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THE PENNSYLVANIA PAROLE SYSTEM--A COST-BENEFIT ANALYSIS

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PREFACE

I wish to express my gratitude to my adviser, Professor Mark Perlman, for suggesting the topic of this study and for his guidance during its undertaking. I would also like to thank him for his advice and guidance during my tenure as a graduate student at the University of Pittsburgh.

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I. INTRODUCTION

During the past several years Americans have displayed a deep concern about the amount of crime in the United States. A study by the National Opinion Research Center revealed that Americans consider crime the second most important domestic issue.[1] Forty-one percent of all white women and 65 percent of all non-white women sampled indicated that they felt at least somewhat unsafe walking alone after dark in their own neighborhoods. The corresponding figure for white males was 13 percent, and for non-white males 42 percent.

The relative ease with which the District of Columbia crime bill, providing for preventive detention and no-knock searches, passed through Congress is further evidence of the current intense feelings on the part of the American public toward crime.

Questions of how to deal with criminal behavior have largely been left to the sociologists and the psychologists academically, and to the lawyers and legislators in practice. Economists, until recently, have generally steered clear of questions dealing with criminal behavior.

The present attention being given to criminal behavior by economists may be the result of several recent developments. First, it has been shown that the theorems of economics do not necessarily depend upon the economist's usual conception of rational behavior, but could indeed be consistent with many different conceptions of rational behavior, or,

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[1]Philip H. Ennis, Criminal Victimization in the United States: A Report of a National Survey (Chicago: National Opinion Research Center, University of Chicago, 1967).

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even with much irrational behavior.[1] In addition, in a stimulating article appearing in the Journal of Political Economy in 1968, Professor Becker presented a framework within which criminal activity could be viewed in terms of traditional economic theory.[2] As Professor Becker points out, combating crime involves the use of economic resources, both directly (police, prison, etc.) and indirectly (foregone income of those incarcerated, etc.). Hence, combating crime is a question involving the allocation of resources--a question which does deserve the attention of economists.

Perhaps the most important factor contributing to the recent interest in crime by economists is the perception on the part of the population as a whole (including economists) that the quantity of crime has increased significantly. Whether or not this perception is correct is largely irrelevant from a cost point of view since one does not have to be a direct victim of crime to incur (part of) its costs. The fear of being victimized may in fact represent one of the single largest components of the cost of crime.[3] A higher priority is placed on dealing

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[1]Gary S. Becker, "Irrational Behavior and Economic Theory," Journal of Political Economy, LXX (February, 1962), 1-13.

[2]Gary S. Becker, "Crime and Punishment: An Economic Approach," Journal of Political Economy, LXXVI (February, 1968), 169-217.

[3]Fear itself results in disutility and hence a cost. In addition, in an attempt to alleviate fear, individuals invest in preventive measures (burglar alarms, locks, guards, etc.) and may actually alter their own behavior. In a survey conducted by the National Opinion Research Center, 15% of all white women and 37% of all non-white women sampled indicated that they had recently wanted to go somewhere but stayed home because it was unsafe. The corresponding figures for men were 10% for whites and 27% for non-whites. In addition, it is not known how many individuals altered their means of transportation or altered their route of travel so as to avoid unsafe passage to their desired

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with criminal activity then because there is either more crime or because our awareness of crime has increased.

In this study we will attempt to employ traditional economic analysis to analyze an aspect of the correctional system. Specifically, we will attempt to determine whether the institution of parole, as it operates in Pennsylvania for burglars, is justified on economic grounds. Parole systems allow inmates of correctional institutions to be released before their term expires, under the supervision of a parole authority. In effect, the institution of parole results in a reduction in the expected penalty for given crimes.

The employment of incarceration as a punishment for a crime against society may not result in a repayment of the criminal's debt to society. The criminal suffers a probable loss of income while incarcerated, in addition to the disutility associated with prison life. The former loss, however, is also a loss to society since the criminal's probable foregone income will represent foregone production. In addition, society will be faced with the direct costs associated with incarceration. Only if the utility which society derives from the knowledge that convicts are made to suffer exceeds the above mentioned costs by society's perceived loss from the crime can the criminal be viewed as having paid his debt to society.

Even if the criminal does not repay his debt, society can still be a net gainer by employing incarceration as a punishment for a criminal

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destination. To the extent that fear is abated by crime preventive measures, the cost of such measures is offset by the reduction in the disutility associated with fear. It is the dollar equivalent of the disutility associated with the remaining fear, plus the cost of all measures taken to alleviate fear, that represents the true cost of fear.

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act. By imprisoning a convicted law violator, society insures that the convict will not commit additional crimes--at least over the period of incarceration. Furthermore, to the extent that this form of punishment acts as a deterent to others, fewer crimes will be committed by the rest of society. If the cost of the additional crimes we would experience if we did not use detention as a punishment exceeds the total cost of incarceration, then society benefits from the use of detention.

To reduce the length of imprisonment for a given crime via a parole system will result in both benefits and costs to society. The benefits will be the result of the reduced direct and indirect costs of imprisonment and the difference in the lifetime crimes committed by those convicts paroled and those not paroled,[1] while the costs will be the result of the administration of the parole system, the crimes committed by parolees, and the crimes induced by the lowering of the expected penalty for the given crimes.[2]

If the benefits outweigh the costs, then the parole system will be justified on economic grounds. After such a cost benefit calculation is completed, one can attempt to determine the optimum parole policy

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[1]This will only be of benefit if the probability of recidivism is higher for mandatory releasees than for parolees. On a priori grounds one cannot say which group should have the higher probability since the process of parole may result in forces which act to both increase and decrease the rate of recidivism. See pp. 8-9.

[2]When the prisoner is released on parole we may find that his family no longer requires welfare assistance; or, if the parolee has difficulty supporting himself, that he requires some temporary welfare assistance. Welfare payments are transfers and the only social cost involved is in the administration of the welfare system. Since the marginal cost of adding an additional recipient to the welfare rolls is probably quite small, little will be saved by removing parolees' families and little spent by adding parolees.

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given the structure of the existing parole system. Many criminologists have worked out prediction tables whereby success or failure on parole is predicted from various socio-economic characteristics of the criminal.[1] However, once the decision maker knows the probability of failure he is still left to decide upon an acceptable failure rate. The prediction table can offer no assistance in this area. By measuring the costs and benefits of parole, we may be able to determine the optimum probability of failure. For example, if we have a parole system with given direct costs, we can determine what the maximum acceptable probability of failure will be if we know the cost associated with failure; i.e., the cost associated with the commission of particular crimes. The cost of failure multiplied by the probability of failure will be equated with the excess of the benefits over the direct costs for the marginal parolee. The benefits derived from paroling the marginal criminal will just be equated with the cost of so doing.

Our study will raise many questions related to parole which we will not attempt to answer. It is recognized that certain costs and benefits either cannot be measured or are beyond the ability of the author to measure, given his time and budget constraints. In addition, it is also recognized that it may be desirable to make policy decisions from a wider perspective than that from which the conclusion of this study is drawn. Nevertheless, it is felt that the conclusion will be of value in that it may form at least part of the basis from which policy decisions are made.

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[1]See, for example, Floyd E. Ohlin, Selection for Parole (New York: Russell Sage Foundation, 1951).

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II. THE FRAMEWORK

The parole system will result in a net gain to society if:

$$O_{pv} + I_{pv} + \left[(X\Sigma\Sigma P_{kit}C_i)_{pv} - (X\Sigma\Sigma P_{jit}C_i)_{pv}\right] > A_{pv} + (P.O.)_{pv} + (\Sigma\Sigma\Delta N_{it}C_i)_{pv}$$ [1]

where

O_{pv} = the present value of the output produced by parolees;

I_{pv} = the present value of the reduction in the direct cost of incarceration due to parole;

X = number of parolees;

P_{kit} = the probability that individual k will commit crime i in time period t where individual k is an average releasee who does not go through the parole process;

C_i = the social cost of crime i;

P_{jit} = the probability that individual j will commit crime i in time period t where individual j is an average parolee;

A_{pv} = present value of the administrative cost of the parole system;

$(P.O.)_{pv}$ = the present value of the output produced by the inmates;

ΔN_{it} = the change in the number of crimes i committed in time period t because of the reduction in the expected value of the penalty for crime i.

Each term in our cost benefit expression will be discussed in turn. Our discussion at this point will deal with the general framework

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[1] All terms represent values taken over the parole period for a group of parolees with the exception of $(X\Sigma\Sigma P_{kit})_{pv}$ which is taken over an equivalent length of time in the future.

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of our study and hence each term will be treated on a conceptual level. The actual measure of the terms in the cost benefit expression for paroled burglars in Pennsylvania will be dealt with in Chapter III. We defer the discussion of our data sources and their limitations until then.

A. The Earnings of Parolees (O)

The present value of the earnings of parolees over the length of the parole period will be used to estimate the addition to output attributed to the parole system. We will assume full employment, and hence an absence of multiplier effects. We also assume that the employment of parolees is not at the expense of other members of society so that their entire earnings represent added production.

B. The Reduced Incarceration Costs (I)

In calculating the direct costs of incarceration we must be careful to include only those components of the state's dollar outlay which represent social costs. The resources devoted to the production of the food, clothing, and shelter provided the prisoners would in fact be devoted to such uses whether or not the individuals were imprisoned; i.e., the prisoners would eat, be clothed and sheltered if they were not prisoners. Only those costs which would not exist were the individuals not incarcerated should be counted.[1]

---

[1]The fact that we count the parolees' earnings gross would lead to double counting if we included expenditures for the prisoners' subsistence.

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C. The Difference in the Probability of Recidivism between Parolees and Mandatory Releasees ($P_{jit} - P_{kit}$)

If the process of parole reduces the probability that a releasee will commit a new crime, then this reduced probability will represent a benefit of the parole system. If, however, the process of parole increases the probability of recidivism, then the increased probability will represent a cost of the parole system. On a priori grounds there is no reason to suspect that the probability of recidivism will be either higher or lower with parole. Parolees receive supervision in the form of counseling and related services which may or may not reduce the probability of recidivism. The supervision is intended to have a beneficial effect. However, there is some evidence that parolees find their supervision somewhat stifling--a fact which may lead to an increase in recidivism. Parolees have in the past, for example, complained of the added difficulty of readjustment to society's ways, resulting from the stringent rules of parole.[1]

In addition, an individual who is paroled may have a subjective estimate of the probable punishment which will be imposed if he is convicted of a new crime which is lower than that of the convict who serves

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[1]Donald Rassmussen, "Prisoner Opinions about Parole," American Sociological Review, V (August, 1940), 585-595.

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his full sentence.[1] This too can be expected to result in a higher relative rate of recidivism for parolees since the expected return from the commission of a given crime will appear to be higher to them.

An added factor which would lead one to expect parole supervision to reduce the rate of recidivism is that the closeness with which parolees are watched may lead to a higher probability of apprehension for them. If this is true, the net return from the commission of a crime would be lower for them than for mandatory releasees.

Since differential probabilities of recidivism will affect the gains from parole, it would be useful to determine whether or not a difference in the probabilities of recidivism between parolees and mandatory releasees exists and, if it does, the difference in those probabilities.

D. The Administrative Cost of the Parole System (A)

The process of parole will result in direct costs in terms of the operation of the parole system. All costs of administration would not exist were there no parole system. Hence the present value of the dollar expenditures for the operation of the parole system over the length of the parole period will be taken as a cost to society.

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[1] May is emphasized for the following reason. Consider the case, for example, in which the parolee who commits a crime is made to serve the remainder of his original sentence, in addition to making up for the time released, before beginning his new sentence. Then, even if the parolee expects to be paroled after serving the same proportion of his new sentence, he will in effect be serving a full term in prison because of his being made to fully complete his original sentence. In this case the parolee would have no reason to expect a lesser penalty than the mandatory releasee; and if he believes that the Parole Board will be less lenient with him in the future, he may even expect a more severe penalty than the mandatory releasee.

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E. The Reduction in Inmate Production (P_iO_i)

As part of a prison system we can expect inmates to take part in some work programs which result in production. The reduction in this production, as a result of an inmate being paroled, will represent a cost of the parole system.

F. The Number of Induced Burglaries (ΔN)

We can expect an increase in the number of crimes committed when we introduce a parole system since parole reduces the penalty for a given crime and hence increases the expected return from the commission of that crime.

The expected return (Y_n) from the commission of a given property crime will depend upon the gross amount stolen, the probability of apprehension and conviction, and the penalty imposed when convicted.

It can be shown that the response of the crime rate to changes in Y_n will only be independent of the component of Y_n changed if criminals are risk neutral.

This can be seen from the three figures below. In each figure, Y_g is the gross income received from the commission of the crime, D is the penalty if convicted, and Y_n is the actuarial value of the crime.

In Figure 1, given the utility function exhibiting risk neutrality, the utility derived from the illegal activity will be equal to the utility derived from an alternative riskless activity yielding the same expected return (Y_n) as the illegal activity.

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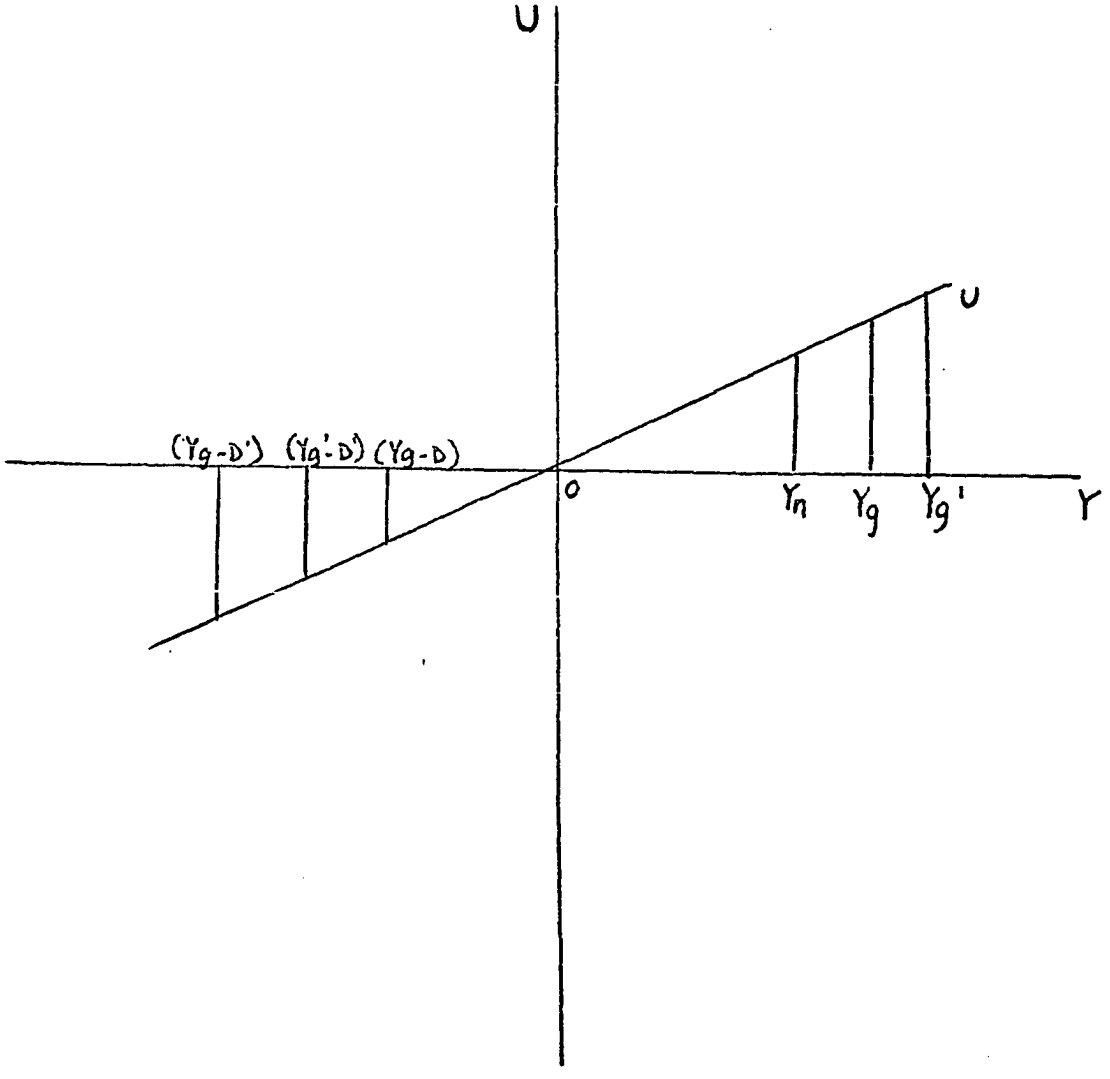
Figure 1



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If the penalty for the illegal activity were increased and the probability of conviction simultaneously decreased so as to leave the actuarial value of the illegal activity unchanged,[1] the utility derived from the illegal activity would also be unchanged and hence we could expect no change in the criminal's behavior. Similarly, if we simultaneously increase the possible gain (Y_g) and penalty (D) so as to leave the expected value of the illegal activity unchanged,[2] there would be no change in the criminal's utility and hence behavior.

These results will not hold once the assumption of risk neutrality is dropped. In Figure 2 we assume risk preference.

Given the utility function exhibiting risk preference, the utility derived from the commission of the illegal activity will exceed the utility derived from a riskless activity, resulting in the same net return. This can be seen by a comparison of points A and B, A representing the utility derived from the riskyactivity and B representing the utility derived from the riskless activity.

If the penalty were increased to D' and the probability of conviction simultaneously reduced so as to leave Y_n unchanged, the criminal's utility would increase.[3] This can be seen by a comparison of

---

[1]The change in D necessary to bring this about will be equal to $-\Delta qD/-q+\Delta q$.

[2]The change in Y_g necessary to bring this about will be equal to $q\Delta D$. This assumes that the gain is received whether or not a penalty is imposed, i.e., that the criminal keeps what he steals whether or not he is caught. This may not be the case and is taken account of below.

[3]For a mathematical proof of this, see G. Becker, "Crime and Punishment: An Economic Approach," Journal of Political Economy, LXXVI (February, 1968), 178.

