arrest Costs

Smith, Alexander, and Thalheimer (1980) found that the cost to the police of an arrest is half the cost of investigation Therefore, these arrest figures are estimated to be one half as great as the police investigation costs (Larsen, 1983, 96)

5 Court Costs

The Lawrence-Leiter study (1975) also examined court costs and the results of the study were adjusted to 1981 dollars The court administrator provided figures for cases disposed of in 1981 to help authenticate the numbers (Larsen, 1983, 95)

6 Prosecution Costs

The Maricopa County Attorney's Office conducted a study of prosecution costs in 1982 These figures include direct salary costs with some adjustment for administrative overhead, but did not include a fixed facilities component (Larsen, 1983, 97)

7 Defense Costs

The court administrator conducted a study in 1977 to determine the charges made to the court from appointed counsel on various types of cases The average cost for each crime was found and adjusted to 1981 dollars (Larsen, 1983, 97)

8 The Use of Cost Figures

For the prior arrests, this cost information was used in the following way If an arrest were made for a crime, the cost of that crime was estimated to include all costs of going to court It was assumed that each case went to court Clark Larsen stated in a phone interview that almost all of the arrested persons went to court in Maricopa County in 1980 Though many plea bargained, the lower cost associated with plea bargaining is reflected by the average value for

court costs This cost is much lower than it would have been without the many plea bargained cases included in the average

In the case of the self-reported crimes, there were no arrest, court, prosecution, or defense costs Therefore, self-reported crimes were multiplied only by the remaining costs police investigation, target hardening, and victim loss Table VI presents the total costs of crimes committed by convicts, before and after punishment It also presents some background information about each convict

The reader may notice that the cost of crimes are not discounted here The costs of crime (as well as the cost of corrections) are discounted later in the chapter, and the results are presented

B The Crime Multiplier

One of the estimates that is needed for this study is the ratio of the total number of crimes to the number of arrests This ratio can be multiplied by the number of arrests to estimate the total number of crimes committed Deriving this crime multiplier is a challenge, because it requires an estimate of the number of unreported crimes One wants to estimate the following for each crime type

$$\frac{\text{Total Crimes}}{\text{Arrests}} = \frac{\text{Total Crimes}}{\text{Reported Crimes}} \quad \frac{\text{Reported Crimes}}{\text{Arrests}} \tag{16}$$

There are several ways to estimate the crime multiplier or the ratio of the total cost of all crimes to the total cost of crimes with arrests One begins by estimating the ratio of all crimes to arrests One way to do this involves nation-wide estimates of total crimes based on victimization survey data

The estimate of national multipliers comes from the Uniform Crime Reports (1982, 319 and 399) Each year, 40,000 people are surveyed and

TABLE VI

BACKGROUND INFORMATION AND CRIME COSTS OF CONVICTS

Convict Number	Interviewed (1=yes)	Age	Sentence*	Months in Prison	Months in Jail	Yearly Priors Cost	Yearly Recidivism Cost
1		30	A	14		$ 8,557	$2,592
2		37	A	6		$12,094	$58,860
6	1	29	A	18		$10,097	$3,288
7	1	31	A	12		$1,678	$0
14	1	25	A	6		$9,925	$58,776
20	1	32	A	18		$5,331	$54,072
21	1	33	A	4		$2,499	$8,472
22	1	23	A	7		$61,281	$58,776
23		23	A	25		$7,724	$840
28	1	37	A	23		$2,789	$7,764
31		22	A	18		$3,918	$11,352
32	1	23	A	18		$16,082	0
34	1	26	A	12		$6,324	$58,776
36	1	24	A	14		$17,967	$2,016
9		32	AOO	26		$7,549	$0
11	1	30	AOO	29		$8,504	$0
16	1	30	AOO	26	3	$12,868	$0
17	1	23	AOO	24	8	$7,790	$0
18	1	27	AOO	27	4	$4,049	$0
33	1	22	AOO	26		$14,885	$0
47		41	AOO	17	3	$468	$0
49	1	23	AOO	26	1	$26,460	$0
79		22	AOO	24	3	$9,796	$0
93	1	36	AOO	25	1	$5,145	$0
10		27	J		4	$6,409	$10,488
58		37	J		6	$72	$0
63		42	J		2	$1,662	972
82	1	21	JOO		27	$4,716	$0
5		28	JP		3	$596	$0
8		26	JP		8	$577	$3,288
12		38	JP		4	$1,580	$1,464
15		43	JP		2	$826	$4,896
29		20	JP		3	$5,027	$0
35		23	JP		1	$3,249	$0
39	1	21	JP		3	$7,396	$3,468
43	1	20	JP		1	$6,228	$3684
46	1	22	JP		3	$7,837	$19,584
52		37	JP		4	$157	$0
65	1	20	JP		9	$9,460	$143,364
67	1	22	JP		7	$2,163	$29,640
68		20	JP		1	$25,407	$0
69		23	JP		1	$2,238	$0
73		22	JP		6	$11,128	$27,516

TABLE VI (continued)

Convict Number	Interviewed (1=yes)	Age	Sentence	Months in Prison	Months in Jail	Yearly Priors Cost	Yearly Recidivism Cost
85	1	40	JP		1	$201	$0
89		19	JP		2	$30,457	$2,748
92		19	JP		1	$17,953	$144
104		19	JP		6	$993	$29,904
105		25	JP		2	$4,656	$9,216
107	1	27	JP		1	$958	$504
19		27	N			$0	$468
94		20	N			$7,347	$0
103	1	28	N			$559	$0
112		19	N			$15,172	$264
3		26	P			$4,214	$7,320
4		28	P			$4,433	$492
13	1	24	P			$887	$1,968
24		23	P			$10,181	$14,400
25		24	P			$6,763	$1,056
26	1	32	P			$12,228	$5,952
27	1	27	P			$587	$2,016
30		21	P			$10,152	$600
37	1	22	P			$4,488	$420
38	1	22	P			$265	$0
40	1	44	P			$932	$648
41	1	21	P			$2,500	$10,824
42	1	21	P			$0	$68,436
44		22	P			$3,674	$22,032
45	1	19	P			$4,906	$8,592
48	1	20	P			$7,957	$552
50	1	20	P			$40,565	$19,584
51		21	P			$39,732	$25,308
53	1	19	P			$0	$2,952
54	1	21	P			$4,898	$0
55		26	P			$3,766	$0
56	1	19	P			$17,481	$540
57		20	P			$1,045	$804
59		20	P			$8,984	$0
60	1	19	P			$19,235	$7,344
61	1	20	P			$280	$0
62		21	P			$98	$0
64	1	41	P			$50	$0
66		19	P			$4,364	$8,124
70	1	32	P			$0	$69,360
71		20	P			$1,924	$0
72		20	P			$0	$0
74	1	35	P			$44	$468
75	1	21	P			$269	$0
76		23	P			$273	$19,584

TABLE VI (continued)

Convict Number	Interviewed (1=yes)	Age	Sentence	Months in Prison	Months in Jail	Yearly Priors Cost	Yearly Recidivism Cost
77		20	P			$0	$7,344
78	1	19	P			$14,694	$1,008
80	1	19	P			$0	$0
81	1	19	P			$741	$0
83	1	19	P			$741	$1,308
84	1	20	P			$0	$105,792
86	1	41	P			$12	$0
87		29	P			$1,633	$6,504
88	1	19	P			$19,235	$1,692
90	1	24	P			$124	$120
91	1	21	P			$187	$120
95	1	22	P			$0	$0
96		19	P			$0	$924
97		34	P			$208	$2,112
98	1	24	P			$0	$600
99		26	P			$481	$21,048
100		22	P			$198	$0
101	1	23	P			$0	$0
102		20	P			$0	$8,808
106	1	19	P			$741	$0
108		19	P			$0	$33,120
109	1	20	P			$29,174	$17,196
110	1	35	P			$0	$0
111		31	P			$105	$0