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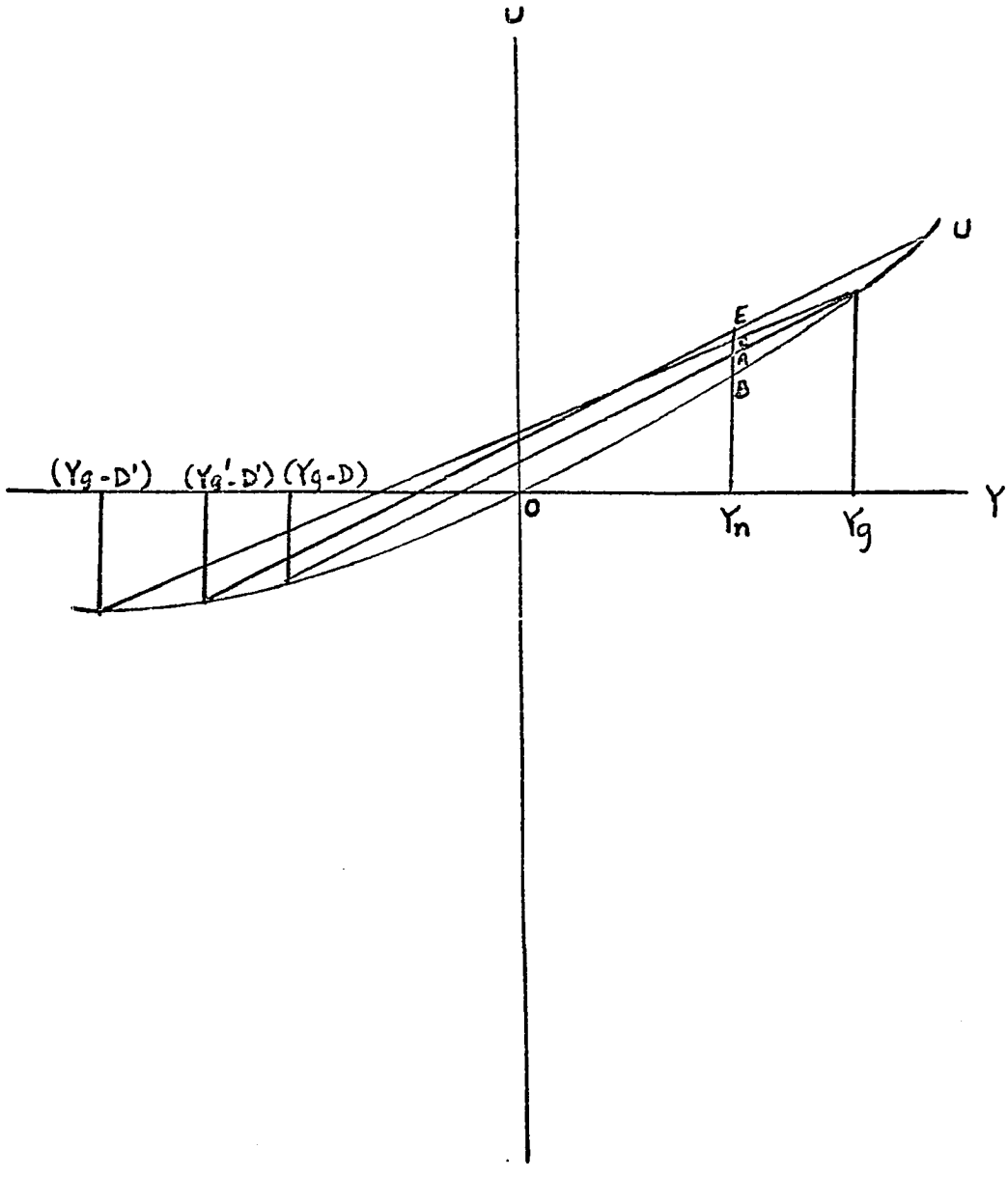
Figure 2



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points C and A, C representing the new higher utility resulting from the increase in D and offsetting decrease in q.

In addition, if the possible gain were increased and the penalty simultaneously decreased so as to leave the net gain unchanged, the criminal's utility would also increase. This can be seen from a comparison of points E and A. However, the increase in utility may or may not exceed the increase which results from the offsetting changes in q and D.

Finally, Figure 3 represents the case of risk aversion. The utility derived from the commission of the illegal activity will fall short of the utility derived from a riskless activity resulting in the same net gain. This can be seen from a comparison of points A and B, point A representing the utility derived from the commission of the illegal activity and B the utility derived from the alternative riskless activity.

Now, if the penalty is increased to D' and the probability of conviction simultaneously reduced so as to leave the expected gain unchanged, the utility derived from the burglary is reduced. This can be seen by a comparison of points A and C.

In addition, if we simultaneously increased the possible gain and penalty so as to leave the expected gain unchanged, the utility derived from the illegal activity would also decrease, as can be seen from an examination of points E and A. However, the decrease may be greater than or less than the decrease associated with the offsetting changes in D and q.

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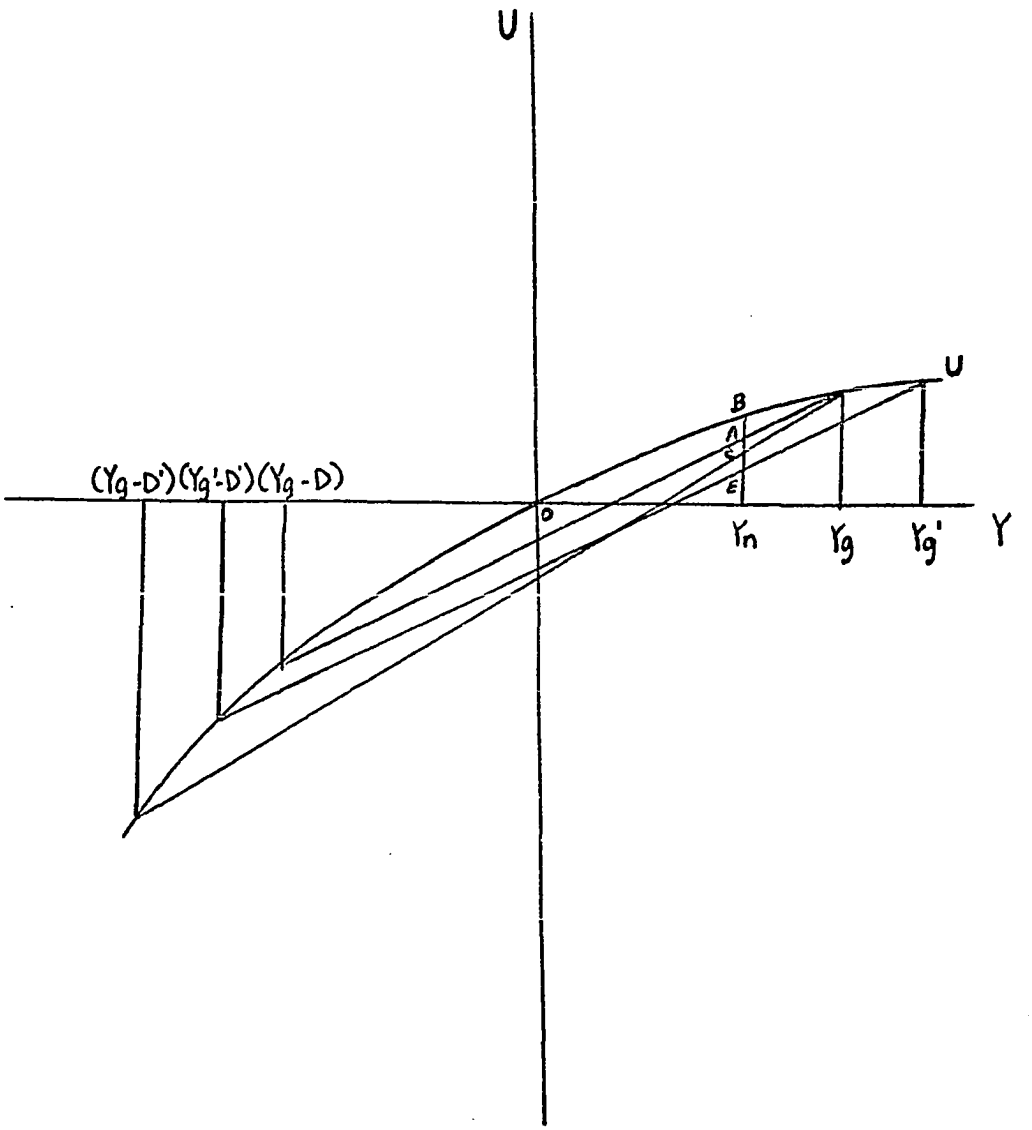
Figure 3



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Since parole reduces the penalty for a given crime we can expect the response, in terms of new crimes, to the institution of parole to be greatest when criminals have risk aversion and weakest when they have risk preference. The social cost resulting from parole then will be least when criminal behavior exhibits risk preference and greatest when it exhibits risk aversion.

G. The Social Cost of Crime (C_i)

In addition to the crimes induced by lowering the penalty for the given crime, new crimes can be expected from the parolees. Parole allows convicts to serve part of their sentence outside of prison and, therefore, provides them with opportunities to commit new crimes. If the probability of recidivism is the same for parolees and mandatory releasees, then the parole system may simply result in crimes being committed sooner. Hence, if the crimes committed by a group of parolees are the same as the crimes committed by a group of mandatory releasees, then the cost attributed to the parole system is simply a consequence of the crimes occurring sooner; i.e., in present value terms the cost will be greater the sooner the crime is committed. If parole is viewed as an ongoing process, then the lifetime crimes may exceed those of mandatory releasees even if the probability of recidivism is the same since parolees will have more time in which to commit crimes. The term $\left[\left(\sum_{it} P_{kit} C_i\right)_{pv} - \left(\sum_{it} P_{jit} C_i\right)_{pv}\right]$ would allow these differences to be taken into account as well as different probabilities of recidivism.

Our task now is to define the social costs associated with particular crimes. As will be seen from the discussion which follows, the

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cost associated with a given crime committed by a parolee may differ from that committed by others.

When an individual commits a given crime he uses time and energy which could be devoted to some alternative legal activity which would serve to increase society's total output. This opportunity cost of the criminal will represent a cost to society.

We can assume that an individual will engage in illegal activity only if the utility derived from such activity exceeds the utility derivable from the most lucrative alternative legal activity. In making the decision whether or not to engage in illegal activity, the individual is faced with two alternatives, only one of which has a certain outcome. If the individual chooses a legal activity, then his utility function may be written as follows:

$$(1) \quad U = U(Y_o)^1$$

where Y_o is the income derived from the given legal activity. If, on the other hand, the individual chooses the illegal activity, his income will be uncertain; i.e., it will depend upon whether or not he is caught and penalized. In such cases we can express the individual's expected utility function as follows:

$$(2) \quad EU = (1-q)\cdot U(Y_g) + q\cdot U(Y_g-D)$$

---

[1]This assumes that the individual is choosing among alternative opportunities with definite incomes and that he derives utility only from his income and not from the nature of the activity itself. This, of course, need not be the case since different individuals will have different tastes for different activities apart from the income derived from them. We could take account of this by viewing $U(Y_o)$ as depending upon both the magnitude of Y_o and its source.

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where q is the probability that the individual is caught and penalized, Y_g is his gross income[1] from the illegal activity, and D is the penalty if convicted.

The actual risk which the criminal is subject to is generally greater than that expressed in (2). In many cases the magnitude of Y_g will be the actuarial value of some probability distribution; i.e., Y_g may be expressed as

$$(3) \quad Y_g = p_1y_1 + p_2y_2 + \ldots + p_ny_n = \sum_1^n p_iy_i$$

where $\sum p_i = 1$ and p_1 is the probability that the illegal activity will yield y_1[2], p_2 the probability that it will yield y_2 and so on.

In addition, once caught the ultimate penalty is also uncertain. We might think of the actual penalty, D, as depending upon the probabilities of reaching various stages of the prosecution process. We have then

$$(4) \quad D = q_1d_1 + q_2d_2 + \ldots + q_nd_n = \sum_1^n q_id_i$$

where $q_i \leq q_i\text{-}1$ and q_i is the probability of reaching the i^{th} stage in the prosecution process and d_i the cost to the criminal associated with stage i.

---

[1]Gross income here is defined unconventionally as the monetary value of the gain from the illegal activity less the cost of capital goods used in the course of committing the crime. Net income will be used to take account of the expected penalty.

[2]All y_i's are defined net of capital costs.

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Equation (2) can now be rewritten as follows:

$$(5)\quad EU = \left[p_1 \cdot U(y_1) + p_2 \cdot U(y_2) + \ldots + p_n \cdot U(y_n)\right] + \left[q_1 \cdot DU(d_1) + q_2 \cdot DU(d_2) + \ldots + q_n \cdot DU(d_n)\right]$$

where $DU(d_i)$ is the disutility associated with d_i.

When an individual is apprehended there will be some probability of Y_g being confiscated. We could think of some q_i as being this probability and the associated d_i as Y_g. However, Y_g depends upon a distribution of y_i's. Therefore, it is convenient to redefine D as follows:

$$(6)\quad D = \Sigma q_i d_i + rY_g$$

where r is the probability that Y_g will be confiscated, and to rewrite (5) as

$$(7)\quad EU = \left[p_1 \cdot U(y_1) + p_2 \cdot U(y_2) + \ldots + p_n \cdot U(y_n)\right] + \left[q_1 \cdot DU(d_1) + q_2 \cdot DU(d_2) + \ldots + q_n \cdot DU(d_n)\right] + r\left[p_1 \cdot DU(y_1) + p_2 \cdot DU(y_2) + \ldots + p_n \cdot DU(y_n)\right]$$

The actuarial value of the net income derived from the illegal activity will be

$$(8)\quad Y_n = \Sigma p_i y_i - (\Sigma q_i d_i + rY_g) = Y_g - D$$

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If the individual is risk neutral, (7) reduces to

$$(9) \quad EU = U(\Sigma p_i y_i - \Sigma q_i d_i - r\Sigma p_i y_i) = U(Y_g - D)$$

and (8) can be compared with (1) to determine whether or not the individual will engage in illegal activity. He will do so if $Y_n > Y_o$. If, however, the individual is risk averse, then he must receive some premium for engaging in the risky illegal activity. In such a case, Y_n would have to be sufficiently greater than Y_o to induce the individual to engage in illegal activity. On the other hand, if the individual has risk preference, then he will engage in illegal activity for certain values of $Y_n < Y_o$.

If in fact criminals are risk neutral, and there are no economic rents paid to them, (8) may be taken as the criminal's opportunity cost of committing a given crime. This opportunity cost will represent one component of the social cost of the given crime.

However, some criminals probably will receive economic rents. The supply curve for criminal activity will probably be positively sloped since, at higher levels of Y_n, Y_n will exceed Y_o for more individuals. In addition, the higher Y_n may lead to a substitution toward more crime on the part of those already engaged in criminal activity. Any one of the above will, by itself, be sufficient to cause the supply curve to be positively sloped. Given Y_g the community and private citizens fix Y_n by determining D. D will depend on the q_i's and d_i's. The community and private citizens will determine the q_i's by determining the level of public and private expenditures devoted to apprehension and prosecution and the d_i's by directly setting them.

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DD' in Figure 4 is analogous then to a demand curve and is determined by the community and private citizens. The number of crimes committed will be determined by the intersection of DD' and S, the criminal's supply curve. The area OAD will represent the total economic rent shared by all criminals (unequally) with opportunity costs below the marginal criminal's.[1] The opportunity cost associated with a single crime then will not be Y_n but $Y_n/2$ (given the linear supply curve).

If, however, criminals exhibit either risk preference or risk aversion, it will make little sense to relate the number of crimes to Y_n without specifying how the components of Y_n change as Y_n changes. As was seen above, the criminal can be expected to react differently to equivalent changes in the various components of Y_n when he is not risk neutral.

The criminal's opportunity cost will only be relevant for crimes induced by parole. The alternative to parole is lengthier incarceration. The opportunity cost of the parolee then is zero since inmates are not productive.[2]

Society will, of course, incur a cost in excess of the criminal's opportunity cost, much of which will result from society's

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[1]If a higher Y_n induces criminals to engage in more illegal activity, then the higher return they receive on the amount of activity they would have engaged in at a lower Y_n is economic rent. This economic rent will exist whether the supply curve slopes upward because of new entrants to the criminal activity or because criminals are induced to higher levels of activity as Y_n increases.

[2]This ignores possible inmate production in prison work programs. However, such production is accounted for separately in our cost-benefit expression.

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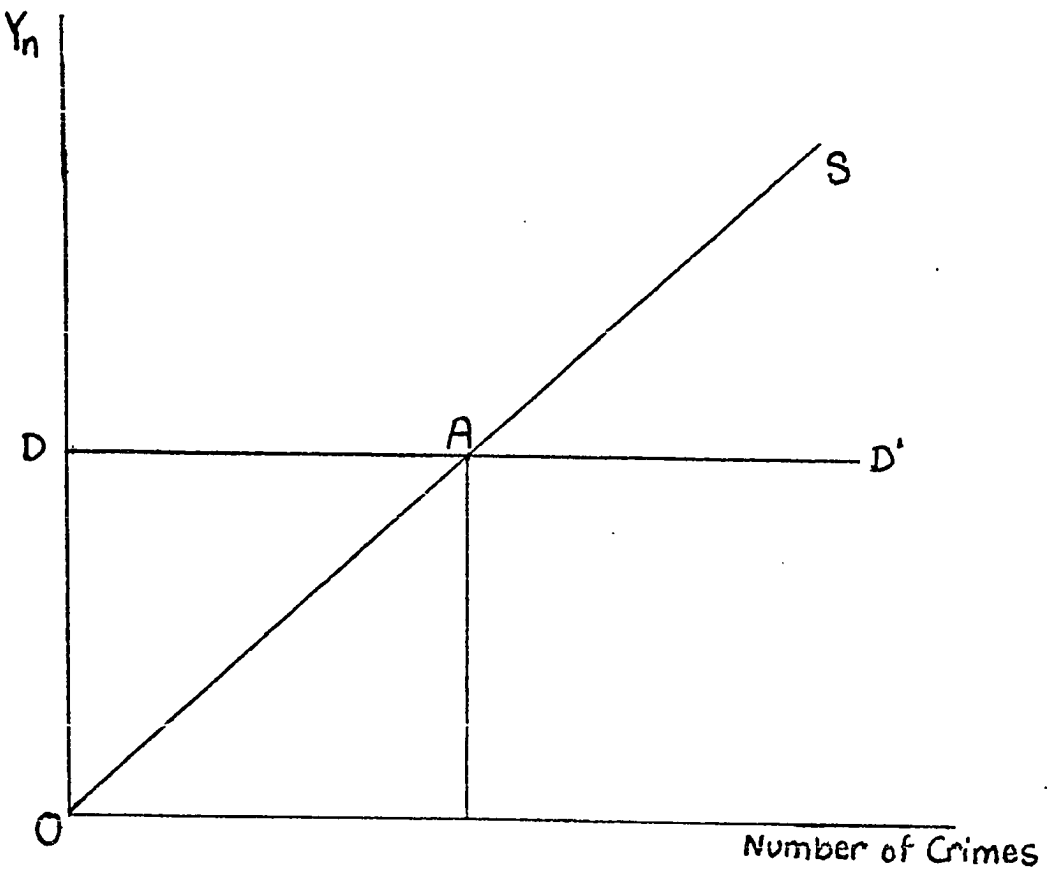
Figure 4



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reaction to crime. To begin with, much of the cost incurred by the criminal will also represent a cost to society. The use of legal resources by the criminal will represent a cost to society, as will the cost of operating the bail-bond service. Society will incur the cost of punishment in terms of operating the probation and prison systems, in addition to the indirect costs which the criminal suffers in terms of foregone income. Apprehension and prosecution costs, which the criminal does not bear, must also be taken into account. Police, public defenders, prosecutors, judges, court clerks, witnesses, etc., will all add to social costs.

When an attempt is made to apprehend and punish criminals, the danger of apprehending and punishing the wrong individual will be present. Such results would involve social costs apart from those of apprehending and punishing a guilty party. In addition, the apprehension process may deny some members of society certain of their rights. This too should be viewed as a cost incurred as a result of the commission of criminal acts.[1]

Private citizens will employ resources in an attempt to prevent crimes from being committed against them (burglar alarms, locks, etc.) and to apprehend the criminals in the event that their preventive measures fail (private investigators, etc.). To the extent that these expenditures vary with the level of crime they will represent costs to be attributed to the added crimes due to parole.

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[1]See J. R. Harris, "On the Economics of Law and Order," Journal of Political Economy, LXXVIII (January/February, 1970), 165-174, for a discussion of such costs.

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In addition to attempting to prevent crimes and apprehend criminals, individuals attempt to divide the losses from crime via insurance schemes. To the extent that the added crimes due to parole result in additional costs of administering the insurance system, social costs will result.

The intermediate goods used by the criminal in the course of committing a crime will also add to social costs.

So far we have said nothing of the costs to victims of crime. Basically there are four outcomes, not necessarily exclusive, which result from serious crimes: (a) a person (people) may be injured; (b) life may be lost; (c) property may be destroyed; and (d) property may be transferred.

When a person is injured or when life is lost, the cost to society will be the sum of the present value of the lost incomes of the injured or deceased, the resources devoted to the medical treatment of the victims, and the personal pain suffered by the victims and their friends and family. In addition, the commitment of the crime may serve to instill fear into the minds of unrelated individuals.[1] This, of course, may be a cost attributable to all types of crimes.

When property is destroyed its value is no doubt a component of social cost. This is not the case when property is transferred

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[1]See Footnote 3, pp. 2-3.

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since the loss to the victim is compensated by the gain to the criminal.[1] The social cost of the crime, however, is not entirely independent of the amount of property transferred since the greater the average transfer the greater the opportunity cost for the average criminal, assuming that the penalty and probability of conviction does not vary with the magnitude of the transfer. In crimes involving only (c) and (d) above, there are also costs in terms of emotional upset. The shock of being robbed or having one's home burglarized can indeed represent major costs. In addition, the victim may experience a cost in terms of the time spent getting his property back in order, filing insurance claims, assisting the police, etc.

H. The Social Rate of Discount

Before proceeding to the actual measure, we must choose a discount rate to employ in our study. The choice of such a social discount rate has provoked considerable discussion among economists. Most government projects for which cost benefit studies have been undertaken result in large expenditures (costs) in the present and returns (benefits) in the future. The proper choice of a discount rate is of great significance since too high a rate may lead to a large understatement of the benefit cost ratio and vice-versa.

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[1]This need not be the case. The utility derived by the criminal from the transferred property may exceed or fall short of the utility which would have been derived by the victim. In addition, the social cost may depend upon what is done with the stolen property. If, for example, the resources stolen are used to effect a real investment, which would not have been made were the resources not transferred, then society may gain. The reverse situation would, of course, result in a loss.

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The difficulty in choosing the proper rate is caused by the fact that there is a divergence between the rate which will yield the proper amount of investment from the point of view of consumers time preference and the rate which will result in a proper allocation of resources between the public and private sectors. The rates diverge because of the externalities present in investments and because the corporate income tax and private risk require a higher return on private investments than on public ones.

In the present study the choice of a discount rate is of much less significance than it was with most previous cost benefit studies. This is because the parole system does not result in an investment in the sense of initial expenditures and future returns. Both the costs and benefits in our equation are incurred in the future--a future which is reached in a relatively short amount of time.

We will use a social discount rate of 5% in our calculations.

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III. THE MEASURE

We will attempt to measure the components of the cost-benefit expression for a group of paroled burglars in Pennsylvania. We choose a property crime from one of the FBI index crimes,[1] because property crimes will generally involve fewer intangible costs than crimes against the person. Burglary is the most common of the FBI index crimes. It involves breaking and entering with intent to commit a felony.

We will conduct our study over the length of a single parole period. Hence, if a crime is committed by a parolee, the cost of the crime will be that it is committed sooner than if the parolee were released after serving his full sentence (assuming the same probability of recidivism). Certain additional costs and benefits will be treated in the same way as will be seen below. If parole is viewed as an on-going process, then over the life of a given criminal the parole system may give him more opportunities to commit crimes, so that his lifetime crimes are greater in number with parole than they would have been without it. This, of course, holds for benefits also. A continuous process of parole not only results in more lifetime crime, but also in more lifetime benefits (earnings, reduced incarceration costs, etc.).

The Pennsylvania State Board of Probation and Parole handles adult parole cases from the state correctional institutions and from county jails when the maximum sentence imposed is not less than two

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[1]The FBI Index Crimes are: murder, rape, aggravated assault, robbery, burglary, larceny ($50 or more), and auto larceny. We choose from among the index crimes since the best data will be available for them.

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years. Pennsylvania is an atypical state in that it relies heavily on a system of county prisons.[1] Since these prison systems operate autonomously, there is little data available which allows us to compare the treatment of prisoners under different jurisdictions. While the state centrally collects a fair amount of data dealing with the treatment of prisoners under its own jurisdiction, it does not do so for the prisoners under the jurisdiction of individual counties.

While we know then that the state parole board is empowered to deal with county prisoners receiving sentences of not less than two years, we cannot isolate this population (of potential state parolees) since we do not know what percentage of all those sentenced to county prisons received sentences of less than two years.

As a result of this lack of data on county prisoners, we will be forced, at times, to rely on crude estimates for certain terms in our cost benefit equation.

The state parole agency is faced with the task of "helping and preparing the offender to return to the community and make an adjustment wherein he becomes an asset rather than a liability to society."[2] How successful the agency is in achieving its aim depends upon the actions of the parolees and the response of society to those actions. There are several routes which the convict may take once released on

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[1]Approximately 50% of the total daily prison population in Pennsylvania is confined in county prisons. The Census of Pennsylvania Prisons, 1967, Report C-53, October, 1968, p. 3.

[2]Commonwealth of Pennsylvania, Board of Probation and Parole, 25th Annual Report, 1967-1968, p. 41.

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parole. The tree diagram in Figure 5 summarizes the possible alternative routes.

If a parolee commits a new crime while on parole he will be returned to prison, made to make up the time for which he was released, serve the rest of his initial sentence, and serve an additional sentence for the new crime. If the probability of recidivism is the same for parolees and mandatory releasees, then the consequences of paroling those who turn out to be recidivists is that (a) their contribution to output while released and the crimes they commit have been moved up in time; (b) the cost of keeping them incarcerated and their contribution to output while in prison have been moved back in time; and (c) resources have been expended on parole services.

The consequence of paroling those who violate the rules of parole will depend on which route they follow once re-incarcerated. If they are simply made to serve the rest of their sentence without making up for the time released, then the benefits and costs of parole are all those in our equation taken over the time between parole and recommitment. Since the sentence will have been reduced for violators, we can expect new crimes to be induced by their parole. This was not the case for recidivists because requiring them to make up their time released abrogates the decrease in the penalty.[1]

On the other hand, if the violators are required to make up the time released, then the costs and benefits are simply moved up in time as they are for those who commit new crimes. Furthermore, since in this

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[1]See pp. 111-112.

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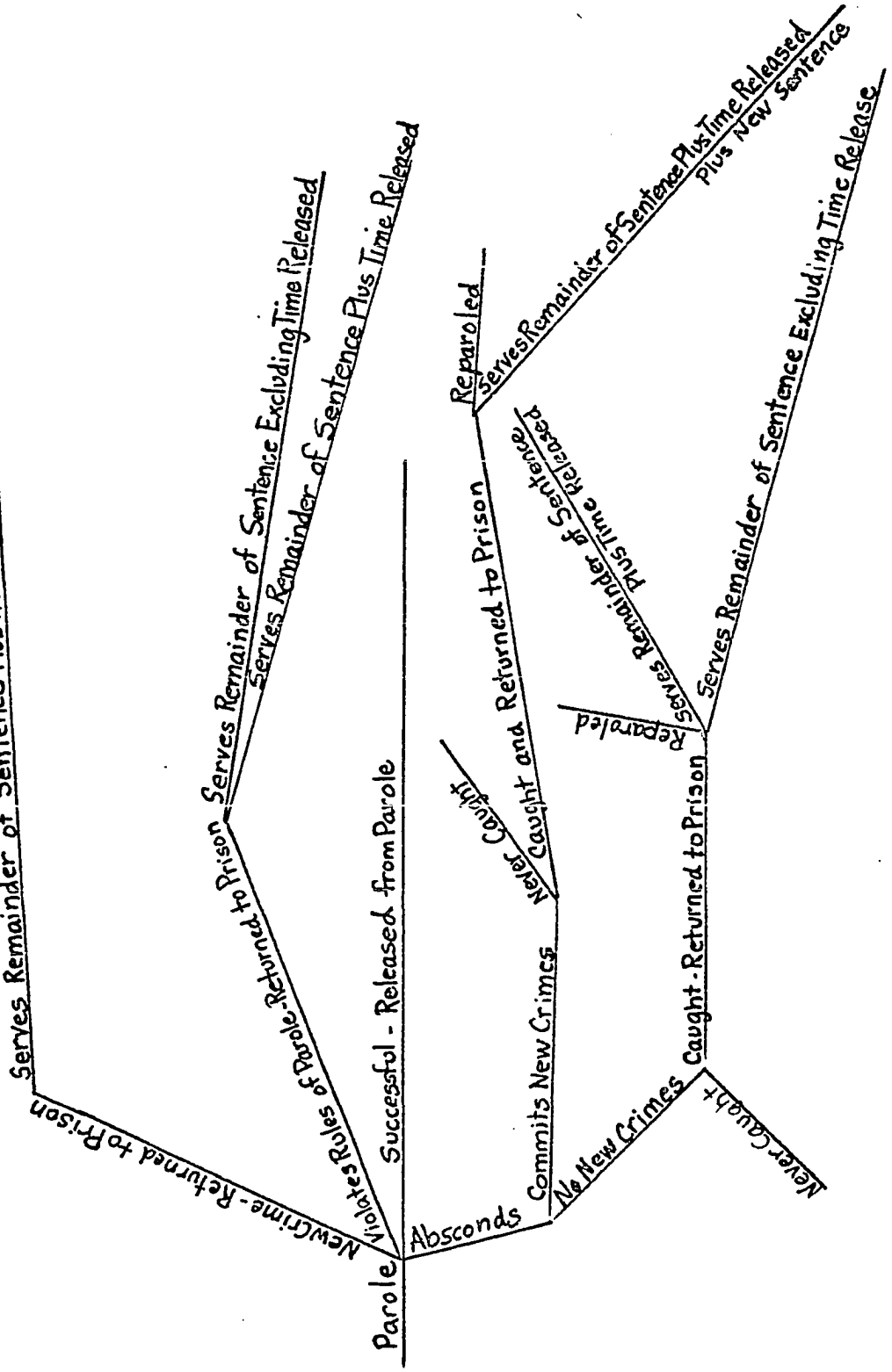
Figure 5



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case the decrease in the penalty will be nullified as it was for recidivists, no induced crimes will occur.

For those who are successful on parole the costs and benefits will be as given in our equation over their parole period.

For absconders the consequences of parole will depend upon how they behave once they have absconded and whether or not they are caught. If they commit new crimes and are caught, then the results are similar to those classified as recidivists. If they commit new crimes and are never caught, we will not be faced with the prosecution and incarceration costs, but will be faced with the costs of induced burglaries.[1]

If the absconder commits no new crimes and is never caught, the result is similar to the successful parolee with the additional benefit of saved parole administration costs. If he is caught, however, then the result is similar to that for those who violate the rules of parole.

A major difficulty which we face when attempting to study the parole system in Pennsylvania is that, once a parolee is returned to prison or absconds, he disappears from our view. As a result, we can only follow violators of the rules of parole until they are returned to prison and absconders until they abscond. To deal with this problem, we will, in each case, choose both the cost maximizing and benefit maximizing routes.

At this point, which routes will achieve the desired results will not be apparent. It may appear that, if rule violators, for example, are not made to serve their time released, then benefits would be

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maximized. However, while requiring violators to make up the time released involves increased costs in terms of incarceration (I) and foregone production (O), it also involves benefits since making them do so increases the expected penalty for burglary and hence results in fewer induced burglaries.[1] Which route maximizes benefits then will depend upon the elasticity of the burglary rate with respect to the penalty and the cost of an induced burglary. It turns out that the elasticity and cost are sufficient in magnitude to make the assumption that violators are made to serve their released time a benefit maximizing one.

To maximize benefits then we assume that rule violators are made to serve their released time and that absconders behave like successful parolees and are never caught; and to maximize costs that all rule violators are not required to serve their time released and that all absconders cease to earn income when they abscond and are never caught.[2]

In this way we will be able to obtain an interval estimate of the true benefits or costs of the parole system by aggregating over our benefit maximizing assumptions and over our cost maximizing assumptions. We will follow this same procedure in calculating all the components of our cost-benefit equation whenever the form of the available data prevents us from obtaining the true measure.

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[1]See pages 111-112.

[2]The important point as far as cost maximization is concerned is that those who abscond are never caught. We could assume that absconders commit new crimes. However, there would be little justification then for assuming that the probability of apprehension for absconders who commit crimes is zero while that for the general population is positive.

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A. The Data

During the 1967-68 fiscal year, 551 burglars were released on parole under the authority of the Pennsylvania State Board of Parole.[1]

Unfortunately, we will be unable to follow directly the group through their parole. As a result, certain data will be used from previous groups of paroled burglars as well as from the group currently under consideration. In addition, where needed data is not classified by crime groups, we will use the available data for all crime groups.

As can be seen from Table 1, 127 or 23% of the 551 paroled burglars can be expected to be returned to prison for committing new crimes while on parole. Of the remaining 424 parolees, 105 can be expected to be returned to prison for violating the rules of parole, and 143 can be expected to abscond. Hence, 176 or 32% of all those paroled can be expected to complete their parole successfully.

The estimates of the time spent on parole by those who fail are based on the time distribution of returned parolees and absconders by reason for return which is given in Table 2. The data are for all parolees taken over a five-year period. Not all members of the population represented in Table 2 will have been released during the 1967-68 fiscal year. Nor will all of those released during the 1967-68 fiscal year, who will eventually be returned to prison, have been returned

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[1]During the 1967-68 fiscal year, 2,064 inmates were released on parole. Of this number, 246 or 11.9% were being released on re-parole. The number of burglars in the entire group was 625. Assuming 11.9% of these are being re-paroled, 551 burglars were being released on parole for the first time.

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TABLE 1

Parole Outcome

Parolees	Total	% of All Parolees
Recidivists	127[a]	23%
Rule Violators	105[b]	19%
Absconders	143[b]	26%
Successful	176	32%

[a]Source: Commonwealth of Pennsylvania Board of Probation and Parole, "A 20-Year Comparison of Releasees and Recidivists, June 1, 1946, to June 30, 1966." Unpublished report, October 1, 1966.

[b]Source: Abstracted from Commonwealth of Pennsylvania Board of Probation and Parole, "A 5-Year Study of Parolees Declared Delinquent from July 1, 1964, to June 30, 1969." Unpublished report, February 25, 1970.

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TABLE 2

Length of Time Under Parole Supervision
for Each Reason for Delinquency

Time on Parole	Violators of Rules of Parole		New Convictions		Absconding		Total	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Less than 3 mos.	283	20.6	241	15.2	573	31.7	1,097	23.0
3 mos. less than 6 mos.	236	17.2	221	13.9	305	16.9	762	16.0
6 mos. less than 9 mos.	163	11.9	248	15.6	215	11.9	626	13.1
9 mos. less than 1 yr.	151	11.0	184	11.6	163	9.0	498	10.5
1 yr. less than 1½ yrs.	191	13.9	219	13.8	189	10.4	599	12.6
1½ yrs. less than 2 yrs.	117	8.5	175	11.0	132	7.3	424	8.9
2 yrs. less than 2½ yrs.	66	4.8	93	5.9	61	3.4	220	4.6
2½ yrs. less than 3 yrs.	55	4.0	85	5.4	71	3.9	211	4.4
3 yrs. less than 4 yrs.	66	4.8	69	4.4	52	2.9	187	3.9
4 yrs. less than 5 yrs.	17	1.3	15	1.0	17	0.9	49	1.0
Over 5 yrs.	27	2.0	35	2.2	31	1.7	93	2.0
TOTAL	1,372	100.0	1,585	100.0	1,809	100.0	4,766	100.0

Source: Commonwealth of Pennsylvania, Board of Probation and Parole, "A 5-Year Study of Parolees Declared Delinquent from July 1, 1964 to June 30, 1969." Unpublished report, February, 1970.

by July 1969. We will take, however, the data on parole failures as recorded in Table 2 as indicative of the behavior of the group under consideration.

Our estimates of the time served on parole by those discharged from parole are taken from Table 3 and are for those released during the 1967-68 fiscal year. From Table 3 we find that the average parolee who completed his parole spent 34 months on parole.[1] From Table 4 we find that the average parolee spent 42 months in prison before parole, while the average paroled burglar spent 37 months in prison, or 89% as long as the average parolee. Assuming that he also spends 89% as long on parole, he will spend 30 months on parole.