*A = Arizona State Prison (ASP)
AOO = not released from ASP sentence during study period
J = jail
JOO = not released from jail during study period
JP = jail and probation
N = no sentence
P = probation

their reports of victimization are used to estimate the total number of index crimes committed These estimates are good estimates to the extent that all crime is accurately reported in the survey

Unfortunately, there are several problems associated with this procedure First, these estimates are available only for the seven index crimes Second, even if they were available for all crimes, one does not know what fraction of the total crimes were committed by those arrested Since all crimes are not committed by people who get arrested, the ratio of total crime to arrests overstates the crime multipliers for individual criminals Also, with any given sample of convicts, the convicts in the sample may be better at some crimes and worse at others than average It is the individual crime multipliers for the convicts in the sample that are of interest here For these reasons, national multipliers are not used in subsequent estimates

Larsen avoided each of these problems by interviewing 61 of the 112 convicts in his sample He asked them what crimes they had committed since sentencing and recorded it alongside their arrests since sentencing The average ratio for each crime type was used to estimate the crime multipliers for the convicts who were not interviewed This technique introduces its own problems For one thing, the sample size is small Also, the convicts may lie about their exploits to appear brave or from fear of being caught As pointed out earlier, several studies by the Rand Corporation have shown that though these over- and underestimates do occur, they tend to cancel each other out (Greenwood and Abrahanse, 1982, 13) For most of the crimes committed by the convicts in Larsen's study, the crime multiplier, or the ratio of crimes committed to arrests was one However, for some crimes the crime

multiplier was more than one Each of these crimes is listed in Table VII along with all seven index crimes

Table VII shows the unweighted crime multipliers as well as the crime multipliers which are adjusted for cost The columns showing the cost adjusted crime multipliers show the ratio of the total cost of crime (with and without arrests) to the cost of crimes with arrests Cost adjusted multipliers are lower than the unweighted crime multipliers because all the costs associated with a crime for which an arrest is made do not apply to crimes for which no arrest is made While the costs of police investigation, target hardening, and victim loss are relevant to all crimes, the costs of arrest, court, prosecution, and defense apply only to crimes with arrests

C Measuring the Rehabilitation Benefit

Having solved for the crime multiplier and the social cost of crime, the yearly cost of priors and of recidivism can be solved for The formulae at the beginning of the chapter showed how these values are obtained The yearly cost of priors and recidivism for each convict are printed in the last two columns of Table VI The yearly rehabilitation benefit is estimated by the difference between the yearly cost of priors and recidivism If the former is greater, rehabilitation has occurred If not, dehabilitation has occurred The total rehabilitation benefit is equal to the yearly rehabilitation benefit times the number of years of rehabilitation Finally, the annual rehabilitation benefit is derived by dividing the total rehabilitation benefit by the number of years in the study This annual rehabilitation benefit is obtained for

TABLE VII

CRIME MULTIPLIERS

Crime Type	Unweighted Crime Multipliers (not adjusted for cost) National*	Larsen**	Crime Multipliers (adjusted for cost) National	Larsen
Murder	1	1	1	1
Rape	5	2	1	1
Robbery	7	1	3	1
Aggravated Assault	14	1	2	1
Burglary	14	4	7	3
Grand Theft	21	8	8	3
Motor Vehicle Theft	10	1	8	1
Assault		2		1
Receiving Stolen Property		13		3
Fraud and Forgery		3		2
Drug Sale		23		5
Drug Possession		488		1
Marijuana Possession		450		1

*Uniform Crime Reports, 1982, 319 and 399

**Larsen, 1983, 101

prison inmates, jail inmates, and probationers The estimates stemming from the equations that follow are shown in Table VIII These estimates are based on the assumption that rehabilitation lasts 2 25 years In this case, the annual rehabilitation benefit is equal to the yearly rehabilitation benefit Other assumptions will be explored in the next chapter

$$\text{Annual Probation Rehabilitation Benefit} = \sum_{p=1}^{62} \frac{(\text{Annual Rehabilitation Benefit}_p)}{62} \tag{17}$$

where

p = an index for the probationer number

P = the number of probationers in the sample

$$\text{Annual Jail Rehabilitation Benefit} = \sum_{j=1}^{24} \frac{(\text{Annual Rehabilitation Benefit}_j)}{24} \tag{18}$$

where

j = an index for the jail inmate number

J = the number of jail inmates in the sample

$$\text{Annual Prison Rehabilitation Benefit} = \sum_{a=1}^{14} \frac{(\text{Annual Rehabilitation Benefit}_a)}{14} \tag{19}$$

where

a = an index for the prisoner number

A = the number of prisoners in the sample

IV Incapacitation Benefit

To know how much money is saved by physically removing a convict from society, one needs to know how much crime the convict would have committed if free To estimate this value, the yearly cost of priors, or crimes committed prior to incarceration was used This value is

TABLE VIII

ANNUAL REHABILITATION BENEFIT PER CONVICT

	Yearly Priors Cost	Yearly Recidivism Cost	Yearly Rehabilitation Benefit
Prison	$11,900	$23,300	$-11,400
Jail	$ 6,100	$12,100	$- 6,000
Probation	$ 4,900	$ 8,000	$- 3,100

multiplied by the years of incapacitation to determine the total incapacitation benefit The total incapacitation benefit is then divided by the 2 25 years in the study to get the Annual Incapacitation Benefit This benefit is derived for prison and jail inmates, as follows All 49 inmates are included here, whether or not they were released during the study period See Table IX for empirical results

$$\text{Annual Jail Incapacitation Benefit} = \sum_{j=1}^{25} \frac{(\text{Annual Incapacitation Benefit}_j)}{25} \quad (20)$$

$$\text{Annual Prison Incapacitation Benefit} = \sum_{a=1}^{24} \frac{(\text{Annual Incapacitation Benefit}_a)}{24} \quad (21)$$

V Deterrence Benefit

In this section, an estimate of the deterrence benefit is drawn from the literature The deterrence benefit is estimated from the literature rather than from Larsen's data set because deterrence affects all potential criminals and not just the convicts in Larsen's sample Many studies have used regression analysis to estimate the deterrence benefit Isaac Ehrlich (1973) wrote what is perhaps the most quoted piece in this field

Ehrlich used cross-section data for each of the states in the United States in 1940, 1950, and 1960 He used measures of the certainty and the severity of punishment to see how much increases in punishment cause crime to decrease He took the natural logarithm of the following regression equation

$$\frac{\text{Index Crimes}}{\text{Population}} = B_0 + B_1 \frac{\text{Felons Incarcerated}}{\text{Index Crimes}} + B_2\,(T) + B_3\,(W) + B_4\,(X) + B_5\,(NW) + \mu \quad (22)$$

TABLE IX

ANNUAL INCAPACITATION BENEFIT PER CONVICT

	Annual Incapacitation Benefit
Prison	$ 7,100
Jail	$ 800

where

T = average time served by prisoners

W = median income of families

X = percentage of families below one-half of median income

NW = percentage of non-whites in the population

Ehrlich used the variable, Offenders Imprisoned/Index Crimes, to measure the certainty of punishment, while T, or the length of the average prison sentence, was used to measure the severity of punishment Ehrlich found that both measures of punishment deter crime Using 1960 data, his estimates of B_1, or the elasticity of per capita index crimes with respect to the certainty of punishment, range from - 52 to - 99 (Ehrlich, 1973, 546 and 551) His estimates of B_2, or the elasticity of per capita index crimes with respect to the severity of punishment, range from - 58 to -1 12 (Ehrlich, 1973, 546 and 551)

Ehrlich examined the deterrence benefit of incarceration only Since this study compares incarceration to probation, the deterrence benefit of probation is important as well Unfortunately, very little has been done to evaluate the deterrence benefit of probation

Llad Phillips and Harold Votey (1975), wrote the only article concerning the deterrence benefit of prison, probation, and probation with jail Since 104 of the 112 convicts in this sample had one of these three sentences, the results of the Phillips and Votey study are directly relevant to this study Phillips and Votey began by estimating the following equation for counties in California in 1966

$$\frac{\text{Index Crimes}}{\text{Population}} = B_0 + B_1 \frac{\text{Felony Convictions}}{\text{Index Crimes}} + B_2 (SE) + B_3 \frac{\text{Felony Convictions}}{\text{Convictions of Felony Defendants}} + B_4 (PJ) + \mu \qquad (23)$$

where

SE = various socioeconomic factors

PJ = ratio of the sentence "probation with jail" to all three types of felony convictions prison, probation with jail, and probation