1. The Present Value of the Output Produced by Parolees (O_{pv})

The state of Pennsylvania collects data on parolee earnings but does not classify the earnings by crime groups. It is difficult to estimate reliably the per capita income of paroled burglars from the time series of parolee earnings since the number of burglars in the parole group at a given time is unknown.[2] We must be satisfied, then, with the total income earned by all parolees divided by the total number of parolees as our estimate of the per capita earnings of paroled burglars.

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[1]This was found by assuming that all parolees served until the middle of their time class interval. The open class was closed at 12 years.

[2]We know the number of burglars being paroled in a given year, and we have a good estimate of the number being returned to prison. However, we do not know how many are released from parole.

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TABLE 3

Length of Time under Parole Supervision for Parolees Discharged During 1967-68

Period on Parole	Number	Percentage
Less than 6 months	104	6.4
6 mos. less than 1 yr.	180	11.1
1 yr. less than 2 yrs.	450	27.8
2 yrs. less than 3 yrs.	323	19.9
3 yrs. less than 4 yrs.	226	13.9
4 yrs. less than 5 yrs.	94	5.8
5 yrs. less than 6 yrs.	124	7.7
6 yrs. less than 7 yrs.	47	2.9
7 yrs. less than 8 yrs.	24	1.5
8 yrs. less than 9 yrs.	8	0.5
9 yrs. less than 10 yrs.	4	0.2
10 yrs. less than 11 yrs.	12	0.7
11 yrs. less than 12 yrs.	11	0.7
12 yrs. or over	15	0.9
TOTAL	1,622	100.0

Source: Commonwealth of Pennsylvania, Board of Probation and Parole, 25th Annual Statistical Report: Year Ended June 30, 1968 (Harrisburg, 1968).

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TABLE 4

Length of Incarceration Before Parole

Time Served Before Parole	Murder	Robbery	Assault and Battery	Burglary	Larceny, RSG Auto Larceny OMVWC	Forgery and Checks	Rape with Intent to Ravish	Sodomy	Other Sex	Drugs	Escape	VUFA CCDW	Arson	Other	TOTAL
Less than 6 mos.	2	6	2	9	12	2	1	1	0	1	0	0	1	3	40
6 mos.- 1 yr.	4	9	7	28	26	8	2	3	5	6	0	2	0	6	106
1 yr.- 2 yrs.	26	62	51	205	108	31	14	13	10	17	15	15	5	17	589
2 yrs.- 3 yrs.	25	84	24	122	45	18	30	10	7	21	10	1	4	6	407
3 yrs.- 4 yrs.	19	46	7	58	27	2	20	3	3	11	4	0	2	0	202
4 yrs.- 5 yrs.	17	40	5	36	7	4	15	11	1	2	2	0	3	0	143
5 yrs.- 7 yrs.	36	28	6	37	2	7	15	7	2	3	2	0	3	1	149
7 yrs.- 10 yrs.	19	25	0	19	0	1	7	4	0	1	1	0	1	0	78
10 yrs.- 15 yrs.	13	15	0	11	0	0	3	0	0	0	0	0	0	0	42
15 yrs.- 20 yrs.	17	8	0	3	1	0	3	0	0	0	0	0	0	0	32
Over 20 yrs.	11	0	0	4	0	0	2	0	0	0	0	0	1	0	18
TOTAL	189	323	102	532	228	73	112	52	28	62	34	18	20	33	1,806

Source: Pennsylvania Board of Probation and Parole.

Ideally we would like to follow a group of burglars who are paroled at a given time through their parole process. However, the existing data do not permit us this desirable avenue. By viewing the entire parole population at a given time, we are in effect making use of a synthetic cohort of parolees; i.e., those who, at the given time, are serving their first year on parole will be representative of our hypothetical group of parolees during their first year on parole; those who, at a given time, are serving their second year on parole will be representative of our hypothetical group of parolees during their second year on parole, and so on. By dividing the total income earned in a given year by the average number of releasees on parole in that year, we are finding the average income earned per parolee per year. This will be greater than the average income per releasee on parole since the total number of releasees on parole for all or part of the year will exceed the average number. Having the yearly average income, we can then proceed to calculate O_{pv} in accordance with the time each parolee spends on parole.

This method of computation may result in an understatement of the true earnings of parolees. Consider, for example, the case in which the distribution of earnings among parolees is unequal. We might expect those who will not be repeaters to have higher incomes than those who do repeat crimes since the higher incomes would make the criminal activity less attractive. In this case our method of computing the parolees' incomes will understate the true income. To find the true income in the extreme case when repeaters earn nothing, for example, we should divide the total income by the number of non-repeaters in the

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parole group so as to obtain their average income. Even though the average income of all parolees taken together has not changed O_{pv} has, since non-repeaters spend more time on parole than repeaters.

It may also be the case that those returned to prison for violating the rules of parole earn less than those who complete their parole successfully. Failure to maintain steady employment is, in fact, a violation of the rules for which parolees may be returned to prison. This too will lead to an understatement of O_{pv}. Since we are unable to directly observe the income of our different classes of parolees, we will make two assumptions regarding the distribution of income among them. To maximize benefits we will assume that those who commit new crimes or violate the rules of parole have no earnings. This will result in a smaller number of parolees by which we divide a fixed quantity representing parolee earnings. Hence, income per income earning parolee will be larger and, since successful parolees spend more time on parole than those who fail, O_{pv} will be larger. To maximize costs we assume that all parolees have the same earnings.[1]

A further error may exist if parolees' incomes increase over time. This will lead to a small overstatement of the true income of parolees in present value terms since less income will be earned at the beginning and more income will be earned at the end of the parole period than our method will indicate.

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[1]This does not suggest that the parole system will result in greater benefits if those who fail earn nothing while on parole. It is simply a consequence of the method of computation.

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The data on parolee earnings are reported for the calendar year. In 1967, 5,797 parolees[1] earned $11,396,348.89.[2] We will use this figure to determine the earnings of paroled burglars released during the 1967-68 fiscal year.

Under our cost maximizing assumption each parolee will contribute equally to the total. Therefore, earnings per parolee are $1,965.90 per year.[3] Using Table 2 above we can compute the total earnings of the 127 parolees who will be returned to prison for the commission of new crimes and of the 105 who will be returned to prison for violating the rules of parole. In each case we assume that the parolees are returned to prison at the midpoint of their respective class intervals. Hence,

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[1]This number was found by excluding all those parolees not under active supervision (those in other countries, those serving sentences under the Pennsylvania Board of Parole jurisdiction or under other jurisdictions and those in mental hospitals) from the total number of parolees under the jurisdiction of the Pennsylvania Board of Parole on June 30, 1967. Commonwealth of Pennsylvania, Board of Probation and Parole, 25th Annual Statistical Report, 1968.

[2]Ibid.

[3]Since this figure seemed surprisingly low and since the corresponding figure under our benefit maximizing assumption will not be much higher ($2,390), an attempt was made to find supporting evidence for our data. Comparable data was not readily available. In a 1960 survey of federal parolees, it was found that median income during the first three months after release was $179 per month. Daniel Glasser, The Effectiveness of a Prison and Parole System (Indianapolis: The Bobbs Merrill Co., Inc., 1964), p. 334.

Adjusted to 1967 dollars (it is unknown whether the real income of parolees increased, decreased, or remained constant over this time), this figure becomes $201. The nature of the survey was such that a disproportionate number of successful parolees were included in the sample. Offsetting this, however, is the fact that the data are for the beginning of the parole period, a time when adjustment difficulties usually arise.

The income figure reported by Glasser is not inconsistent with ours. It is not clear, however, that the two are really comparable.

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we assume, for example, that all 127 parolees who will commit new crimes are income earners for 1½ months, that 84.8% of the 127 are income earners for 4.5 months, 70.9% for 7.5 months, and so on. We can then compute the total earnings in each time interval so that we can express our total in terms of its present value.

Computed in this manner the present value of the earnings of those who will be returned to prison as violators of the rules of parole is $186,440.05 or $1,775.62 per violator, and that of recidivists is $289,313.18 or $2,278.06 per recidivist.

Recidivists, however, will be made to make up their time released. If the probability of recidivism is the same for parolees and mandatory releasees, then the only benefit in terms of production we receive from their parole is the fact that it occurs sooner than if they were not paroled.[1] Since those burglars who complete their parole successfully serve an average of 30 months on parole and since parolees generally serve their full unexpired term on parole, we can conclude that parolees are released 30 months prior to the expiration of their sentence. The benefits society receives from their production, then, are not their full earnings, but simply the difference between $289,313.18 and its present value if it were received 30 months hence. This difference is $33,283.18.

Those who will complete their parole successfully will earn $1966 per year for 2½ years. In present value terms, $814,285.48 or $4,626.62 per parole will be earned by successful parolees.

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[1]Assuming that they would earn the same real income in the future.

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Absconders, under our cost maximizing assumption, cease to earn income after absconding and are never caught. Using Table 1 above and employing the technique described above, we find the present value of the earnings of absconders to be $246,377.59 or $1722.92 each.

Aggregating over our cost maximizing assumption, we find O_{pv} to be $1,280,386.30.

Under our benefit maximizing assumption, the entire $11,396,348.89 is earned by successful parolees and absconders (while they are present) who behave as successful parolees.

In order to calculate O_{pv} under our benefit maximizing assumption, we must know how many members of the synthetic cohort of parolees fall into each behavior category. In order to find this we must determine how many of the 5,797 parolees are serving their first year on parole, how many their second year, and so on. This step is accomplished with the aid of Tables 2 and 3. We divide the parolees into six subgroups--those serving their first, second, third, fourth, fifth, and sixth or more years on parole. From historical data we know that 18.5% of all those released will commit new crimes on parole, 14.5% will violate the rules of parole, 21.1% will abscond, and 45.9% will complete their parole successfully. From Table 2 we can determine what percentage of those paroled in the first year will not be present in the second year because they abscond, or are returned to prison with new convictions or as rule violators. Similarly, Table 3 enables us to determine how many released on parole in year one will be released from parole before year two begins. In this manner we can determine how large the group of second year parolees is in relation to the group of first year

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parolees. Similarly, we can find how large the third-year group of parolees would be in relation to the second-year parolees, and so on. Knowing that the sum of all sub-groups of parolees is 5,797, we will have six equations and six unknowns allowing us to solve for the size of each sub-group. The results are given in column 2 of Table 5. Columns 3 and 4 of Table 5 give the percentage of parolees in each sub-group who we will assume do not have any earnings. Column 7 gives the percentage of absconders whose earnings are not counted. Columns 3 and 4 may require some explanation. Line 1 of column 3 indicates that 18.5% of sub-group 1 will have no earnings. This is the total percentage of all parolees who will commit new crimes while on parole. Line 2 of column 3 indicates that 8.08% of sub-group 2 will have no earnings. This is found by multiplying 18.5% by the percentage of those who will not have committed their crime in year 1. Line 3 is found by multiplying 18.5% by the percentage of those who will not have committed their crimes in years 1 or 2, and so on. Column 4 is derived in the same manner. Column 8 gives us the total amount of income earners in each sub-group. Summing, we assume 4,767 parolees will be income earners. Each then will earn $2,390.67. In present value terms each parole (those who are successful on parole and those who abscond behaving as successful parolees) will earn $5,626.07, for a total of $990,188.32 for successful parolees, and $804,528.01 for absconders. Together they earn $1,794,716.33.

2. The Present Value of the Reduced Incarceration Costs (I_{pv})

In calculating the direct costs of incarceration, the marginal social cost (M.S.C.) will be difficult to determine. The state's

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TABLE 5

Income Earners Under Our Benefit Maximizing Assumptions

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7[a]	Col 8[b]
Sub-groups	Size	% of Each Sub-group Who Will Commit New Crimes During Parole Period	% Who Will Violate Rules of Parole During Parole Period	% Who Will Abscond During Given Year	% of Year on Parole Before Absconding	% of Absconders Whose Income Is Not Counted	Total Number of Income Earners
1	1,864	18.50	14.50	13.20	41.89	7.67	1,105.91
2	1,110	8.08	5.69	4.53	45.72	2.45	929.95
3	832	3.49	2.46	1.89	49.47	.95	774.59
4	712	1.40	1.17	.82	50.00[c]	.41	690.78
5	650	.59	.47	.21	50.00[c]	.11	642.46
6	629	.40	.29	.42	50.00[c]	.21	623.34

[a]Col 7 = Col 5·(1-Col 6)

[b]Col 8 = Col 2 - Col 2·(Col 3 + Col 4 + Col 7)

[c]Mid-point of year is assumed.

marginal cost, i.e., the additional dollar outlay for imprisoning one additional convict (or dollar saving for releasing one additional convict), differs from M.S.C. While the existence of excess capacity in a prison will lead to a less than proportionate increase (decrease) in the state's dollar outlay when an additional convict is imprisoned (released), it is not clear that the M.S.C. will be less than proportional. A prison system may result in future benefits to society if it performs a rehabilitation function or future costs if it reinforces the prisoners' tendency towards criminal activity. Which of these functions it performs may be at least partially the result of the density of the prison population. Hence, while filling (increasing) the empty beds in an institution will not increase (decrease) the state's dollar outlay proportionally, it may result in a more than proportional increase (decrease) in social cost if recidivism is a positive function of the number of inmates per institution. M.S.C., then, becomes difficult to measure. First we must find exactly which type of expenditures, if any, affect the criminal's future behavior and to what extent. Given our inability to do this at present, average cost will probably be a more useful concept than M.C. computed in terms of the state's dollar outlay.

In any event, the magnitude of the parole system is such that many new facilities would be required were there no parole system.[1] This being the case, A.C., M.C., and M.S.C. may not differ significantly

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[1]In 1968, for example, there were over 10,000 men and women on parole in Pennsylvania while the total prison population was between 11,000 and 12,000. Pennsylvania Crime Commission, Task Force Report: Correction in Pennsylvania, July, 1969.

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if at all. Average cost then will be used in our calculation of the direct cost of incarceration.

In calculating the reduced incarceration costs we must decide which expenditures represent social costs. Table 6 below is a typical allotment sheet for a state prison for the 1969-70 fiscal year.[1] The breakdown is not fine enough to allow us to isolate all social costs. The categories salaries (110), wages (120), contracted personal services (130), and employee benefits (140), for example, represent both private and social costs. The costs will not be social to the extent that the services paid for would be rendered whether or not the prison existed. Including all of each of the above items will overstate their contribution to social costs to the extent that each represents private costs (the state in this case bearing the private costs). However, since most of the above probably go for services which would not be rendered if the prison did not exist, and since they cannot be further categorized, they will be counted in full, as will all starred items. All remaining items will be treated as private costs and therefore transfer payments. If the magnitude of any item in this category exceeds what would be spent by an individual out of prison, the excess will represent social costs. The magnitudes were checked, therefore, against the expenditures for single individuals as reported in the B.L.S. studies on consumer expenditures. In all cases the expenditures on prisoners fell short of that of civilians.

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[1]The author was unable to obtain similar sheets for the 1967-68 fiscal year. However, we are only interested in the distribution of expenditures and not their absolute magnitudes.

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TABLE 6

Allotment Sheet

FUND General
DEPARTMENT Justice
APPROPRIATION Penal and Correctional
PROGRAM SCI-Philadelphia

FOR THE PERIOD

7/1/69 to 6/30/70

DATE August 19, 1969

ACCOUNT CODE

FUND	DEPT.	APPRO.	YEAR	PROG.
01	11	03	9	630

Object Classification	Amount Budgeted	Amount Allocated	Allotments Requested	Allotments Approved
*110 SALARIES	2,435,733	2,435,733	2,435,733	2,279,733
111 Salaries	2,105,733	2,105,733	2,105,733	
112 Overtime	330,000	330,000	330,000	
113 Temporary Salaried Employes				
*120 WAGES	109,243	109,243	109,243	109,243
121 Wages	109,243	109,243	109,243	
*130 CONTRACTED PERSONAL SERVICES	32,439	24,000	24,000	24,000
131 Contracted Personal Services	32,439	24,000	24,000	
*140 EMPLOYE BENEFITS	288,801	271,821	271,821	271,821
141 Employes' Hospitalization Insurance--State Share	9,500	9,500	9,500	
142 Annuitants' Hospitalization Insurance--State Share				
143 Social Security Contributions--State Share	101,240	84,260	84,260	
144 Retirement Contributions--State Share	155,451	155,451	155,451	
145 State Workmen's Insurance	9,027	9,027	9,027	
146 Employes' Group Life Insurance--State Share	11,583	11,583	11,583	
147 Out-Service Training	2,000	2,000	2,000	
200 CONTRACTED REPAIRS	3,500	1,200	1,200	1,200
210 Contracted Repairs	3,500	1,200	1,200	

Continued...

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TABLE 6 (Continued)

Object Classification	Amount Budgeted	Amount Allocated	Allotments Requested	Allotments Approved
300 SUPPLIES, MATERIALS AND CONTRACTUAL SERVICES	707,948	528,125	528,125	684,125
310 Specialized Services	16,560	15,000	15,000	15,000
320 Printing				
325 Advertising				
*330 Postage and Freight	6,400	5,000	5,000	5,000
*332 Communications	10,013	9,600	9,600	9,600
*335 Travel	3,088	2,500	2,500	2,500
340 Utilities and Fuel	138,536	130,000	130,000	130,000
*350 Membership Dues and Subscriptions	146	146	146	146
355 Insurance, Surety and Fidelity Bonds	260	260	260	260
360 Motorized Equipment Supplies and Repairs	4,672	4,000	4,000	4,000
366 Contracted Maintenance Services	4,000	4,000	4,000	4,000
370 Rent of Real Estate	11,004	11,004	11,004	11,004
375 Rent of Equipment	276	276	276	276
380 Laboratory and Medical Supplies	33,498	25,000	25,000	25,000
382 Wearing Apparel	60,426	35,000	35,000	66,000
383 Food	333,192	254,339	254,339	334,339
384 Housekeeping Supplies	40,900	15,000	15,000	40,000
*385 Office Supplies	11,421	4,000	4,000	9,000
386 Educational, Recreational and Religious Supplies	1,139	1,000	1,000	1,000
387 Agricultural Supplies				
390 Maintenance Materials and Supplies	29,927	10,000	10,000	25,000
399 Other Services and Supplies	2,490	2,000	2,000	2,000
400 FURNITURE, EQUIPMENT AND LIVESTOCK	6,780			0
410 Motor Vehicles				
420 Livestock, Game and Poultry				
430 Equipment and Machinery	6,780			
440 Furniture and Furnishings				

Continued...