Felony Convictions = the number of felony defendants who get convicted for a felony Persons who get felony convictions in California are sentenced to prison, felony probation, or felony probation with jail

Convictions of Felony Defendants = includes all convicted felony defendants whether or not they are convicted for a felony

Phillips and Votey use the variable, Felony Convictions/Index Crimes, to measure the certainty of punishment Taking the logarithm of both sides of this equation, they get the result that the elasticity of per capita crime with respect to the certainty of punishment is - 62 (Phillips and Votey, 1975, 336) The measure of severity of punishment is given by the ratio of felony convictions to the convictions of felony defendants The elasticity of per capita crime to the severity of crime is - 34 (Phillips and Votey, 1975, 336) Both of these values are significant at the 5 percent level In each case, the two-stage least squares results are similar to the ordinary least squares results described above (Phillips and Votey, 1975, 338)

In addition, Phillips and Votey check the elasticity of per capita crime with respect to the sentence of probation with jail as a proportion of all felony convictions "Receiving a felony sentence of probation with jail appears to be neither more nor less effective than straight felony probation or state prison" (Phillips and Votey, 1975,

338) The authors confirm this by adding a variable comparing "the fraction of these felony sentences which were commitments to state prison The elasticity for this variable was insignificant and the variable added nothing to the equation" (Phillips and Votey, 1975, 338) That is, Phillips and Votey failed to find that prison deters more crime than probation or probation with jail

Though economic theory suggests that more severe punishments deter more crime than less severe punishments, it is not yet possible to estimate this difference The Phillips and Votey study is the only relevant study and it failed to find a difference between the deterrence values of the punishments How then should the deterrence benefit be measured? One begins by estimating the number of index crimes prevented by granting an additional felony conviction in Maricopy County, Arizona in 1980 [1] To do this, the elasticity measures of Phillips and Votey (1975) as well as their estimates of elasticity are used

$$\epsilon = \frac{\frac{\Delta \text{ Index Crimes}}{\text{Population}}}{\frac{\Delta \text{ Felony Convictions}}{\text{Index Crimes}}}$$

$$= \frac{\text{Index Crimes } (\Delta \text{ Index Crimes})}{\text{Population } (\Delta \text{ Felony Convictions})} \qquad (24)$$

$$-62 = \frac{142{,}065\ (\Delta \text{ Index Crimes})}{1{,}509{,}262 \qquad (1)}$$

$$\Delta \text{ Index Crimes} = -6\ 59$$

This value suggests that an increase of one felony conviction should reduce index crimes by 6 59 This estimate is consistent with Isaac Ehrlich's estimates of the reduction in index crimes brought about

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[1]Information provided by Ron Fountain, statistician for the Maricopa County Attorney's Office, Phoenix, Arizona

by an increase of one prisoner As pointed out earlier, Ehrlich found that the elasticity of index crimes with respect to felons incarcerated is between - 52 and - 99 (1973, 546 and 551) These estimates yield values of 5 52 and 10 52 crimes reduced, respectively, when applied to Maricopa County in 1980 For other estimates of this measure of elasticity, see Table X

Phillips and Votey's elasticity estimate of the severity of punishment follows Using figures for Maricopa County in 1980, one additional felony conviction would prevent 67 29 crimes as below

$$\epsilon = \frac{\frac{\Delta \text{ Index Crimes}}{\text{Population}}}{\frac{\Delta \text{ Felony Convictions}}{\text{Convictions of Felony Defendants}}} \qquad (25)$$

$$-34 = \frac{7{,}626\ (\Delta \text{ Index Crimes})}{1{,}509{,}262 \quad (1)}$$

$$\Delta \text{ Index Crimes} = -67\ 29$$

There are two problems with this measure of the severity of punishment First, Phillips and Votey use the proportion of the convicted felony defendants receiving severe (felony) convictions as their measure of the severity of punishment Their finding may be little more than a second measure of certainty The certainty elasticity implies that one more felony conviction leads to 6 59 fewer index crimes, while the severity elasticity implies that one more felony conviction leads to 67 29 fewer crimes

TABLE X

ESTIMATES OF THE ELASTICITY OF CRIME WITH RESPECT TO THE CERTAINTY OF PUNISHMENT

Source	Range of Estimates
Ehrlich, 1973, 546 and 551	- 52 to - 99
Forst, 1976, 479	- 02
Vandaele, 1978, 299 and 306	- 62
Carr-Hill and Stern, 1973, 304	- 17 to - 28
Votey and Phillips, 1975, 336[2]	- 43 to -1 24

[2]This measure of the certainty of punishment differs from the others in the group because the variable Felony Convictions/Index Crimes is the independent variable rather than Felons Incarcerated/Index Crimes

Second, this measure cannot be compared to the other estimates of the severity of punishment which are in the literature Most of the other estimates measure the length of prison sentences, and find that longer sentences deter more crime [3] However, it is useful to compare Phillip and Votey's severity estimate to the certainty estimate of Ehrlich (1973) Ehrlich found that one more prison sentence prevents 5 to 10 index crimes, Phillips and Votey's severity estimate suggests that even a probation or a probation with jail sentence prevents 67 index crimes

There are numerous ways to estimate the deterrence benefit from the literature The certainty measure of Phillips and Votey is used in two ways In Case I, it is assumed that 6 59 crimes are saved by every felony conviction In Case II, it is assumed that all the crimes saved by felony convictions (in the work of Phillips and Votey) were saved by prison sentences That is, there is no need to measure the deterrence benefit of probation, prison deters while probation does not In this case, the deterrence benefit of prison is estimated to be equal to 6 59 index crimes while the deterrence benefit of probation and probation with jail is zero Case II was designed to provide a good contrast to Case I That is, Case I uses an estimate of the deterrence benefit of probation which is as large as that of prison Since theory predicts that such a relatively large deterrence benefit is overstated, Case II estimates the deterrence benefit of probation to be zero Theory

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[3]The reader may wonder how many crimes would be saved if one applied Ehrlich's estimate of the elasticity of the severity of punishment to Maricopa County, 1980 The answer is "none" because the average Arizona felon served a sentence of 25 months as did the average prisoner in this sample, were all months (rather than just the 27 months in the sample) included Thus, the average sentence length is unchanged by these burglars and the deterrence benefit for this measure of the severity of punishment is zero

predicts that zero is an underestimate of probation's deterrence benefit so Case I and Case II represent opposite extremes

The careful reader will notice the absence of a crime multiplier in the use of 6 59 reported index crimes as an estimate of the total index crimes saved by deterrence The crime multipliers presented in Table VII compared the total number of crimes to the number of arrests Here, the appropriate multipliers compare total crime to reported crime For serious crimes such as these index crimes, these multipliers are all below two and are further reduced when they are cost-adjusted Therefore, 6 59 reported crimes is used as an estimate of total crimes not committed due to deterrence

Next, one needs to know how much each index crime costs society Larsen's figures (as presented in Table V) are used for each of the index crimes, except murder For murder, Larsen's failure to estimate the cost of the foregone earnings of the victim was considered too serious an underestimate to ignore In this study, Hofler and Witte's (1978) review of the literature is used to estimate the cost of murder They found that the average estimate of the social cost of murder was $186,000, with a range from $151,000 to $221,000 This $186,000 was adjusted to 1981 dollars and the resulting $279,000 figure was used as the estimated cost of murder in 1981 Using $279,000 as the cost of murder, the average index crime cost $2274 Table XI shows how the cost of this "average crime" would be divided among the types of index crimes, as well as how many of each crime type would be represented in a typical group of 6 59 crimes (Because of the small number of murders, the average crime cost is relatively insensitive to different estimates of the cost of murder)