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TABLE 6 (Continued)

Object Classification	Amount Budgeted	Amount Allocated	Allotments Requested	Allotments Approved
500 CAPITAL IMPROVEMENTS				
510 Land Acquisition				
520 Buildings and Structures				
530 Non-Structural Improvements				
*600 SUBSIDIES AND GRANTS	100	100	100	100
610 Grants and Payments to Individuals	100	100	100	
620 Grants to Institutions				
630 Subsidies to Government Units				
700 DEBT SERVICE AND FIXED CHARGES				
710 Debt Retirement				
720 Interest on Debt				
730 Authority Rentals				
800 NON-EXPENSE ITEMS				
810 Refunds				
820 Inter-Fund Disbursements				
830 Investments				
835 Loans				
840 Accrued Interest on Investments				
850 Premiums and Discounts on Investments				
860 Transfer Payments to Other Governments				
TOTALS	5,584,544	3,370,222	3,370,222	3,370,222

*Items resulting in social costs.

Defining social costs in the above manner, the percentage of total costs accounted for by social costs for all state institutions was 80%.

No comparable breakdown is available for county prisons. It will be assumed, therefore, that 80% applies to state and county institutions.

On December 31, 1967, 5,671 prisoners were confined in state institutions and 5,674 in county institutions.[1] The dollar outlay for the 1967-68 fiscal year was $27,791,213 or $4,900.58 per inmate for the state institutions and $12,600,000 or $2,220.65 per inmate for the county institutions.[2] Seventy-four percent of those paroled under the authority of the state board of parole come from state institutions, the remainder coming from county institutions.[3] Hence, $4,425.86 is the average dollar expenditure saved by paroling one inmate and $3,536.26 ($4,425.86 times .8) is the average reduction in social costs.

Using Tables 1 and 2 above, we can compute the total savings in prison costs which result from parole in the same manner that we computed the earnings of parolees.

Under our cost maximizing assumption the present value of the savings due to the parole of recidivists is $59,886.45 or the difference

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[1]The Census of Pennsylvania Prisons 1967. Report C-53, October, 1968, p. 3.

[2]Pennsylvania Crime Commission, Task Force Report: Corrections in Pennsylvania, July, 1969, pp. 1-3.

[3]Commonwealth of Pennsylvania Board of Probation and Parole, 25th Annual Statistical Report, June 30, 1968.

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between $520,551.41 and its value when received 30 months later. The saving from the parole of violators is $395,994.60, or $3,770.90 each.

The parole of those who complete their parole successfully results in a saving of $1,465,110.24 in present value terms or $8,324.49 per parolee, while that of absconders results in a saving of $1,190,402.07 or $8,324.49 per parolee.

Aggregating, $3,111,393.36 in incarceration costs will be saved under our cost maximizing assumption.

Under our benefit maximizing assumption, violators will be made to serve their released time. The saving to society then will merely be the difference between the $395,994.60 and its value if received 30 months hence. This difference is $45,551.38.

By paroling absconders, who are now assumed to behave like successful parolees, society saves the same amount as under our cost maximizing assumptions.

Successful parolees and recidivists behave and are treated the same under both our cost and benefit maximizing assumptions. Savings associated with their parole, then, will not change.

Aggregating over our benefit maximizing assumptions, the total saving in terms of resources devoted to incarceration is $2,760,950.14.

Notice that more is saved in terms of incarceration costs under our cost maximizing assumptions. This is a consequence of the magnitude of the elasticity of the burglary rate with respect to the penalty and the cost of an induced burglary. While our cost maximizing assumptions lead to a greater saving in terms of incarceration costs, they will lead to a more than offsetting cost in terms of induced burglaries.

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3. The Difference in the Probability of Recidivism between Parolees and Mandatory Releasees ($P_{jit} - P_{kit}$)

It will be rather difficult to determine whether the probability of recidivism is affected by the parole system. A direct comparison of recidivism rates of parolees and mandatory releasees would be of little value since those chosen for parole generally have characteristics more favorable to non-recidivism. In a comparative study of recidivism rates among a group of parolees and mandatory releasees from a Minnesota reformatory, it was found that the rate for the mandatory releasee group was slightly higher than the rate for the parolee group.[1] The investigators concluded, however, that the difference could well be due to the different characteristics of the two groups as well as to the fact that parolees who commit minor crimes while on parole are often returned as violators of the rules of parole, rather than as new offenders (supposedly to avoid the cost of prosecution).

In an attempt to avoid the problem of differing characteristics, we could regress the probability of recidivism on the characteristics of all releasees, treating the method of release as a characteristic to be measured by a dummy variable. The difficulty, of course, is that our dummy variable would be correlated with the other characteristics.

Alternatively we could observe the behavior of parolees only. We might, for example, using cross section data, regress the probability of recidivism on several selected variables to represent the characteristics of parolees and on a proxy variable for the quality of the parole

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[1] S. B. Zuckerman, A. J. Borron, H. D. Whittier, "A Follow-up Study of Minnesota State Reformatory Inmates," Journal of Criminal Law, Criminology, and Police Science, XLIII (January-February, 1953), 622-636.

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system. Per parolee expenditures might be such a proxy variable. Such a test might shed some light upon the counseling effect.[1]

If the expenditure variable were insignificant, suggesting that the quality of the parole system was of no importance in determining the rate of recidivism, we might look for further evidence by regressing the probability of recidivism for mandatory releasees on the same set of characteristics to see if the coefficient of each characteristic is similarly significant.

None of this can in fact be done since comparable data among parole agencies is not presently available, nor are data for mandatory releasees.[2]

We will assume, for the purposes of this study, that the parole system has no effect on the rate of recidivism. Since recidivists will be made to complete their original sentence, including the time released, there is little reason to suspect that their subjective estimate of the penalty is lower than a mandatory releasee's. This then amounts to assuming that the counseling and stifling[3] effects offset each other.

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[1]A difficulty arises, however, if more expenditures lead to a greater probability of detection of new crimes.

[2]Data do exist which would allow us to run the suggested regression for parolees. However, the National Council on Crime and Delinquency, which is the agency in possession of the cross section data on parolee characteristics and outcome, may not presently release them in such a manner that individual parole agencies would be identified. Not being able to identify the individual agencies would prevent us from adding our quality proxy variable.

[3]See p. 8.

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4. The Present Value of the Administrative Costs of the Parole System (A_{pv})

In calculating the direct costs of parole, average cost will be relevant since we are attempting to determine whether the parole system, as it currently operates, is economically justified. However, for our optimality analysis, marginal cost will be relevant. Marginal cost is only meaningful, however, if we can define a homogeneous product of the parole system. The parole system produces parolees who receive a certain quality of services. If we are to talk about a standard product, the services must not be allowed to vary. If, for example, we increase the number of parolees, the average case load must be held constant. Almost all of the direct costs of operating the parole system, then, can be viewed as variable. Marginal cost may well be constant at the existing size (output) of the parole system, and hence not very different from average cost.

The State Board of Probation and Parole spent $344 per parolee during the fiscal year 1967-68. Using the technique described above, $50,615.85, or $398.55 per parolee will be spent on recidivists; $38,500.35, or $366.67 each on violators; $142,461.44, or $809.44 each for those successful on parole; and $43,123.08, or $301.56 each on absconders.

Aggregating, $274,700.72 will be spent on parole.

5. The Present Value of the Reduction in Inmate Production $(P.O.)_{pv}$

The division of correctional industries in Pennsylvania administers a work program in the state institutions consisting of both

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farming and manufacturing. Conceptually we would like to take the contribution to output in prison of those prisoners who are paroled as a cost of parole. Unfortunately, there is no way to do this since prisoners are not paid a competitive wage. Here again, we will use an interval estimate, taking the payments to prison laborers as the lower limit and total sales minus payments to civilians as the upper limit.[1]

To find the lower limit of our interval estimate of inmate production, we take the average annual payments ($182.50) to inmates who are employed by the correctional industries and multiply by the percentage of the total inmates who are employed (30%). Since there is no comparable program on the county level, we multiply this figure by 74%, the percentage of state institutional prisoners making up our parole population. Our lower estimate, therefore, is $40.52 per inmate per year. Our upper estimate is obtained by taking the total sales of the correctional industries in 1967-68 ($6,989,811), subtracting the estimated salaries paid to civilian personnel,[2] dividing by the number of inmates employed (30% of the total state prison population), and multiplying by 74% (the percentage of state prisoners in the parole population). Our upper estimate is $729.60.

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[1]While this upper limit certainly exceeds the contribution of prisoners to the output which is sold, there is no computed estimate known to the author of the production which is self-consumed in the prison system. If this is substantial, then our upper limit may underestimate the true figure.

[2]This was estimated by taking the average payments to all those employed in Pennsylvania State Correctional Agencies and multiplying by the total number of civilian employees in the state correctional industries.

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Under our benefit maximizing assumption the inmate production lost by paroling those who turn out to be recidivists is $682.90 or the difference between the present value of the production lost while they are on parole ($5,935.98) and the value of that output were it produced 30 months later.

Violators are assumed to make up for their time released. The present value of their foregone production, then, is $519.55.

The in-prison production foregone by paroling those who complete their parole successfully will be $16,707.68 in present value terms, or $94.92 per parolee.

The production foregone by paroling absconders, who under our benefit maximizing assumption behave like successful parolees, will also be $94.93 per man, for a total of $13,574.99 in present value terms.

Aggregating for all parolees under our benefit maximizing assumption, we find that the present value of the production foregone by paroling the group of burglars is $31,485.12.

Under our cost maximizing assumption, the production foregone by paroling recidivists is $12,348.60, or the difference between the present value of their foregone production ($107,337.86) and its value if received 30 months hence.

The parole of violators, who are now assumed not to make up their time released, will result in a loss of $81,644.85 or $777.57 per violator.

The parole of those who will be successful will now result in foregone production in amount $302,107.52 or $1,716.52 per parolee;

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while the parole of absconders will result in a loss of $245,462.36 or $1,716.52 each.

Aggregating over a cost maximizing assumption, $641,563.33 worth of output will be lost.

6. The Number of Induced Burglaries (ΔN)

To determine whether there will be a change in the number of crimes committed because of the reduction in the penalty brought about by parole in Pennsylvania, we will use cross section data for the United States.[1] That is, we will compare burglary rates with the components of the net gain from the commission of the burglary in each state. We hypothesize then that:

$$\text{Burglary rate} = f(Y_n)$$

where Y_n is the net return to the burglar from the commission of the burglary and depends on the gross amount stolen, the probability of apprehension and conviction, and the penalty. We regress the burglary rate on the three components of the net gain.

$$\text{Burglary rate} = f(q,D,Y_g)$$

where q is the probability of apprehension and conviction, D is the penalty imposed if apprehended and convicted, and Y_g is the gross gain from the commission of the burglary.

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[1]Certain states will be omitted because of a lack of data necessary to calculate one or more of the needed variables. See Table 7 below for the states included in the study.

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From our discussion above (pages 10-16), we can expect the regression results to show a greater response on the part of the burglary rate to Y_g than to q and a greater response to q than to D if burglars have risk preference. We can expect just the opposite results if they have risk aversion, and we can expect no differences in their response to the various components of the net gain if they have risk neutrality.

We will be able to estimate the change in the number of burglaries (ΔN) from the coefficient of D.

The variables in the regression equation will present measurement problems.

a. The Probability of Conviction (q). The probability of conviction for a given crime is a rather difficult variable to estimate, especially at the state level. No state-wide data are available which permit a direct calculation of the magnitude of the desired variable. In a recent study, Mrs. Leibowitz attempted to estimate the probabilities for various crimes on a state-wide basis.[1] She used the number of entries to state prisons for a given crime, divided by the number of such crimes reported in each state, as her estimated probability. This method has several shortcomings, a number of which Mrs. Leibowitz points out, and some of which can be corrected for. Both the numerator and denominator of the measure will be subject to error.

To begin with, some acts, as Mrs. Leibowitz explains, violate both state and federal law. To the extent that such violations result

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[1]Arlene Leibowitz, "Crime and Punishment: An Economic Analysis." Unpublished M.A. thesis, Columbia University, New York, 1965.

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in commitment to federal prison, the probabilities will be understated. However, these distortions are slight since in general jurisdictions of federal and state authorities do not overlap.[1]

A second problem discussed by Mrs. Leibowitz is that of the differential treatment which juveniles receive. Since juveniles are not generally sentenced to state prisons, the observed probabilities will understate the true probability. Their crimes will be included in the denominator, but their conviction will not be accounted for in the numerator.

If we assume that the probability of arrest is the same for juveniles and adults and that the same percentage of burglaries are committed by juveniles in each state, we can correct the denominator of the probability measure. This is done by multiplying the denominator by the percentage of total burglary arrests in the United States accounted for by adults.

An added problem is that those convicted could be sentenced to county prisons rather than state prisons, be fined, placed on probation, or receive suspended sentences. Data provided by a survey of the American Bar Association (A.B.A.) permits us to take account of the different penalties imposed upon convicts in different states. Unfortunately, the survey data do not classify the type of sentence imposed by crime categories. We must assume, therefore, that the distribution of penalties (prison, probation, etc.) for burglary in each state is similar to the distribution for all felonies as a whole in

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[1] Ibid., p. 15.

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that state. By not making this correction Mrs. Leibowitz implicitly assumes that the distribution of the type of penalties for burglars in the various states are similar.

The method of reporting crimes itself will lead to errors in the calculated probabilities. The true number of crimes will exceed the reported number since many crimes go unreported. A study conducted by the National Opinion Research Center at the University of Chicago indicated that 50 to 70% of all burglaries go unreported.[1]

It would appear that the N.O.R.C. figures may be subject to error themselves. On the one hand, to the extent that being victimized is not a salient experience, the survey will understate the true crime rate. On the other hand, if being victimized is a salient experience, victims may tend to report crimes to the surveyors which were committed prior to the time period under consideration.

To correct for unreported crimes we will double the burglary rate for each state. This assumes that the same percentage of burglaries go undetected in each state.

An additional problem arises out of the procedure which the F.B.I. instructs local police departments to follow in reporting crimes.

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[1]Philip H. Ennis, Criminal Victimization in the United States: A Report of the National Survey (Chicago: National Opinion Research Center, University of Chicago, 1967). The study focused on home burglaries only. It was found that 70% of home burglaries go unreported. If the same percentage of burglaries committed against organizations go unreported, then 70% is the relevant figure. However, one would expect that under-reporting among organizations would be considerably less than among individuals. Using the FBI data for the total burglary rate, the total amount of under-reporting would be only 50% if all organizations reported all burglaries. This figure will probably be closer to the true figure and will be used below.

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If a crime is reported and the police arrest a suspect who is later convicted of a lesser offense (than the crime which the police originally charged him with), the original crime is recorded and there can never be a conviction for it. Thus, the probability of conviction for a given crime can be under or overstated, depending upon whether more persons charged with the particular crime are convicted of a lesser offense or whether more persons charged with a more serious crime are convicted of the crime in question. If these types of errors are similar across states, the relative probabilities would not be seriously distorted.

Even if we could measure both the number of convictions and the number of crimes accurately, our probability measure would still be subject to error. The number of criminals will exceed or fall short of the number of crimes as the average number of conspirators per crime exceeds or falls short of the number of crimes committed by a single individual. Thus, the probability will be overstated when the average number of accomplices exceeds the average number of crimes committed by a single individual and will be understated when the reverse holds true.[1]

Once again, as far as relative probabilities are concerned, these problems will not be too serious if the discrepancies are similar across states.

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[1]Even if the multiple crime and accomplice problem could be solved, an individual may still not be able to determine the probability of his being convicted were he to commit a burglary since the probability of conviction may not be independent of the number of crimes committed by a single individual, either alone or with an accomplice.

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Our method of estimating the probability of conviction will differ from that employed by Mrs. Leibowitz in the following ways: (a) the numerator of our probability measure will include all convicts rather than just those sentenced to prison. The A.B.A. survey data are employed to account for those not sentenced to prison. (b) The denominator will exclude all juveniles and will include unreported crimes as estimated by the N.O.R.C. survey.

Table 7 shows the computation of q. The data from the A.B.A. study (columns 1 and 2) were taken from a sample in 1962, while the data from the Federal Bureau of Prisons and the F.B.I. were for 1960. Hence, we assume that the distribution of penalties did not change over the two years. Column 7 gives us the desired variable--the probability of conviction.

b. The Gross Gain (Y_g). Data on the gross gain to the burglar, i.e., the dollar amount which the burglary yields, are not available on a state-wide basis. However, this variable can be estimated by using data on insurance claims. The National Insurance Actuarial and Statistical Association collects state-wide data from most major insurance companies on claims against homeowners' policies. The available data include all the crimes against property. However, most of the claims will be against burglary since it is the most common type of property crime committed against households. The claims will, of course, overstate the value of the yield to the burglar as he will not be able to dispose of his non-monetary ill-gotten gains at their market value. However, the difference in the claims should give us a good indication of the relative magnitude of the gains in various states. Data on the gross gain are given in Table 8.

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TABLE 7

Probability of Conviction

State	Col 1 % of All Those Tried Who Are Sentenced to Prison[d]	Col 2 % of All Those Tried Who Are Sentenced[d]	Col 3[a] % of Those Sentenced Who Are Sent to Prison	Col 4 No. of Burglars Sent to Prison[e]	Col 5[b] No. of Burglars Convicted	Col 6 Total No. of Burglaries[f]	Col 7[c] Probability of Conviction
Alabama	42	68	62	718	1,158	12,040	.096
Arizona	32	73	41	167	407	8,947	.045
Arkansas	43	78	55	345	627	4,893	.128
California	64	90	71	1,159	1,632	143,553	.011
Colorado	37	67	55	291	529	10,167	.052
Connecticut	56	87	64	217	339	8,383	.040
Delaware			37	90	243	2,486	.098
Florida	33	59	56	1,021	1,823	41,078	.044
Georgia	68	89	76	930	1,223	16,092	.076
Idaho	52	87	60	84	140	2,010	.070
Illinois	57	81	70	790	1,129	52,584	.021
Indiana	23	44	52	484	931	20,035	.046
Iowa	54	85	64	143	223	6,439	.035
Kansas	40	80	50	300	600	7,742	.077
Louisiana	28	54	52	648	1,246	13,394	.093
Maine	45	72	63	133	211	2,384	.089
Michigan	42	79	53	912	1,721	46,324	.037
Minnesota	41	83	49	156	318	12,294	.026
Missouri	43	73	59	571	968	22,610	.043
Montana	44	79	56	94	168	2,708	.062
Nebraska	63	87	72	177	246	3,272	.075
New Hampshire	17	85	20	34	170	1,108	.153

Continued...

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TABLE 7 (Continued)

	Col 1	Col 2	Col 3[a]	Col 4	Col 5[b]	Col 6	Col 7[c]
New Mexico	52	74	70	95	136	4,136	.033
New York	56	89	63	663	1,052	56,445	.019
North Dakota	53	77	69	38	55	1,260	.044
Ohio	43	80	54	1,057	1,957	34,013	.058
Oklahoma	45	81	56	494	882	12,495	.071
South Carolina	64	92	71	289	407	8,849	.046
Tennessee	68	82	83	348	419	16,744	.025
Texas	48	77	62	1,711	2,760	58,798	.047
Utah	26	62	42	68	162	4,611	.035
Vermont	53	81	65	41	63	944	.067
Virginia	41	85	48	581	1,210	13,738	.088
Washington	15	49	31	247	797	13,945	.057

[a]Col 3 = Col 1 ÷ Col 2

[b]Col 5 = Col 4 ÷ Col 3

[c]Col 7 = Col 5 ÷ Col 6

[d]Source: Lee Silverstein, Defense of the Poor in Criminal Cases in American State Courts, Vols. II and III (Chicago: American Bar Foundation, 1965).

[e]Source: U. S. Department of Justice, Federal Bureau of Prisons, National Prisoner Statistics: Characteristics of State Prisoners--1960, Washington, D. C., 1961.

[f]Source: U. S. Department of Justice, Federal Bureau of Investigation, Crime in the United States: Uniform Crime Reports--1965, Washington, D. C., 1966.

TABLE 8

Penalty (D) and Gross Gain (Y_g)

Col 1	Col 2	Col 3	Col 4[a]	Col 5
State	Months Spent in Prison Mean	% of All Convicts Sentenced to Prison	Average Penalty in Mos.	Gross Gain
Alabama	22.7	61	13.8	96
Arizona	20.2	41	8.3	145
Arkansas	23.5	54	12.7	101
California	26.9	71	19.1	125
Colorado	16.5	55	9.1	84
Connecticut	17.3	64	11.1	117
Delaware	14.9	37	5.5	88
Florida	23.6	56	13.2	169
Georgia	27.0	76	20.5	108
Idaho	16.3	60	9.8	79
Illinois	30.8	70	21.6	163
Indiana	29.8	52	15.5	78
Iowa	34.6	64	22.1	58
Kansas	21.3	50	10.7	79
Louisiana	22.8	73	11.9	85
Maine	15.5	52	9.8	70
Michigan	22.2	51	11.3	95
Minnesota	25.3	49	12.4	70
Missouri	20.9	59	12.3	118
Montana	13.9	56	7.8	75
Nebraska	21.4	72	15.4	62
New Hampshire	21.3	20	4.3	81
New Mexico	22.4	70	15.7	103
New York	33.7	63	21.2	159
North Dakota	16.3	69	11.2	68
Ohio	25.4	54	13.7	86
Oklahoma	21.3	56	11.9	103
South Carolina	29.5	71	20.9	95
Tennessee	29.4	83	24.4	86
Texas	25.7	62	15.9	108
Utah	24.3	42	10.2	83
Vermont	13.1	65	8.5	73
Virginia	30.2	48	14.5	73
Washington	26.0	31	8.1	68

[a]Col 4 = Col 2 x Col 3

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c. The Penalty (D). The penalty will be measured by the average number of months spent in prison by a convicted burglar before first release. Data as to the length of time served in prison are available on a state-wide basis. We will use a weighted average of the time served in prison by all convicts, counting those receiving suspended sentences, fines, or probation as having served zero months. This assumes that all penalties other than prison are costless, which is not the case with fines or probation and may or may not be the case with suspended sentences.[1] A small downward bias, then, in the relative penalty for those states using non-prison sentences more frequently than the average, will be interjected into the measure.

The penalty, expressed in months served in prison, is found by multiplying the mean prison sentence by the percentage of all those sentenced who receive prison terms and is given in column 4 of Table 8.

d. The Regressions. Regressing the burglary rate on q, D, and Y_g, we get

$$B.R. = 395.8 - 2201.06x_1 - 9.5x_2 + 3.06x_3$$
$$(869.18)^{**} \quad (5.34)^{*} \quad (.85)^{***}$$
$$R^2 = .45$$

where $x_1 = q$, $x_2 = D$, $x_3 = Y_g$.

The standard errors are given in parentheses. One asterisk indicates significance at the .1 level; two asterisks, significance at the .05 level; and three asterisks, significance at the .01 level.

The elasticity of the burglary rate at the mean with respect to q, D, and Y_g is -.30, -.29, and .67, respectively. This result is

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[1] See p. 79.

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in accordance with behavior exhibiting risk preference. The elasticity of the burglary rate with respect to the penalty is very close in magnitude to that of the probability of apprehension. This may be a consequence of the fact that our penalty variable contains some element of risk.[1]

The regression tells us that, for each one-month reduction in the weighted average penalty, we will experience an increase in the burglary rate of 9.5. This coefficient will not be applicable to all states. If we have two states, for example, each with the same weighted average penalty but with significantly different probabilities of apprehension, then we would expect a change in the penalty to result in a larger increase in the number of burglaries in the state with the higher probability of apprehension. This is because any given change in the penalty will have a greater affect on the expected return (Y_n) the greater is the probability of apprehension.

We can apply the coefficient to Pennsylvania to determine the number of induced burglaries since the probability of apprehension in Pennsylvania is very close to the mean.[2]

Since the burglary rate will increase by 9.5 for each one-month reduction in the penalty and since the estimated 1967 population of Pennsylvania was 11,629,000, we can expect 1110 new burglaries to result from each one-month reduction in the penalty.

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[1]See p. 71.

[2]The mean probability of apprehension for all states combined is .059. The probability for Pennsylvania is .058.

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The deficiencies in the data may have led to errors in the regression coefficients. Our penalty variable is negatively correlated with the probability of apprehension which may result in biases in the coefficients. In addition, since the burglary rate is found by dividing the number of burglaries by the total population and multiplying by one hundred thousand and the probability of conviction was found by dividing those convicted by the number of burglaries, a spurious negative correlation between q and the dependent variable may result. There is, however, evidence that the relative magnitude of the elasticity of the burglary rate with respect to the penalty is correct. Below it is found that the expected return from the commission of a burglary (Y_n) is negative, indicating risk preference on the part of burglars.[1]

A further difficulty is that we cannot be certain which way the causation runs. What if, for example, a state with a high crime rate employs punishment other than incarceration to a large degree (or shorter prison terms) since its prisons would be too overcrowded otherwise. The high crime rate causes the low penalty rather than the other way around.

An added problem may arise if tastes (for illegal activity) are different among states. While persons with different social backgrounds may have different tastes for illegal activity, it is probable that the social backgrounds of given state populations are sufficiently diverse so that we can consider tastes constant.

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[1]See p. 105.

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A plot of the residuals ($\hat{Y}$ - Y) against the actual values of the dependent variable reveals a further problem with our regression equation. A negative correlation between the actual values of the dependent variable and the residuals was found indicating that our equation overpredicts the burglary rate for states with low rates and underpredicts for states with high rates. This indicates that our equation may be specified incorrectly. In an attempt to remedy this, variables were added to account for possible structural differences among states. A measure of population density was used to attempt to capture an urbanization effect if one existed, and the unemployment rate and median income were used to attempt to differentiate between relative opportunities in legitimate activities between states. All three variables proved to be insignificant when added individually and when added in combination.

Our measure of population density (the percentage of population living in cities of 250,000 or more) is correlated with the probability of conviction (q) and the gross gain (Y_g). Its addition reduced the coefficient of both variables and increased their standard errors. The new variable added little to the explanatory power of the equation.

The addition of the unemployment rate also added virtually nothing to the explanatory power of the regression equation. It had little effect on the standard errors or coefficients of the other variables.

Median income turns out to be correlated with the probability of apprehension. Its inclusion causes the standard error of the probability of apprehension variable to increase. The coefficient also

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increases but not by as much. This variable also added virtually nothing to the explanatory power of the regression equation.

The penalty variable employed in the above equation is not free of risk. It is a weighted average so that some prisoners receive probation, suspended sentences, etc., rather than prison terms.[1] As measured, then, the penalty variable does not conform to D as it was discussed in our analysis of choices involving risk.[2]

Our penalty coefficient may be biased, then, in that it does not distinguish between prison and nonprison sentences. This factor may help explain why the elasticity of the burglary rate, with respect to the penalty, was so close in magnitude to that for the probability of apprehension.

Since parole only affects those in prison, only one component of the weighted average penalty is affected by parole. To correct for the possible errors introduced by the inclusion of this risk element in our penalty variable, we will calculate the penalty for those actually sentenced to prison.

Now, our apprehension variable takes on a new meaning. Previously it made sense to think of the probability variable as being the probability of conviction since each convict was viewed as having been imposed with a penalty; i.e., our penalty variable was a weighted average which included those sentenced to prison and those not so sentenced.

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[1]There is also a risk involved for those going to prison since some will receive longer sentences than others, some will be paroled sooner than others, and some will not be paroled at all.

[2]See pp. 10-16.

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Now, since we are excluding those receiving non-prison sentences from the penalty, it would be more appropriate to think of our apprehension variable as being the probability of being sentenced to prison.

We will reformulate our regression then by changing the penalty variable so that it reflects the time actually served by those sentenced to prison (column 2 of Table 8). In addition, we will alter the probability of apprehension variable so that it will tell us the probability of a burglar going to prison. This is accomplished by multiplying the probability of apprehension (column 7 of Table 7) by the percentage of those convicts sentenced to prison (column 3 of Table 8). Finally, we will add a variable to account for the actual sentence as opposed to the actual time served.

The results of these changes are as follows:

$$B.R. = 134.15 - \underset{(1840.8)^{**}}{3659.2x_1} - \underset{(4.6)}{4.8x_2} + \underset{(.945)^{***}}{3.1x_3} + \underset{(.596)}{.25x_4}$$

$$R^2 = .46$$

where $x_1 = q$, where q is now the probability of a burglar being sent to prison,

$x_2 = D$, where D is now the actual time served by those sentenced to prison,

$x_3 = Y_g$

x_4 = the actual sentence.

The elasticity of the burglary rate with respect to each variable in turn is -.27, -.25, .70, and .04. The relative magnitude of the elasticity coefficients is as expected. However, the difference between the elasticity, with respect to the penalty and that with respect to probability of apprehension, did not increase as much as was expected.

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The coefficient of the penalty variable now turns out to be of doubtful significance. The fact that its magnitude is lower than that of the coefficient in our earlier regression is what one would expect, for now some of the risk is removed from the penalty. The fact, however, that the coefficient is almost fifty percent smaller than the previous coefficient does not indicate that half as many crimes will be induced by parole. Parole will have a greater effect on the penalty as it is now calculated so that a given parole policy will reduce the penalty by a greater amount than it would when we view the penalty as a weighted average of prison and non-prison sentences. It turns out, in fact, as will be seen below (page 114), that the coefficient obtained by our new formulation indicates that there would be approximately 15% fewer induced burglaries.[1]

While these results will not be identical, they are at least in the same range.

The sign of the sentence variable (x_4) is positive. If burglars have risk preference, then one would expect this sign to be negative. For any given actual penalty (x_3) an increase in the sentence increases the variance in the penalty and hence the risk. With risk preference, then, a longer sentence, given the penalty, should induce more crimes. While the sign is incorrect, the coefficient is not at all significant.

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[1]The probability of a convicted burglar being sentenced to prison in Pennsylvania is .058. The mean for all states is .057. Therefore, the coefficient of the penalty variable is applicable to Pennsylvania.

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We will use the former regression to calculate the number of induced burglaries. Both regressions provide us with the same explanatory power. The relative magnitude of the coefficient of the penalty variables and their standard errors leads us to have more confidence in the coefficient of the initial regression. The fact that it contains added risk, however, leads us to expect it to be biased upward. The difference in the number of induced crimes as indicated by the two regressions is relatively small and will not seriously affect the range of our results. The possible errors in the regression equation will be kept in mind in interpreting our results.

Our task now is to determine the reduction in the penalty brought about by the parole system in Pennsylvania. This will be deferred until after we have considered the social cost associated with the commission of given crimes.

7. The Social Cost of Crime (C_i)

a. The Criminal's Opportunity Cost. The social cost of crimes will present measurement problems. To compute the criminal's opportunity cost, we must calculate the gross gain (Y_g), the probability of apprehension (q), and the penalty (D). Since there is evidence that burglars have risk preference,[1] Y_n[2] will understate the opportunity cost of the burglar. We will, therefore, compute their opportunity cost under both the assumption that they are risk neutral (which we will consider the

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[1]See pp. 67-68.

[2]Assuming that burglars receive no economic rent.

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lower limit of an interval estimate of the true opportunity cost) and the assumption that they exhibit the greatest possible degree of risk preference. In the latter case their opportunity cost will be Y_g.[1] To further maximize benefits, we will combine the assumption of risk neutrality with the assumption that one-half of Y_n is economic rent.

Data for Y_g are available. However, the gain to the burglar will generally fall short of the market value of what he steals since he will not be able to dispose of his non-monetary ill-gotten gains at their market value.[2] The data for Y_g are based on the market value of the stolen property. Unfortunately, there is no reliable estimate of the percentage of the market value of the stolen items actually received by the burglar. To maximize costs, we will assume that the burglar either consumes all of his non-monetary tangible ill-gotten gains or disposes of them at their market value. To maximize benefits, we assume that the non-monetary component of his stolen goods is disposed of for one-third of its value.[3]

In transforming Y_g into Y_n, the stolen property which is recovered can be subtracted directly from Y_g.

In computing the cost of the penalty to the criminal, only those criminals who are convicted can be included. No doubt some criminals

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[1]Since the actual yield from the burglary may be greater than the average yield, the true opportunity cost may even exceed this figure.

[2]Unless the burglar consumes what he steals and values the consumption at its market price.

[3]This estimate is an educated guess made by a criminal lawyer in New York City. As will be seen below, its accuracy is of limited importance since Y_n turns out to be negative even if the criminal disposes of the stolen property at its market value.

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will go through the prosecution process and be acquitted or released at some stage along the way. However, there is no way to determine the percentage of those guilty who are freed just as there is no way of determining the percentage of those innocent who are convicted. We must assume, therefore, that those not convicted are innocent and that those convicted are guilty.

To begin we must find the probability of conviction. In attempting to compute the net gain to the burglar, errors in the probability of apprehension and conviction will be serious.

The juvenile problem referred to above is corrected for in the same manner as above (page 60). However, data on the percentage of arrests accounted for by juveniles is available for Pennsylvania, so that our correction is made with Pennsylvania rather than national data.

We must also add to the numerator the number of convicts sentenced to county jails, placed on probation, fined, and receiving suspended sentences. Such data for burglars are available for Pennsylvania.

The accomplice and multiple crime problems may also lead to errors unless corrected for. The use of accomplices will result in an overstatement of the true probability since the number of burglars will exceed the number of burglaries. The use of accomplices will also result in a decrease in the gain component of the net gain since the amount stolen will now have to be shared. The decrease in the gain component will just offset the decrease in the penalty component when the amount stolen is just equal to the expected value of the penalty. It will more than offset the decrease in the penalty component when the expected value of the penalty falls short of the amount stolen, and

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will be insufficient to offset the decrease in the penalty component when the expected value of the penalty exceeds the amount stolen.[1]

While an interval estimate of the number of accomplices can be obtained from existing data, no such estimate can be made for the number of crimes cleared by a single arrest. However, if a conviction for multiple offenses results in a multiple punishment and the probability of conviction for each crime is independent of that for all other crimes, then the decrease in the observed probability of conviction due to the multiple commission of crimes will be just offset by the higher penalty when the expected value of the penalty is just equal to the gross gain. The expected return will decrease if the

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[1] (1) Expected Return $= (1-q)Y_g + q(Y_g-D)$

where q = probability of being caught
Y_g = gross return
D = penalty

Taking accomplices into account

(1) becomes

(2) Expected Return $= (\frac{1-q}{x})\frac{Y_g}{x} + \frac{q}{x}(\frac{Y_g}{x}-D)$

where x = total number of accomplices

Rewriting (1) we have

(1)' E.R. $= Y_g - qD$

Rewriting (2) we have

(2)' E.R. $= \frac{Y_g - qD}{x}$

Expression (2)' $\gtrless$ Expression (1)' as $qD \gtrless Y_g$

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expected penalty exceeds the expected gain and will increase if the expected penalty falls short of the expected gain.[1]

The magnitude of the expected gain will be affected in opposite ways by the accomplice and multiple crime problems when the expected penalty is not equal to the expected gain, and will therefore tend to offset each other. Hence the error in the probability of conviction caused by the accomplice and multiple crime problems should not greatly affect our measure of the criminal's opportunity cost.

The cost to the burglar of imprisonment will be equal to his net foregone earnings less the value of his subsistence.[2] To measure foregone earnings we take the present value of the average earnings of individuals with characteristics similar to the burglars, over the length of imprisonment.

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[1](1) Expected Return = $(1-q)Y_g + q(Y_g-D)$

Taking the multiple commission of crimes into account

(1) becomes

(2) $(1-q)NY_g + qN(Y_g-D)$

where N = the number of crimes cleared by a single conviction

Rewriting (1) we get

(1)' $E.R. = Y_g - qD$

Rewriting (2) we get

(2)' $E.R. = NY_g - NqD$

Expression (2)' $\gtrless$ Expression (1)' as $qD \lessgtr Y_g$

[2]The personal discomfort of prison life will also represent a cost to the criminal. However, no attempt will be made to measure this.

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Fines present no conceptual difficulty. However, there are no data available which indicate the magnitude of the fines imposed on burglars. Burglars, however, may not often be fined.[1] If this is the case, the magnitude of the penalty will not be seriously affected.

Probation will represent a cost in terms of the time the convict spends on probation activities, e.g., reporting to his probation officer. This cost will be small and, since judicial statistics lump probation and suspended sentences together, will be ignored. Probations along with all other sentences including suspended sentences may, however, involve an added cost. Once convicted of a crime the set of alternatives open to the individual with respect to legitimate income sources will decrease.

In Figure 6 the opportunity line, for example, may decrease from AB to CB[2] after conviction.[3] Whether a cost is involved will depend upon the individual's preference function with respect to illegitimate and legitimate activity. If the individual is indifferent between the two types of activity (i.e., he regards the income derived from

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[1]Approximately 4% of all sentenced burglars receive their punishment in the form of only fines in Pennsylvania. The difficulty is that we do not know how many burglars are fined in addition to receiving other penalties.