TABLE XI

CRIMES AND CRIME COSTS SAVED DUE TO DETERRENCE, BY CRIME TYPE

Crime Type	Crimes	Crime Cost
Larceny	3 94	$780
Burglary	1 74	$756
Murder	01	$349
Grand Theft of Automobile	38	$223
Aggravated Assault	32	$109
Robbery	16	$ 47
Rape	04	$ 10
Total	6 59	$2274

The total deterrence benefit for prisoners is then $2274 x 6 59 or $14,985 This value is divided by the 2 25 years in the study to get the annual deterrence benefit In Case I, the deterrence benefit for probation and jail is less than $2274 because sentences of "jail only" and "no supervision" were not counted by Phillips and Votey (1975) as felony convictions since California felons are not given these sentences Four jail inmates were sentenced to "jail only" and four probationers were sentenced to "no supervision" and this lowered the deterrence benefits of these two groups In Case II, the deterrence benefit of probation and probation with jail is counted as zero See Table XII for these deterrence values

VI Cost of Corrections

The values for punishment costs presented here come from the work of Clark Larsen In solving for the punishment cost of each inmate, Larsen included direct government spending for annual budgetary items, fixed facilities costs, rehabilitation programs, and medical costs He also included indirect community costs such as lost tax revenues and welfare Since these indirect community costs represent transfer payments rather than social losses, it is unfortunate Larsen included them It is not possible to reduce the values printed here to adjust for transfer costs because of the aggregate nature of the values However, these values are a very small part of the total cost Measures of negative costs like the value of restitution, required community service and fines were also included (Larsen, 1983, 18)

In this work, the individual punishment costs were divided by 2 25 years to get an annual individual punishment cost Why was 2 25 years

TABLE XII

ANNUAL DETERRENCE BENEFIT PER CONVICT

	Annual Deterrence Benefit
CASE I [4]	
Prison	$6,700
Jail	$5,600
Probation	$6,200
CASE II [5]	
Prison	$6,700
Jail	$0
Probation	$0

[4] In Case I, prison, jail, and probation yield deterrence benefits

[5] In Case II, only prison yields a deterrence benefit

chosen? It is important for the annual punishment cost to reflect the fact that longer periods of punishment cost more than shorter periods While a one month jail sentence is almost as costly as the monthly cost of a ten month prison sentence, the total cost of the prison sentence is much more This fact is reflected in the annual punishment costs reported in Table XIII

Table XIII also shows the cost of the foregone labor of inmates The foregone earnings of inmates for the period of incarceration is estimated by the earnings of inmates during the year prior to incarceration Though a poor estimate of lifetime earnings, this estimate may be a good one for the average incarceration period of these inmates which is 19 months for prison inmates (during the study period) and 3 months for jail inmates

Notice that most of the inmates in this sample are unemployed In Arizona in 1980, only 6 percent of whites were unemployed and only 10 percent of Hispanics were (U S Department of Labor, 1982, 11) The high rates of unemployment for inmates points to two facts First, inmates are a below-average group of legitimate income earners Second, many inmates earn their income through illegitimate means

VII Net Benefits

Annual net benefits are solved for by summing all benefits and subtracting all costs However, the meaning of "annual" is somewhat different for the rehabilitation benefit than it is for incapacitation, deterrence, and costs For the other measures, a total across the whole study period was solved for and this value was divided by 2 25 years to get an annual estimate However, in order to estimate the total

TABLE XIII

THE COST OF PUNISHMENT AND FOREGONE LABOR PER CONVICT

Convict Number	Annual Punishment Cost	Cost of Foregone Labor	Total Annual Cost
1	$8,990	$0	$8,990
2	$6,439	$3,733	$10,172
6	$11,763	$13,440	$25,203
7	$13,335	$0	$13,335
14	$2,808	$933	$3,742
20	$7,732	$0	$7,732
21	$6,305	$0	$6,305
22	$3,217	$0	$3,217
23	$11,484	$0	$11,484
28	$11,501	$0	$11,501
31	$7,785	$0	$7,785
32	$9,202	$7,200	$16,402
34	$5,146	$0	$5,146
36	$6,000	$0	$6,000
9	$2,987	$0	$2,987
11	$12,373	$0	$12,373
16	$11,182	$7,733	$18,915
17	$10,609	$14,791	$25,400
18	$11,520	$0	$11,520
33	$12,060	$6,194	$18,254
47	$7,253	$0	$7,253
49	$11,093	$0	$11,093
79	$10,240	$0	$10,240
93	$10,944	$0	$10,944
10	$898	$0	$898
58	$6,253	$0	$6,253
63	$449	$0	$449
82	$673	$0	$673
5	$6,840	$1,600	$8,440
8	$6,184	$0	$6,184
12	$2,031	$0	$2,031
15	$549	$0	$549
29	$1,366	$1,600	$2,966
35	$856	$733	$1,589
39	$2,462	$0	$2,462
43	$3,020	$0	$3,020
46	$1,042	$853	$1,896
52	$1,252	$2,222	$3,474
65	$2,200	$0	$2,200
67	$1,791	$0	$1,791
68	$484	$0	$484

TABLE XIII (continued)

Convict Number	Annual Punishment Cost	Cost of Foregone Labor	Total Annual Cost
69	$604	$0	$604
73	$1,547	$0	$1,547
85	$6,325	$0	$6,325
89	$702	$0	$702
92	$464	$0	$464
104	$1,507	$0	$1,507
105	$715	$1,438	$2,153
107	$11,864	$0	$11,864
19	$0	$0	$0
94	$0	$0	$0
103	($100)*	$0	($100)
112	$1,840	$0	$1,840
3	$440	$0	$440
4	$3,262	$0	$3,262
13	$916	$0	$916
24	$3,367	$0	$3,367
25	$140	$0	$140
26	$4,468	$0	$4,468
27	$8,640	$0	$8,640
30	$5,840	$0	$5,840
37	$240	$0	$240
38	$361	$0	$361
40	$1,027	$0	$1,027
41	$549	$0	$549
42	$476	$0	$476
44	$300	$0	$300
45	$2,638	$0	$2,638
48	$413	$0	$413
50	$60	$0	$60
51	$120	$0	$120
53	$480	$0	$480
54	$240	$0	$240
55	$280	$0	$280
56	$424	$0	$424
57	$611	$0	$611
59	$40	$0	$40
60	$320	$0	$320
61	$6,429	$0	$6,429
62	$20	$0	$20
64	$3,676	$0	$3,676
66	$1,692	$0	$1,692
70	($3,807)	$0	($3,807)
71	$20	$0	$20
72	$20	$0	$20
74	$3,087	$0	$3,087

TABLE XIII (continued)

Convict Number	Annual Punishment Cost	Cost of Foregone Labor	Total Annual Cost
75	$2,148	$0	$2,148
76	$224	$0	$224
77	$13,936	$0	$13,936
78	$4,438	$0	$4,438
80	$10,014	$0	$10,014
81	$140	$0	$140
83	$2,340	$0	$2,340
84	$1,636	$0	$1,636
86	$160	$0	$160
87	$380	$0	$380
88	$8,066	$0	$8,066
90	$4,920	$0	$4,920
91	$4,486	$0	$4,486
95	$642	$0	$642
96	$2,204	$0	$2,204
97	$100	$0	$100
98	$4,297	$0	$4,297
99	$100	$0	$100
100	$60	$0	$60
101	$227	$0	$227
102	$320	$0	$320
106	($502)*	$0	($502)
108	$404	$0	$404
109	$40	$0	$40
110	$413	$0	$413
111	$480	$0	$480

*This value is negative because this convict paid more to the community in the form of restitution than was spent on him or her by the state

rehabilitation benefit, one needs to know how long rehabilitation lasts Unfortunately, no one knows how long rehabilitation lasts In Table XIV, it is assumed that rehabilitation lasts 2 25 years, or the length of the study period In this case, the yearly rehabilitation benefit is equal to the annual rehabilitation benefit, or total rehabilitation divided by the years in the study Other possibilities will be explored in the next chapter Regardless of how long rehabilitation lasts, incarceration is more costly than probation

The net benefits per average prison inmate, jail inmate, and probationer are presented in Table XIV While there are 62[6] probationers, there are fewer prison and jail inmates When measuring rehabilitation benefits, there are 14 prison inmates and 24 jail inmates These inmates had to be released in order for rehabilitation to be measured Since incapacitation and deterrence benefits do not depend on the inmate's release, all 24 prison and 25 jail inmates were studied

The reader may wonder how the net benefits would change if the benefits and costs were discounted While many of the cost and benefit streams run parallel to each other, this is not always true See Figure 10 for a pictoral display of the average number of quarters each benefit and cost stream extends across In each case, the total benefit or cost is assumed to be evenly distributed across each quarter

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[6]The reader may remember that there were 63 probationers in Larsen's (1983) data set One probationer was omitted from consideration in this study because of his high rate of self-reported crime This probationer reported committing 60-90 burglaries a month which was 15-22 times as many as any other convict in the sample This quantity of burglaries seems implausible Also, in this small sample, one such outlyer would unduly alter the results Therefore, the probationer was deleted from the study

TABLE XIV

UNDISCOUNTED NET BENEFITS PER CONVICT

	Incapacitation		Rehabilitation		Deterrence	Costs		Net Benefits
			CASE I [7]					
Prison	$ 7,100	-	$ 11,400	+	$6,700	- $11,100	=	- $8,700
Jail	$ 800	-	$ 6,000	+	$5,600	- $ 2,800	=	- $2,400
Probation		-	$ 3,100	+	$6,200	- $ 1,700	=	$1,400
			CASE II [8]					
Prison	$ 7,100	-	$ 11,400	+	$6,700	- $11,100	=	- $8,700
Jail	$ 800	-	$ 6,000	+	$0	- $ 2,800	=	- $8,000
Probation		-	$ 3,100	+	$0	- $ 1,700	=	- $4,800

[7] Prison, jail, and probation yield deterrence benefits

[8] Only prison yields a deterrence benefit

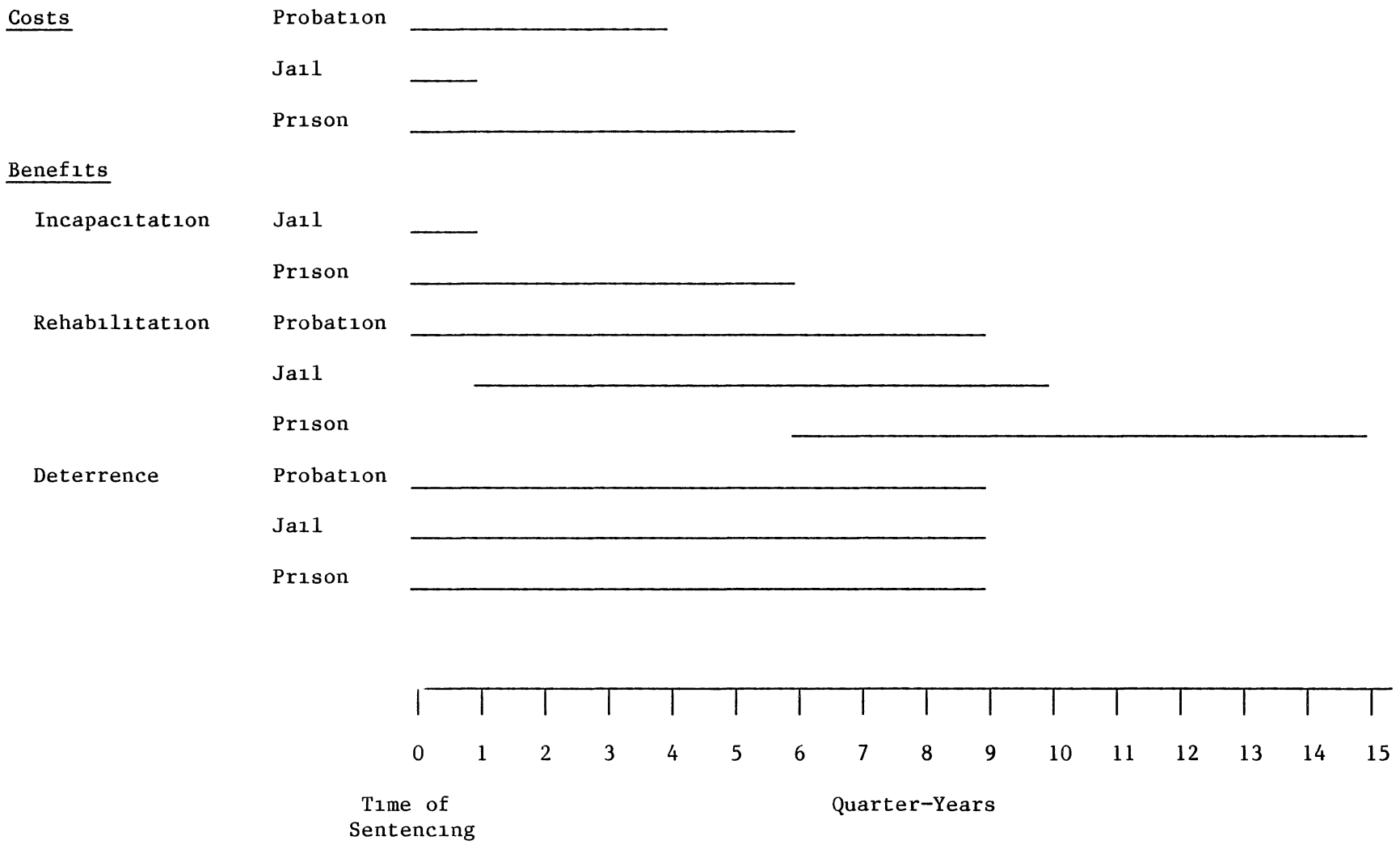

Figure 10. Average Length of Benefit and Cost Streams

Tables XV and XVI present the discounted values of net benefits using three estimates of the discount rate and two assumptions for the deterrence benefit Three discount rates are used because there is no consensus as to which rate is best Some economists favor the social discount rate which is thought to be between 3 and 4 percent Others favor the private opportunity cost of capital which may be as high as 10 percent To represent both views fairly, this study uses discount rates of 3, 7, and 10 percent By comparing Table XIV to Tables XV and XVI, it is clear that discounting reduces the costs (and negative benefits) of prison more than the costs of jail or probation

TABLE XV

NET BENEFITS PER CONVICT WITH ALTERNATE ASSUMPTIONS CONCERNING THE DISCOUNT RATE CASE I[9]

	Incapacitation		Rehabilitation		Deterrence	Costs	Net Benefits
			3 PERCENT DISCOUNT RATE				
Prison	$6,900	-	$10,500	+	$6,500	- $10,800	= - $7,900
Jail	$ 800	-	$ 5,700	+	$5,400	- $ 2,800	= - $2,300
Probation		-	$ 3,000	+	$6,000	- $ 1,700	= $1,300
			7 PERCENT DISCOUNT RATE				
Prison	$6,700	-	$ 9,400	+	$6,100	- $10,500	= - $7,100
Jail	$ 800	-	$ 5,400	+	$5,100	- $ 2,800	= - $2,300
Probation		-	$ 2,900	+	$5,700	- $ 1,600	= $1,200
			10 PERCENT DISCOUNT RATE				
Prison	$6,500	-	$ 8,700	+	$5,900	- $10,200	= - $6,500
Jail	$ 800	-	$ 5,200	+	$5,000	- $ 2,700	= - $2,100
Probation		-	$ 2,800	+	$5,500	- $ 1,600	= $1,100

[9]In Case I, prison, jail, and probation yield deterrence benefits

TABLE XVI

NET BENEFITS PER CONVICT WITH ALTERNATE ASSUMPTIONS CONCERNING THE DISCOUNT RATE CASE II [10]