[2]The income derivable from illegal activities may also change with conviction. The direction of change is, however, uncertain. On the one hand, the probability of apprehension and conviction may increase since the individual is now known to the police. But it may also decrease since the criminal will now have gained experience with the entire criminal apprehension and prosecution process. In addition, if incarcerated he may gain new associates and hence improve his criminal activity opportunities.

[3]The maximum income from illegal activities is necessarily an expected value. Possible substitutions of leisure for work are ignored.

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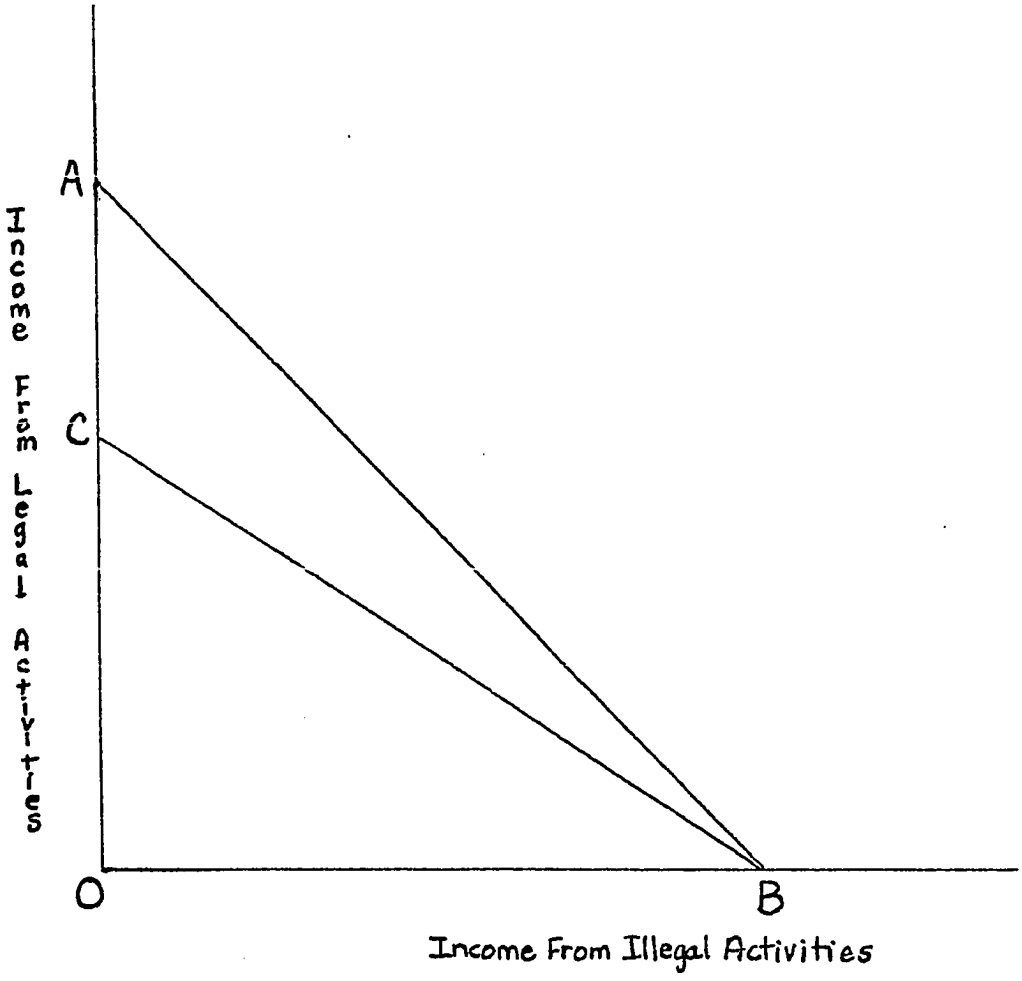
Figure 6



OA = Icome earned if all time is devoted to legal activities
OB = Icome earned if all time is devoted to illegal activities

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them as perfect substitutes, and is risk neutral), then his indifference curves will be straight lines with slopes of negative one.[1] In this case the market solution will result in the individual choosing all of his income from one activity only--the activity yielding the higher income--and there will be no cost involved in a suspended sentence and no added cost involved with probation or other penalties. The individual will have been choosing only the illegal activity and will continue to do so.

The legal and illegal activities may not, however, be independent of each other; i.e., the legal activity may provide the opportunity for the illegal activity. In this case conviction, by reducing the legitimate opportunities available to the individual, reduces the illegitimate opportunities available to him. Here the criminal suffers a loss in terms of future income.

Even if the legitimate and illegitimate activities are independent, an individual may wish to engage in some legal activity to help maintain appearances of respectability. In this case there will be a cost involved in a suspended sentence and an added cost involved with all other penalties.

No attempt will be made to measure the time cost involved with probation. However, under certain assumptions an estimate of the

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[1]The slope of the indifference curve will be less than -1 in algebraic value if the individual has a preference for illegitimate activity and greater than -1 in algebraic value if he has a preference for legitimate activity. Preference in this sense has nothing to do with the individual's income utility function, but with the nature of the two types of activity apart from risk differences.

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reduced potential legal income stream of those convicted who receive non-prison sentences could be made by taking the difference between the earnings of parolees and persons with similar characteristics. However, the assumptions necessary to use this measure are cost maximizing ones[1] and, since Y_g is taken as the criminal's opportunity cost in the cost maximizing case, it will be unnecessary to do this in computing the criminal's opportunity cost. It will be relevant, however, in computing the cost to society.

The prosecution process will also involve costs to the criminal. If the accused retains private counsel he will incur a cost in terms of the lawyer's fee. No data are available on the percentage of those accused burglars who retain private counsel. However, there are data available on the percentage of all felony defendants who do retain private counsel. We will use this percentage multiplied by an estimated fee for legal services.[2]

The cost of equipment used by the burglar in the commission of the burglary will probably be small. Since no data are available which would permit an estimate of this cost, it will be ignored.

Bail may also represent a cost to the criminal. If the defendant can put up his own bail, then the cost involved is the opportunity cost of holding the money idle. If he obtains a bail bond, then the cost to him is the fee he pays. If he is not released on bail, then

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[1]See pp. 105-107.

[2]This percentage may overstate the true percentage of those convicted of felonies who retain private counsel since there may be a positive correlation between retaining private counsel and acquittal.

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the cost will be the sum of all those costs associated with remaining in prison awaiting trial. These costs will be near zero when a prison term is imposed since the time served while awaiting trial will be credited to the convict. When probation, suspended sentences, or fines are imposed, the cost of not having been free on bail may or may not be near zero. It will be near zero when the particular sentence is imposed because the judge viewed the detention while awaiting trial as punishment enough. It will be significantly greater than zero otherwise. There is insufficient data to even obtain an interval estimate of these costs and hence no attempt will be made to quantify them in our calculation of the criminal's opportunity cost.

Subtracting the various components of the cost (D) to the criminal from the amount stolen, we get the net return to the burglar (Y_n).

The opportunity cost will not enter into C_i when C_i is computed for crimes committed by parolees. The alternative for parolees is to stay in prison--hence an opportunity cost of zero.

In addition to the criminal's opportunity cost, society will be faced with many additional costs. It will use up resources in apprehending, prosecuting, and punishing criminals.

b. Apprehension and Prosecution Costs for Parolees. The President's Commission on Law Enforcement and Administration of Justice conducted a study of the direct costs of apprehension, prosecution, and punishment associated with the FBI Index Crimes for the United States.[1]

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[1]President's Commission on Law Enforcement and Administration of Justice, The Challenge of Crime in a Free Society (Washington, D. C.: U. S. Government Printing Office, February 1967).

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We will use this study to infer some of the costs associated with crime in Pennsylvania. Table 9 gives the breakdown of costs for five of the seven index crimes as recorded by the President's Commission.[1] The estimates made by the Commission are crude and reflect only direct costs. Since many social costs are excluded, the data will have to be adjusted.

Since we are dealing with crimes committed by adult parolees, we should remove all costs associated with juveniles. This involves removing the entire juvenile processing cost and the percentage of police costs associated with juveniles. The latter is done by assuming that police costs are distributed among juveniles and adults in accordance with the percentage of arrests accounted for by each. The percentage of arrests for each index crime accounted for by juveniles (persons under 18 years of age) is given in Table 10. For each crime we reduce the police costs by the relevant percentage, in addition to removing all juvenile processing costs. In addition, we will remove all punishment costs. These costs can be computed directly for Pennsylvania and will be when we compute the costs of the crimes induced by the lower penalty which results from parole. In the case of crimes committed by parolees, it will be unnecessary to include punishment costs since, given the same probability of recidivism between parolees and mandatory releasees, costs incurred by society for punishment will be the same with or without parole. When a parolee is released and commits a crime, the apprehension and prosecution costs occur sooner

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[1]We exclude forcible rape and aggravated assault because these are not recorded in the same manner by the Pennsylvania Board of Parole.

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TABLE 9

Apprehension, Prosecution, and Punishment Costs--
Selected F.B.I. Index Crimes, 1960

	Murder and Non-negligent Manslaughter	Robbery	Burglary	Larceny ($50 or more)	Auto Larceny
Number Reported	9,850	118,920	1,173,200	762,000	486,000
Total Costs	$ 48,000,000	$140,000,000	$820,000,000	$500,000,000	$370,000,000
Police	4,800,000	58,800,000	590,400,000	380,000,000	247,900,000
(%)	10	42	72	76	67
Juvenile Process.	480,000	16,800,000	90,200,000	40,000,000	77,700,000
(%)	1	12	11	8	21
Court	3,840,000	5,600,000	8,200,000	5,000,000	3,700,000
(%)	8	4	1	1	1
Corrections	38,880,000	58,800,000	131,200,000	75,000,000	40,700,000
(%)	81	42	16	15	11

Source: President's Commission on Law Enforcement and Administration of Justice, The Challenge of Crime in a Free Society (Washington, D. C.: U. S. Government Printing Office, February, 1967).

TABLE 10

Percentage of Total Arrests Accounted for by Persons Under 18 Years of Age for Selected F.B.I. Index Crimes in the United States in 1965

Crime	% of Total Arrests Accounted for by Persons Under 18
Murder	8.18
Robbery	30.12
Burglary	51.86
Larceny ($50 or more)	54.85
Auto Larceny	62.50

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than if he were not released on parole but made, instead, to serve his whole sentence. Hence, in present value terms, apprehension and prosecution costs are greater with parole since they occur earlier. Once the parolee is returned to prison, however, he is made to serve the time released and the remainder of his whole sentence before his new sentence begins. Therefore, assuming that if the parolee had not been paroled he would have committed the new crime at the same time after his release as he does as a parolee, the punishment costs will be identical in both cases.

Adjusted in this manner and inflated to 1967 dollars, the total cost of each index crime is given in column 3 of Table 11. We are interested, however, in finding the cost per conviction. Column 5 gives the number of adults convicted (column 2 times column 4) and, by dividing column 3 by column 5, we get the desired result--the cost per conviction (column 6).

Some seemingly strange results appear in Table 11. We find, for example, that more than twice as much is spent to apprehend and prosecute a burglar than a murderer. This may be explained by two facts. First, a large percentage of murders are committed within a family or by acquaintances. In many instances there are witnesses to these crimes of passion, leaving little detective work for the police. In addition, the police, in these cases, are not dealing with professional criminals who are skilled at avoiding detection. Burglary, on the other hand, is a calculated crime where there are seldom witnesses. The detective work required to apprehend the burglar then may be quite substantial.

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TABLE 11

Cost of Apprehending and Prosecuting Adults in 1967$--
Selected F.B.I. Index Crimes

Col 1	Col 2	Col 3	Col 4	Col 5[a]	Col 6[b]
Crime	Total No. of Crimes	Total Cost	Probability of an Adult Being Convicted[c]	No. of Adults Convicted	Cost Per Conviction
Murder	9,850	$ 8,726,627	.293	2,888	$ 3,021
Robbery	118,700	49,394,165	.126	14,996	3,294
Burglary	1,173,200	309,440,542	.032	37,542	8,242
Larceny ($50 or more)	762,000	186,831,346	.070	53,340	3,310
Auto Larceny	486,000	102,272,040	.064	31,337	3,263

[a]Col 5 = Col 2 x Col 4

[b]Col 6 = Col 3 ÷ Col 5

[c]Adopted from: U. S. Department of Justice, Federal Bureau of Investigation, Crime in the United States: Uniform Crime Reports--1965, Washington, D. C., 1966; with the exception of Larceny. The data from which the probability of adults' convictions are derived in the Uniform Crime Reports includes larcenies under $50. Data from Pennsylvania was used to estimate the desired probability in this case.

A second possible explanation may lie with the behavior of the police. It may be that police only concern themselves with major burglaries while they concern themselves with all murders. Burglary is the most frequently occurring and one of the least serious of the index crimes. While the police must respond to all calls and spend time filing reports, it may be that no real effort is made at apprehension in minor burglary cases. The probability of conviction will be quite low in this case, while the police costs will not be proportionately lower since they must still respond to the call.

A combination of the above forces might help to explain the results in Table 11.

If we proceed to take the costs of apprehension and conviction in the manner suggested above, we may wind up overstating the true costs of each parolee crime. The probability of apprehension and conviction may be higher for parolees who commit crimes than for the criminal population as a whole since parolees are closely watched. If this is so, the cost per conviction per parolee may be overstated by our method of computation. If an adult commits burglary in Pennsylvania, for instance, then the probability of his being convicted is .058.[1] Thus, for every convicted burglar there are slightly over 17 who go undetected and it is the cost of attempting to apprehend them that is reflected

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[1]This is found in the following way. The number of adult convictions which is reported directly for Pennsylvania is divided by twice the number of adult burglaries. The number of adult burglaries is found by assuming that the ratio of burglaries committed by adults to burglaries committed by juveniles is equal to the ratio of burglary arrests of adults to burglary arrests of juveniles. We divide by twice the number of adult crimes to correct for unreported crimes. See Footnote 1, p. 61.

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in our cost figures. However, if the probability of apprehension and conviction is greater for parolees, then we will be assigning costs to cover some non-existent burglaries attributed to other parolees.

To deal with this we will make two assumptions with regard to the probability of conviction for parolees. First, to maximize benefits we will assume that the probability of conviction is one. In addition, we will also assume that the same police resources are devoted to apprehending those eventually caught and convicted as to apprehending those not eventually caught. To maximize costs we will assume that the probability of apprehension and conviction for parolees is equal to that of the general criminal population.

In the former case we will use the police costs per crime plus the court costs per adult trial in our measure of the cost of apprehension and conviction, while in the latter case we will use the data as presented in column 7 of Table 11. This latter procedure will allow for the fact that more police resources may be devoted to apprehending those eventually caught than to apprehending those who are never caught.

In both cases we will have to adjust the measure to take account of the social costs not included in the commission's study.

The police costs per adult crime and court costs per trial are given in Table 12.

The social costs involved in trying a man will generally exceed the costs as reported by the President's Commission. If witnesses appear their foregone production is a cost to society, as is the foregone production of the jurors and the resources devoted to a defense--attorneys, investigators, etc.

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TABLE 12

Adult Apprehension and Prosecution Costs for Selected F.B.I. Index Crimes--1967$

Col 1	Col 2	Col 3
Crime	Police Costs Per Crime	Court Costs Per Trial
Murder	$515.69	$661.35
Robbery	523.23	216.56
Burglary	532.54	86.50
Larceny ($50 or more)	527.73	93.35[a]
Auto Larceny	539.78	100.20

[a]Average of court costs for Burglary and Auto Larceny.

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Jurors are generally paid a small fixed daily fee so that at least part of their opportunity costs are included in the cost data presented by the President's Commission. If sufficient numbers of jurors are voluntarily substituting jury duty for leisure (women and retired persons), then the pay jurors receive may represent their true average opportunity costs. Since we do not know the exact composition of juries in Pennsylvania, an attempt to measure the divergence between the pay jurors receive and their opportunity costs may result in a larger error than is contained in the Commission's data. Hence, no attempt will be made to correct for this.

The error introduced by using the pay to jurors as a measure of their opportunity costs will not be large in any event, since only approximately 5% of all those tried for criminal offenses in Pennsylvania receive jury trials.

None of the opportunity costs of witnesses are accounted for by the Commission. In a survey of the number of witnesses appearing in criminal trials in the United States for selected crimes, it was found that on the average 17 witnesses appeared at homicide trials and 8.9 in burglary cases.[1] Since we do not have an estimate of the number of witnesses appearing at trials for the other index crimes, we will assume that 8.9, the number of appearances at burglary cases, will be relevant for all index crimes other than homicide.

We will take median income from wages and salaries to represent the cost of time. We will assume that a witness devotes two days to

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[1]H. Kalven and H. Zeisel, The American Jury (Boston: Little, Brown, and Company, 1965).

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witness related activities; i.e., preparing his testimony and actually testifying in murder cases and one and one-half days in all other cases. Murder cases will generally be longer and hence there will be more chance for a particular witness not being called on the day scheduled. The one and one-half days used for all other cases allow for some witnesses being held over for the following day's testimony as well as for testimony preparation.

We will use Table 13 to calculate the opportunity cost of witnesses for each crime in accordance with our cost maximizing assumption with regard to the cost of parolee crimes. Column 4 of Table 13 indicates the number of trials per conviction for the five index crimes. The number of trials will generally fall short of the number of convictions even though some trials result in acquittal since many of the accused plead guilty.

The product of the number of witnesses per trial and their opportunity cost, as found in the manner described above, multiplied by the number of trials per conviction will give the opportunity cost per conviction under our cost maximizing assumption. Our benefit maximizing assumption, however, dictates that we count only the opportunity cost of the witnesses called per conviction in trials resulting in conviction. Table 14 gives the number of trials of those eventually convicted per conviction. The product of the number of witnesses per trial and their opportunity costs, multiplied by the number of trials per conviction, as given in column 4 of Table 14, provide the relevant cost information in our benefit maximizing case.