	Incapacitation		Rehabilitation		Deterrence		Costs		Net Benefits
			3 PERCENT DISCOUNT RATE						
Prison	$6,900	-	$10,500	+	$6,500	-	$10,800	=	- $7,900
Jail	$ 800	-	$ 5,700	+	$ 0	-	$ 2,800	=	- $7,700
Probation		-	$ 3,000	+	$ 0	-	$ 1,700	=	- $4,700
			7 PERCENT DISCOUNT RATE						
Prison	$6,700	-	$ 9,400	+	$6,100	-	$10,500	=	- $7,100
Jail	$ 800	-	$ 5,400	+	$ 0	-	$ 2,800	=	- $7,400
Probation		-	$ 2,900	+	$ 0	-	$ 1,600	=	- $4,500
			10 PERCENT DISCOUNT RATE						
Prison	$6,500	-	$ 8,700	+	$5,900	-	$10,200	=	- $6,500
Jail	$ 800	-	$ 5,200	+	$ 0	-	$ 2,700	=	- $7,100
Probation		-	$ 2,800	+	$ 0	-	$ 1,600	=	- $4,400

[10] In Case II, only prison yields a deterrence benefit

CHAPTER V

DISCUSSION OF THE APPLICATION

In this chapter, the results of the application presented in the last chapter are discussed Some of the questions arising from the results are also discussed An effort is made to explain why certain estimates are best regarded as under- or overestimates

I Cost of Corrections

The cost of corrections presented here probably represents an understatement of the true cost Though the foregone earnings of inmates during incarceration are estimated, no estimate is made of the reduced earnings of convicts resulting from their status as convicts It was assumed instead that the marginal productivity of inmates and probationers was not reduced due to their conviction and subsequent punishment This is probably a poor assumption given that all inmates lose their jobs, and some probationers may lose their jobs as well Upon their return to the workforce, convicts are likely to have lesser jobs and to produce less, even if their skills have not deteriorated While no data are available to test this hypothesis, this estimate of the costs of corrections is probably low because of the reduced productivity of convicts which is not measured

A noticeable feature of the costs of corrections is the low cost of jail as compared to prison The average jail inmate served a jail sentence that was only three months long Such short sentences are

relatively inexpensive, especially as compared to prison sentences which averaged 19 months, during the study period In each case, the total cost of corrections was divided by the 2 25 year length of the study period to solve for the annual corrections cost

II Incapacitation Benefit

The results of this study show that the annual incapacitation benefit is much greater for prison than it is for jail (See Tables XV and XVI) The prison incapacitation benefit is larger for two reason First, the incapacitation benefit is based upon the costliness of past crimes Prison inmates have committed more and more serious past crimes than have jail inmates Second, the total incapacitation benefit is greater, the longer one is physically removed from society Prison inmates served sentences that were seven times as long as the sentences served by jail inmates Remember that the total incapacitation benefits were divided by the 2 25 years in the study to get the annual incapacitation benefit This means that if two inmates had committed the same prior crimes, the one who served the longer term would have the larger annual incapacitation benefit as well as the larger total incapacitation benefit

These estimates of the incapacitation benefit (for prison and for jail) have at least one downward bias Both are based on the cost of past crimes, and this cost does not include the cost of pain and suffering or the cost of victims' lost work due to personal injury This bias may not be too great since a small percentage of the prior crimes committed involved an assault However, if one interprets the meaning of "suffering" more broadly, several of the non-assaultive

crimes could cause it The failure to estimate such costs may be important, however, these estimates of crime costs represent a considerable improvement over the previous dearth of estimates

Another possible source of error in the estimation of the incapacitation benefit comes from the estimates used here for the crime multipliers These estimates are equal to or lower than the aggregate national estimates This is to be expected, since all criminals are not in the correctional system at any one time Therefore, the crime of convicts should not account for all crime Nevertheless, any error in the estimation of the multipliers will affect the results

The estimate of the incapacitation benefit presented here may represent an overestimate because of the displacement effect Some of the crimes which inmates can no longer commit due to their incapacitation, may be committed by someone else This displacement effect means that fewer crimes are prevented due to incapacitation than the estimate presented here The question becomes, "How great is this displacement effect?"

The answer turns on how much displacement is associated with the crimes of burglary and robbery since these two crimes account for 40 percent of the prior crimes, and no other crime accounts for more than 10 percent of the total The displacement effect occurs for many of the crimes with an economic motivation However, burglary and robbery are not controlled by organized crime, as are the crimes with the highest displacement effects Even more importantly, these crimes seem to require a good deal of offense-specific human capital To the extent that this is true, the displacement effect is not great because one burglar (or robber) is not a good substitute for another

> There are certain limits to crime displacement Criminals must be quite familiar with the area in which they work (e g , to learn unguarded spots, to know good escape routes, etc) and they therefore have a tendency to stay close to their own communities, even if the risks of crime are lower elsewhere The importance of 'knowing the turf' is suggested by the fact that the average distance between a place that a robbery occurs and an offender's home is three-fifths of a mile (Levine, 1980, 378)

In addition, 90 percent of all robberies occur within 1 5 miles of the offender's home For burglary, 93 percent of the offenses occur within 1 5 miles of the offender's home and the average distance is one-half of a mile (Reppetto, 1976, 174) Therefore, robberies and burglaries are reduced considerably by the incarceration of robbers and burglars The displacement effect should not be great because of the offense-specific human capital associated with burglaries and robberies and because these crimes are not controlled by organized crime

Consider too the third crime type in the sample which is heavily represented Theft constitutes 10 percent of all prior arrests and is a crime not too different from burglary Theft tends to have a low displacement effect for the same reasons burglary does

Nevertheless, the displacement effect occurs to some extent for nearly all crimes, including robbery, burglary, and theft For most of the crimes represented in this sample, however, the displacement effect is probably not great enough to dramatically reduce these estimates of the incapacitation benefit

To summarize, the incapacitation benefit is probably overestimated due to the displacement effect It is most definitely underestimated due to the failure of this study to estimate the cost of pain, suffering, and the lost work of crime victims A final weakness of this estimate of the incapacitation benefit is worth mentioning The

incapacitation benefit is estimated solely on the basis of past criminal behavior Research has shown that past criminal behavior is a good predictor of future criminal behavior, however, it is not the only predictor Other factors such as age, race, and employment are also relevant Once the proper weighting of such factors is well established, future models of incapacitation should consider them

III Rehabilitation Benefit

Conventional wisdom has it that the rehabilitation benefit of prison is zero That is, whatever rehabilitation results from prison is offset by dehabilitation Previous studies, however, failed to consider the relative costs of crimes committed before and after punishment

The results of this study indicate that the convicts in this sample committed more costly crimes after punishment than before punishment This is true for probationers as well as inmates Dehabilitation results from incarceration for a number of reasons Inmates gain criminal contacts and skills while incarcerated Therefore, the inmate's criminal human capital is increased Further, the social skills of inmates tend to deteriorate This deterioration lowers the legal human capital of inmates Finally, inmates generally leave prison with no job and often experience discrimination when they search for a new one

Offsetting the dehabilitation factors are factors which cause rehabilitation The main such factor may be fear Having experienced incarceration, inmates may be loathe to experience it again Further, the inmates' chances of being incarcerated are increased by each period of incarceration That is, convicts will be punished more harshly for

subsequent violations than they were for prior violations (Petersilia, 1977, 15) This means that the inmate's return from future crimes has decreased (Some readers may think of this benefit as deterrence, but it is rehabilitation as the term is used in this study When a potential criminal changes his or her behavior due to the threat of punishment, he or she is said to be deterred In this case, however, the actual experience of punishment caused the change in behavior This is called rehabilitation)

For probationers, the fear of increased future punishment should also increase In fact, 30 percent of the probationers in this sample were subsequently sentenced to jail or prison during the study period Therefore, the realization that incarceration is imminent provides much of the rehabilitation benefit of probation However, probationers do not experience incarceration, so they do not fear incarceration as a result of their experience

In this sample, rehabilitation appears to be more than offset by dehabilitation for probationers To the extent that probationers lose their jobs or have difficulty in finding jobs, this dehabilitation is understandable Also, the probationer may experience euphoria as a result of receiving a light sentence That is, the probationer's reasoning may go like this the police do not catch me often and when they do, nothing happens One would expect the dehabilitation benefits of probation to be less than that of jail and prison, as these results suggest

The most difficult problem associated with the rehabilitation benefit is this how long does the rehabilitation benefit last? In Figures 1-4, it was drawn as a constant value for the rest of the life

of the convict This is an overestimate, given that most of these convicts have several periods of incarceration or probation in a lifetime

In Table XIV, it was arbitrarily assumed that the rehabilitation benefit lasted the length of the study period, or 2 25 years The period of rehabilitation is probably short relative to the rest of the convict's life Thirty percent of probationers were subsequently sent to prison or jail during this 2 25 year study period Almost 60 percent of prisoners were returned to prison or jail during the study period even though they were incarcerated for an average of 19 of the 27 months in the study Once the probationer is incarcerated, or the inmate is incarcerated again, a whole new cycle of incapacitation and rehabilitation begins For these convicts, the period of rehabilitation is necessarily short For others, it may not be much longer

Table XVII and XVIII show how the results are affected by shorter and longer periods of rehabilitation The length of time that rehabilitation lasts does not change the fact that probation yields higher net benefits than incarceration However, depending on the assumptions, prison may yield net benefits that are greater (or lesser) than those of jail

The reader may ask How were these three time periods chosen? The convicts in the study were free of incarceration for an average of 17 months It is this 17 month period which was used to compare criminal behavior following punishment to that prior to punishment Therefore, it is clear that the increased criminal behavior lasted at least 17 months Therefore, 17 months is the minimum period that dehabilitation could last It is expected that dehabilitation will last somewhat

TABLE XVII

NET BENEFITS WITH A SEVEN PERCENT DISCOUNT RATE AND ALTERNATE ASSUMPTIONS CONCERNING THE REHABILITATION BENEFIT CASE I[1]

	Incapacitation		Rehabilitation		Deterrence		Costs		Net Benefits
REHABILITATION LASTS SEVENTEEN MONTHS									
Prisoners	$ 6,700	-	$ 6,400	+	$6,100	-	$10,500	=	-$ 4,100
Jailers	$ 800	-	$ 3,700	+	$5,100	-	$ 2,800	=	-$ 600
Probationers		-	$ 2,000	+	$5,700	-	$ 1,600	=	$ 2,100
REHABILITATION LASTS TWENTY-SEVEN MONTHS									
Prisoners	$ 6,700	-	$ 9,400	+	$6,100	-	$10,500	=	-$ 7,100
Jailers	$ 800	-	$ 5,400	+	$5,100	-	$ 2,800	=	-$ 2,300
Probationers		-	$ 2,900	+	$5,700	-	$ 1,600	=	$ 1,200
REHABILITATION LASTS THIRTY-SEVEN MONTHS									
Prisoners	$ 6,700	-	$12,300	+	$6,100	-	$10,500	=	-$10,000
Jailers	$ 800	-	$ 7,000	+	$5,100	-	$ 2,800	=	-$ 3,900
Probationers		-	$ 3,800	+	$5,700	-	$ 1,600	=	-$ 300

[1]Prison, jail, and probation yield deterrence benefits.

TABLE XVIII

NET BENEFITS WITH A SEVEN PERCENT DISCOUNT RATE AND ALTERNATE ASSUMPTIONS CONCERNING THE REHABILITATION BENEFIT CASE II[2]

	Incapacitation		Rehabilitation		Deterrence		Costs		Net Benefits
REHABILITATION LASTS SEVENTEEN MONTHS									
Prisoners	$ 6,700	-	$ 6,400	+	$6,100	-	$10,500	=	-$ 4,100
Jailers	$ 800	-	$ 3,700	+	$ 0	-	$ 2,800	=	-$ 5,700
Probationers		-	$ 2,000	+	$ 0	-	$ 1,600	=	-$ 3,600
REHABILITATION LASTS TWENTY-SEVEN MONTHS									
Prisoners	$ 6,700	-	$ 9,400	+	$6,100	-	$10,500	=	-$ 7,100
Jailers	$ 800	-	$ 5,400	+	$ 0	-	$ 2,800	=	-$ 7,400
Probationers		-	$ 2,900	+	$ 0	-	$ 1,600	=	-$ 4,500
REHABILITATION LASTS THIRTY-SEVEN MONTHS									
Prisoners	$ 6,700	-	$12,300	+	$6,100	-	$10,500	=	-$10,000
Jailers	$ 800	-	$ 7,000	+	$ 0	-	$ 2,800	=	-$ 9,000
Probationers		-	$ 3,800	+	$ 0	-	$ 1,600	=	-$ 5,400

[2]Only prison yields a deterrence benefit

longer than 17 months there is no way to know how much longer, however Here, 27 months (the length of the study period) and 37 months were selected as possible time periods

IV Deterrence Benefit

The decision to use a deterrence estimate from the literature was a difficult one Some economists argue that it is not appropriate to draw an elasticity estimate of deterrence from the existing literature and apply it to a different time period Among these is Harvard's Walter Vandaele, who repeated Ehrlich's study of deterrence with alternate model specifications He writes that

> Any conclusions reached in this paper are valid only within the context of Ehrlich's theoretical model and for the data set on hand, and they should not be casually carried over to data sets for a different time period or in a different country (Vandaele, 1978, 271)

In addition, there have been many criticisms of the deterrence literature, and especially of the magnitudes of the empirical estimates Economist Phillip Cook (1977) has written one of the lengthiest and clearest criticisms of the empirical work on deterrence These criticisms explain why a conservative estimate of deterrence was used in this study

A Problems with Isolating Deterrence

The first problem with the deterrence studies stems from their methodology These studies use aggregate data concerning crime commission rates and they analyze this data using regression analysis Nagin explains that these studies use a macroeconomic approach because

> deterrence is inherently an aggregate phenomenon since it is reflected in the behavior of the entire population

> Consequently, all analyses use aggregate data on crime-commission rates, and examine the association of commission rates with various sanctions measures (Nagin, 1978, 99)

Cook points out that

> It is not usually possible to measure a pure deterrence effect using this approach If a negative (partial) relationship between sanction threat levels and crime rates is observed over time or across a number of jurisdictions at a single point in time, then the relationship may be due to deterrence But, especially if the typical mode of punishment is incarceration, the relationship may also be due to incapacitation, rehabilitation, or some combination of effects (Cook, 1977, 182)

That is, the so-called deterrence literature has studied the general preventive effects of punishment If these studies have shown that more punishment makes for less crime, they have not shown whether this negative relationship is because of deterrence, incapacitation or rehabilitation They have looked instead at the combined general preventive effects of punishment For policy purposes, it is important to know why punishment prevents crime as well as to what extent this is true

B Data Problems

There are many errors made in the measurement of crime These errors make it difficult to estimate deterrence accurately They may also generate negative relationships between crime and punishment

Daniel Nagin (1978) explains the problem for time series data In New York City in 1966, there was a change in police administration and crime reporting policies Even though high clearance rates and low crime rates are desirable for a police department, this administration thought that all sincerely reported crimes should be recorded as such That year, reported crime almost doubled and clearance rates fell by

half Had a researcher run a deterrence regression on this data, the "deterrence effect" would have seemed stronger than ever before Actually, less punishment did not make for more crime Rather, more honesty in crime reporting made for what appeared to be higher crime rates and lower rates of punishment Unfortunately, the degree of honesty in crime reporting also varies from area to area Therefore, cross-sectional studies are not immune to data problems either

Consider the case of a cross-sectional study between two jurisdictions with the same crime rate The crime rate (known offenses per capita) is regressed on the arrest rate (arrests per known offenses) What if the reported crime rate of one of these jurisdictions understates the true crime rate by a greater percentage than the other one? The jurisdiction which recorded the higher crime rate would also record a lower rate of arrest The opposite would be true of the other jurisdiction This is because the variable "known offenses" is the denominator of the independent variable and the numerator of the dependent variable Dale Cloninger (1975) points out that nearly all researchers have specified the independent variable in this manner, as arrests, convictions, or incarcerations per offense He argues that, in the studies which use expenditure per capita for the independent variable, no evidence for the deterrence hypothesis has been found

C Cause and Effect Problems

There is considerable agreement that a high crime rate is often accompanied by a low threat level There is less agreement that high

crime rates are caused by low threat levels In fact, Cook (1977) argues that high crime rates may cause a low threat level

Consider the criminal justice system which has both crime and employees as inputs From these inputs, it produces arrests, convictions, and punishments Suppose the number of crimes increases without a corresponding increase in the other inputs Due to the principle of diminishing marginal productivity, one would expect that the number of arrests and convictions would increase, but less than proportionally to the increase in crimes Hence the increase in the crime rate would cause a reduction in the arrest and conviction rates, at least in the short run

In the long run, jurisdictions can increase their criminal justice system expenditures appropriately The question becomes, "Do jurisdictions with increasing crime rates increase their expenditures proportionately?" The answer may well be, "No" FBI statistics suggest that the percentage changes in reported offenses are greater than the corresponding changes in population, arrests, or convictions (Cloninger, 1975, 325) To the extent that this is true, the crime rate and the arrest rate will be negatively related regardless of the deterrence effect Many studies have tried to account for this problem by using simultaneous equations For a discussion of the model specification problems encounted by these studies, see Nagin's (1978) review of the literature

D Model Specification Problems

Many authors have pointed out the problems associated with correctly specifying a model Cook put it this way

> The obvious questions are whether Ehrlich and other scholars who have used regression analysis have actually used appropriate and accurate measures of the factors they think are important, and whether they have actually succeeded in controlling for all the important factors which may distort the deterrence relationship One does not have to be very sophisticated to find fault with Ehrlich's specification, or to suggest other factors which should be controlled for It is certainly suggestive that published multivariate regression analyses based on a variety of data sets have for the most part found a negative partial relationship between crime rates and the probability of arrest or incarceration, however, it is not by any means conclusive evidence of a deterrence effect (Cook, 1977, 186)

E Summary and Conclusions

This section has provided a summary of the criticisms of the deterrence literature These criticisms should be taken seriously, however, the researcher should not dismiss the findings of the deterrence studies either

> Anyone who undertakes research in this area is confronted with substantial problems with both data and methodology It is, therefore, easy to raise objections to every study But it is more difficult to find fault with all the economic research in this area (Palmer, 1977, 15)

Despite the problems associated with the deterrence studies, this study takes an estimate from the literature and applies it to the sample at hand Such an estimate is probably superior to the alternative of ignoring all the estimates of deterrence The criticisms of deterrence studies presented here help explain why a conservative estimate was taken Given the wide range of estimates available, and the controversy surrounding the use of these estimates, this conservative approach may be the best

V Net Benefits

The final question is, "How should the net benefits for the different punishments be interpreted?" The net benefits should be interpreted with care because this is a preliminary study using a new approach In addition, the convicts in the sample were not "matched " That is, the more serious convicts were sent to prison However, the methodology used here adjusts for this and allows certain comparisons to be made across treatment types For example, the fact that prison inmates are more serious offenders than jail inmates is reflected by their greater incapacitation benefit In the case of the rehabilitation benefit, the change in the cost of crime commission is measured rather than the cost of crime following punishment This means that two convicts who reduce their cost of crime commission by $10,000 will generate the same rehabilitation benefit for their respective programs This is true even though the prisoner may still be a big-time offender and the probationer may have quit crime altogether Each program reduced crime by the same amount and gets credit accordingly

The results of this study suggest that punishment increases the costliness of criminal behavior and more severe punishments increase it more Since punishment changes the costliness of convicts' crimes, this study also suggests that a measure of the incapacitation benefit should depend on prior crimes, rather than recidivistic crimes

This study indicates that incarceration may yield lower net benefits than probation What is the meaning of this finding? If confirmed, this finding would not support the popular notion that more convicts should be behind bars It would suggest instead that the high cost of incarceration, coupled with the high rate of dehabilitation, may

mean that incarceration is not the least costly alternative for all the inmates currently incarcerated However, this study does not show conclusively that incarceration is more costly than probation Because of the traditional use of cost benefit analysis in the study, significance testing of the results was not possible Therefore, the results of this study may have been generated by chance Further research is needed to show whether or not there is a statistically significant difference between the net benefits of probation and incarceration Future studies may want to employ an approach which makes possible the significance testing of the results of cost benefit analysis [3] Hofler and Witte (1978)[4] developed one such approach

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[3]One method for doing this involves assigning the net benefits for each convict to the various treatments randomly The researcher could repeat this process many times and see if the differences between the net benefits of the different programs are typically as large as the differences in this study If not, the differences in this study were probably not generated by chance

[4]Hofler and Witte (1978) do not use point estimates to estimate variables when there is considerable uncertainty concerning the proper value of the variable Instead they assume that their point estimate is the mean in a normally distributed population of estimates Then they draw several estimates from this population and take a mean of those estimates The mean values obtained in this manner can be tested for statistically significant differences, because they were drawn from a population of normally distributed values

CHAPTER VI

SUMMARY AND CONCLUSIONS

I Summary

This study is a cost-benefit analysis of prison, jail, and probation Its main contributions are methodological Building on the work of William McGuire, this study examined the meaning of the costs and benefits of corrections New measures for the rehabilitation and incapacitation benefits were developed These measures relied on the cost of crimes committed by each convict, including the cost of crimes for which no arrest was made These measures made it possible to compare the net benefits of correctional programs despite the fact that the convicts were not "matched" across punishments

The deterrence benefit was estimated using estimates from the literature, which were translated into dollar terms On the cost side, the traditional measure of the foregone labor of inmates was challenged and replaced Since each of the costs and benefits was measured in dollar terms, the sum of the rehabilitation, incapacitation, and deterrence benefits for prison, jail, and probation was compared to the cost of that program

II Conclusions

The results of this study should be interpreted with care for several reasons A limited sample, drawn from a specific geographical,

cultural, and institutional setting, was used An estimate of the deterrence benefit was taken from the literature and applied to the sample The validity of the data in the study are dependent upon the veracity of the convicts in the sample

The results of this study suggest that the net benefits of probation may be greater than those of incarceration This result occurs because the more expensive the punishment is, the more dehabilitation it seems to cause However, even this tentative conclusion should be interpreted with care Due to the traditional use of cost benefit analysis, it was not possible to test for a statistically significant difference between the cost of probation and incarceration Therefore, the apparent difference in the net benefits between probation and incarceration could have been generated by chance

III Suggestions for Future Research

This study presents the need for additional studies which compare the net benefits of prison, jail, and probation Such studies have direct policy relevance These studies should be designed to test for a statistically significant difference between the net benefits of these punishments

In addition, future studies should examine the time path of dehabilitation How long does it take for the effect of punishment to "wear off"? This information would improve estimates of the rehabilitation benefit

In future studies, the crime multipliers should be checked against the crime multipliers derived from victimization surveys performed in the area of the study and during the same time period, if possible Of

course, such a check would require performing a victimization survey in the said area at the time of the study

Additional estimates of the social cost of crime are called for An effort should be made to devise a way to measure the value of pain and suffering, as well as the cost of victim time lost from work As for the cost of corrections, researchers should collect the data necessary to estimate the reduction in worker productivity due to each type of punishment

Efforts to measure the displacement effect for each type of crime are also in order As a start, it would be useful to know how much crime is displaced for the crimes thought to have the highest displacement effects

Future estimates of the incapacitation benefit should consider factors other than the cost of past crime commission To make this possible, more research is needed to determine the relative weights of the various predictors of future criminal behavior

Studies like this one should be done elsewhere and with larger samples These studies should address the issues herein with as many of the above extensions as possible Recognizing that such a study would require considerable resources, studies which address any of the above suggestions are also desirable The correctional system is an expensive one, but is well worth the considerable resources needed to analyze it

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