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TABLE 13

Number of Trials Per Conviction

Col 1	Col 2	Col 3	Col 4[a]
Crime	No. of Trials	No. of Convictions	No. of Trials Per Conviction
Murder	218	270	.8074
Robbery	553	681	.8120
Burglary	1,384	3,129	.4423
Larceny ($50 or more)	949	1,800	.5272
Auto Larceny	319	472	.6758

[a]Col 4 = Col 2 ÷ Col 3

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TABLE 14

Number of Trials of Those Eventually Convicted Per Conviction

Col 1	Col 2	Col 3	Col 4[a]
Crime	No. of Trials of Those Eventually Convicted	No. of Convictions	No. of Trials Per Conviction
Murder	117	270	.4333
Robbery	344	681	.5051
Burglary	936	3,129	.2991
Larceny ($50 or more)	576	1,800	.3200
Auto Larceny	207	472	.4385

[a]Col 4 = Col 2 ÷ Col 3

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We must also add the resources employed in the defense of the accused. There are no data which will allow us to do this directly. We should include the attorney's opportunity costs, the opportunity costs of all those who are employed by the defense (private investigators, experts conducting specialized tests, etc.) as well as any non-human resources expended in the defense. Unfortunately, there is no way to determine all this. We do, however, have some idea of the opportunity costs of the attorneys. In a survey conducted by the American Bar Association in 1962, those attorneys sampled in Pennsylvania, who had defended persons in criminal cases, indicated that they would have charged an average of $561 per case. Assuming that the real fee per case was constant from 1962 to 1967, $619 was the average defense fee in 1967.[1] This figure is for all crimes and obviously overstates costs for minor offenses and understates costs for major ones.

Thirty-three percent of all felons in Pennsylvania retained private counsel. However, if counsel is provided to defendants, the attorney's opportunity cost is still a cost to society. The problem involved in calculating the cost of legal services is that we do not know how many attorneys who are assigned to defend indigents are paid by the state, or county, and are thereby included in the President's Commission's data.

Following our general procedure, we will, to maximize benefits, assume that all assigned counselors are paid, and to maximize costs,

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[1]We assume that the lawyer's fee was constant in real terms fo. simplicity. Note that this assumption does not preclude an increase in the lawyer's real income.

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that none have been paid. Under our cost maximizing assumption we will take $619 as the legal resources cost per case, and under our benefit maximizing assumption, $206.33 ($619 x .33).[1]

Attorneys may be employed by all those found guilty, all those found innocent, and all those who are charged and tried.[2] Under our cost maximizing assumption, we are interested in the total number of attorneys employed regardless of the outcome of the proceedings. Table 15 gives us the number charged per conviction, which will be multiplied by the average lawyer's fee per case. In accordance with our benefit maximizing assumption, only those attorneys employed by those eventually convicted will be included.

The five index crimes with which we have been dealing account for approximately 76% of all the crimes committed by parolees. The additional 24% will generally be lesser crimes. We will, however, assume that the apprehension and prosecution costs associated with the crimes unaccounted for by the President's Commission are an average of the costs of the index crimes, excluding murder.

The apprehension and prosecution costs to be assigned to each crime in accordance with both our cost and benefit maximizing assumptions is given in Table 16. Given the same probability of recidivism

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[1]Actually, in 1962 when the American Bar Association survey was taken only 77% of all defendants in criminal cases were represented by counsel. However, we will assume that all are represented during the time period of our study in light of subsequent decisions by the United States Supreme Court regarding the right of defendants in criminal cases to counsel.

[2]Attorneys may also be employed by those arrested and never charged. There is no relevant data on this and, since this will constitute a small cost, it will be ignored.

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TABLE 15

Individuals Charged

Col 1	Col 2	Col 3	Col 4[a]
Crime	Total No. of Individuals Charged	Total No. of Convictions	No. Charged Per Conviction
Murder	521	270	1.9296
Robbery	986	681	1.4478
Burglary	4,162	3,129	1.3301
Larceny ($50 or more)	2,532	1,800	1.4066
Auto Larceny	672	472	1.4237

[a]Col 4 = Col 2 ÷ Col 3

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TABLE 16

Apprehension and Prosecution Costs for Parolee Crimes

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8
Crime	Cost Per Crime, Cost Maximizing Assumption	Cost Per Crime, Benefit Maximizing Assumption	Number of Crimes	Present Value of the Total Cost, Cost Maximizing Assumption	Present Value of the Total Cost, Benefit Maximizing Assumption	Cost of Crimes Occurring 30 Months Sooner, Cost Maximizing Assumption	Cost of Crimes Occurring 30 Months Sooner, Benefit Maximizing Assumption
Murder	$ 4,690.13	$ 1,638.20	1.05	$ 4,629.70	$ 1,616.99	$ 532.20	$ 186.03
Robbery	4,377.00	1,062.33	10.74	44,218.24	10,724.23	5,087.05	1,235.07
Burglary	9,167.09	894.18	60.94	525,594.87	51,226.38	60,466.67	5,899.44
Larceny	4,301.98	901.01	14.65	59,253.92	12,409.51	6,816.82	1,429.13
Auto Larceny	4,299.75	947.19	9.20	37,206.91	8,194.97	4,234.80	942.78
All Other	5,536.46	951.18	30.80	170,954.36	29,313.76	19,663.46	3,372.38
						Σ = 96,851.00	Σ = 13,064.83

for parolees and mandatory releasees, the apprehension and prosecution costs should not be counted in full. Instead we count only the cost incurred as a result of employing the resources devoted to apprehension and prosecution 30 months sooner. These are given in columns 8 and 9 of Table 16 under our cost and benefit maximizing assumptions, respectively.

In addition to the apprehension and prosecution costs, society will be faced with costs in terms of destroyed resources, both human and non-human. In the case of assault, for example, a person may be injured such that he requires medical attention. In addition, he may be unable to continue his normal activities for a period of time. The medical resources and his foregone production or leisure will certainly represent social costs to be attributed to assault. Furthermore, the emotional pain associated with being assaulted or having one's loved one assaulted is also a social cost. These costs, unfortunately, cannot be measured. However, since parole merely moves the crimes up in time, the exclusion of these costs will not result in a large understatement of the cost of the crimes committed by parolees. A partial exception to this will be crimes resulting in permanent incapacitation or death of the victim. When this happens, the production of the victim ceases 30 months sooner with parole and the personal pain suffered by the victim and, or, his loved ones is prolonged. Homicide is such a crime, as are assaults resulting in permanent incapacitation. We will add the value of the production or leisure foregone by those murdered over the parole period to the apprehension and prosecution costs for homicide. We do not know what percentage of assaults result in

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permanent incapacitation. It is, however, probably small and will be ignored. The added personal pain is also, of necessity, not quantified.

Taking median income from wages and salaries as our measure of the value of time, $6,306[1] will be the cost of foregone production or leisure per year.

To determine the present value of the earnings or leisure foregone by a victim of homicide, we must correct for the fact that a homicide victim may have died from other causes during the 30-month period.[2]

Taking the probability of death into account, $14,810 will represent the production foregone as a result of one homicide being committed. Since 1.05 murders will be committed, $15,550.50 will be the added cost of murder.

Adding this to the sum of the apprehension and prosecution costs for all crimes combined, $112,916 will be the total cost of the crimes committed by parolees under our cost maximizing assumption, and $28,615 under our benefit maximizing one.

c. The Cost of the Induced Burglaries. To determine the social cost of the induced burglaries, we must include the criminal's opportunity cost and the cost of punishment, in addition to the apprehension and prosecution costs.

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[1]U. S. Bureau of Census, Current Population Reports, Series P-60, "Income in 1967 of Persons in the United States" (Washington, D. C.: U. S. Government Printing Office, 1969), p. 1.

[2]We assume that victims of homicide are a random sample of the population. To simplify matters we use the probability of a person of median age in Pennsylvania surviving to the midpoint of each time interval in our discounting formula.

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In 1967, the average gross yield (Y_g) from a burglary in Pennsylvania was $288.[1] Under our cost maximizing assumption (that burglars have extreme risk preference), we will take this figure as the burglar's opportunity cost. Under the assumption that burglars are risk neutral (our benefit maximizing assumption), we must take the expected penalty into account.

Thirteen percent of all property stolen in Pennsylvania in 1967 (with the exception of automobiles) was recovered.[2] On the average, then, the burglar will be left with $250,[3] $175 of which will be non-currency items.[4] Assuming that the non-currency items are disposed of at one-third of their market value, the burglar will be left with $126 ($175 x .33 + $75).

The probability of an adult burglar in Pennsylvania being convicted is .058,[5] and the probability of his being sentenced to prison is .0339. If sent to prison, the burglar incurs costs in terms of foregone

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[1]Pennsylvania Crime Commission, Task Force Report: Assessment of Crime and Criminal Justice in Pennsylvania, January, 1969, p. 14. If unreported burglaries tend to result in minor thefts, then this figure will overstate the true Y_g.

[2]Ibid., p. 15.

[3]This assumes that all recovered property is recovered before the burglar disposes of it or that once the property is recovered the burglar is caught and made to return the proceeds.

[4]This calculation assumes that the distribution of the stolen property is similar among all crimes involving the theft of property, and that the distribution of recovered property is similar to the distribution of stolen property.

[5]For the method of computation, see p. 89.

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income and personal disutility associated with prison life, and benefits in terms of consumption, pay (if he works), and increased business contacts. No attempt will be made to quantify the cost in terms of personal disutility and the benefit in terms of improved business contacts.

To measure the convict's foregone income we will take the earnings of individuals with characteristics similar to those of convicted burglars. A survey conducted by the President's Commission on Crime in the District of Columbia indicated that those whites convicted of crimes in the District of Columbia had, on the average, completed slightly over nine years of school, while non-whites had completed slightly over eight. On the average, convicted burglars were 26 years of age. Since such data are not available for burglars in Pennsylvania, or for the nation as a whole, we will assume that the educational characteristics of those committing property crimes in the District of Columbia are similar to that of those who commit burglaries in Pennsylvania, and that the age of those committing burglaries in the state of Pennsylvania is similar to that of those who commit burglaries in the District of Columbia.

In 1959 white males in the 25-34 year age category with one to three years of high school completed, who worked between 50 and 52 weeks, earned $4,998. Non-white males in the same age category with eight years of school completed, who worked from 50 to 52 weeks, earned $2,294. Seventy-one percent of those convicted of burglary in Pennsylvania are white, and 24% are non-white. The weighted average earnings of persons with characteristics similar to that of burglars would be

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$4,418.84 if they worked from 50 to 52 weeks in 1959. Assuming, for simplicity, that there is no change in real income between 1959 and 1967, $5,063.17 would be earned in 1967. Allowing for 4% unemployment, $4,860.64 is the yearly income foregone by those sentenced to prison for having committed burglaries.[1]

While the burglar foregoes $4,860.64 per year while in prison, he is provided with consumption goods and may be paid for the work he performs. Twenty-three percent of all burglars sentenced to prison serve their time in state institutions, the remainder being sentenced to county institutions. The value of the consumption of the state prisoner is $980.12 per year and that of a county prisoner is $444.13.[2] The expected yearly value of consumption, then, to a burglar sentenced to prison is $567.41.

Since 30% of those sentenced to state prisons and none of those sentenced to county prisons can be expected to work for pay, and since the average wage paid to inmates is $.50 a day, the expected prison earnings for a burglar sentenced to prison is $12.59 per year (.23 x .3 x $.5 x 365).

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[1]While the induced crimes will not be committed by juveniles (see footnote 1, page 112), we can expect the 25-34 age bracket to be relevant since only 9% of all those convicted of burglary were above 35.

[2]See pp. 48-51.

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Assuming that the average incarcerated burglar serves 40 months in prison,[1] the expected cost to him, in present value terms is $11,280.17.[2] Since 3.39% of all burglars are sentenced to prison, the expected cost of imprisonment to the burglar is $382.40. In addition, 33% of those charged with burglary retain private counsel. Since we are assuming that those acquitted are in fact innocent, we will count the attorney costs for only the one-third of the convicted burglars who retain private counsel. Hence, $206.33 ($619 x .33) will be spent per convicted burglar. Since 5.81% of all burglars are convicted, the expected cost in terms of legal fees is $11.97. Adding this to the cost associated with prison, $394.37 is the expected cost to the burglar. This amount exceeds the gross gain even if the stolen goods are sold at their market value. Hence, we have further evidence that burglars have risk preference.

We will assume then that the opportunity cost of burglars under our benefit maximizing assumption is zero.

The cost of the induced crimes will, of course, exceed the criminal's opportunity cost. The income foregone by the incarcerated

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[1]See page 110. This may be an overstatement of the true time served since we do not have any data on those incarcerated burglars not under the jurisdiction of the State Board of Parole. However, in a personal communication with Mr. D. J. Pastore, Director of the Budget Bureau in Pennsylvania, the author was informed that J. G. Yaeger, Chief of the Division of Criminal Justice Statistics in the Pennsylvania Crime Commission, believed that the average length of confinement was similar for state and county prisoners.

[2]We assume that 15%, the approximate rate at which consumers may borrow, is the appropriate discount rate. The rate at which burglars' discount may exceed this rate. However, it turns out that the expected return from a burglary is sufficiently negative so that even much higher discount rates would not result in a positive opportunity cost.

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burglars will represent a cost to society. The entire earnings of persons with characteristics similar to that of the convicted burglar, while not necessarily representing the amount incarcerated burglars would earn were they released, may represent a social cost. A convicted burglar can be expected to earn less than a person with similar characteristics, apart from the fact that he may devote his time to illegitimate activity. This is because the legitimate opportunities available to him will be fewer than those of his honest counterpart. Thus, it may be the reactions of society (employers) that results in the convict being less productive. Hence, the fact that he earns less in legitimate activities if released than a person with similar characteristics does not necessarily mean that his lower earnings represent his potential productivity. It is the reaction of society which causes his productivity to be low, and therefore, the difference between his true productivity and his actual productivity (as permitted by society) will represent part of the social cost attributable to the commission of the crime.

If former convicts' incomes are lower than persons with similar characteristics, simply because all or some of them (the convicts) devote all or some of their time to illegitimate activity, then it is the lower earnings which represent the true social cost of detaining them. Since we do not know which the case is, we will assume first that the convicts' lower income is due entirely to society's reaction to them, which will serve to maximize costs, and second, that convicts earn less legitimately than persons with similar backgrounds because they choose to do so. In the former case we will take the earnings of persons with

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similar characteristics to that of a convicted burglar as our measure of his lost production, and in the latter case the lower estimate of the earnings of paroled burglars.[1] Line 1 of Table 17 gives the yearly foregone production per prisoner under our two assumptions, and line 2 gives the present value of the production foregone over the length of the prison sentence.

If convicted burglars' incomes are reduced because of the fewer legitimate opportunities available to them, the lower earnings of those convicted burglars receiving non-prison sentences will also represent a cost to society (assuming that this is their first conviction). We can estimate this by the difference between the earnings of paroled burglars and a person with similar characteristics.[2] The reduced earnings of a convicted burglar not sentenced to prison is given in line 4 of Table 17.

To determine the direct costs of incarceration, the percentage of convicted burglars sentenced to state prisons (23%) is multiplied by the yearly expenditures for non-consumption items in state prisons ($3,920) and added to the product of the percentage of burglars sentenced to county institutions (77%) and the yearly expenditures for non-consumption items in county prisons ($1,696).

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[1]See p. 41.

[2]The reduced earnings may continue over the life of the criminal. We limit our study, however, to an examination of the costs through the length of the prison period. This may result in only a small understatement of the cost, however, since many of the induced crimes will be committed by those who have already been convicted of a crime. In this case, it is not the commitment of the induced burglary which is responsible for their lower legitimate earnings, but the commission of previous crimes.

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TABLE 17

The Cost of an Induced Crime

		Cost Maximizing Assumptions	Benefit Maximizing Assumptions
1.	Yearly foregone production per prisoner	$ 4,860.64	$ 1,965.90
2.	Present value of total foregone production per prisoner	14,947.72	6,045.54
3.	Present value per crime	506.72	204.94
4.	Yearly foregone production per non-imprisoned convict	2,894.74	--
5.	Present value per prisoner	8,902.51	--
6.	Present value per crime	215.44	--
7.	Yearly incarceration costs per prisoner	2,269.63	2,269.63
8.	Present value of total incarceration costs	6,979.57	6,979.57
9.	Present value per crime	236.61	236.61
10.	Yearly in-prison production	226.77	12.59
11.	Present value of total prison production	697.33	38.67
12.	Present value per crime	23.64	1.31
13.	Witness cost per crime	4.05	4.05
14.	Attorney cost per crime	4.81	1.60
15.	Court cost per crime	7.72	7.72
16.	Police cost per crime	266.27	266.27
17.	Present value of Lines 13-16	275.00	272.00
18.	Opportunity cost per crime	288.00	--
19.	Present value	280.97	--
20.	Present value of the total cost per crime Lines (3+6+9+17+19)-Line 12	1,492.00	713.00

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The production of the prisoners will be estimated as above (page 56) and is given in line 10 of Table 17. Notice that the lower production estimate is used in our benefit maximizing case. This is dictated by the fact that more overall benefits will result from the parole system if prisoners produce less while incarcerated. If the induced crimes were sufficiently large in number, then the cost and benefit maximizing assumptions with regard to prison production would be interchanged.

To determine the cost of witnesses we divide the cost per trial ($230) by the number of crimes per trial in Pennsylvania. The result is given in line 13 of Table 17.

To determine the costs associated with the use of attorneys, we divide $619 by the number of crimes per person charged with burglary under our cost maximizing assumption with regard to the compensation of assigned counsel, and $206.33 by the same divisor under our benefit maximizing assumption. The results are given in line 14 of Table 17.

The court and police costs per crime are found by dividing the total costs, as given by the President's Commission, by the number of crimes, and are given in lines 15 and 16 of Table 17, respectively.

Assuming that the police, court, attorney, and witness costs are incurred at the mid-point of the year, their present value is given in line 17 of Table 17.[1] Under our cost maximizing assumption the criminal's opportunity cost is $288. This is given in line 18, and its present value is given in line 19 of Table 17.

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[1]Witness, court, and attorney costs may be incurred later since there will be a lag between arrest and trial. The error will be minute because of the magnitude of these costs.

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Summing the present value per crime for each cost in Table 17, we find the cost per induced burglary to be $1,492.05 under our cost maximizing assumption and $713.06 under our benefit maximizing assumption (line 20 of Table 17).

Now that we know the cost per induced crime and the number of induced crimes per one-month reduction in the penalty, we must determine the magnitude of the reduction in the average penalty brought about by parole. This will present difficulties.

From Table 4, we know that those burglars released on parole will serve 37 months in prison prior to their release, and from Table 3, that they spend 30 months on parole. We do not know, however, what percentage of burglars are paroled. Data for 1960 indicate that 85% of inmates in the state institutions will be released on parole. This figure excludes the county prisoners and is for all crime categories. An educated guess made by the statistician of the Pennsylvania Board of Parole is that approximately 90% of all burglars in the state and county prisons, who come under the jurisdiction of the state board of parole, will be paroled. We will use this figure to determine the expected reduction in the penalty brought about by the parole system.

Without parole all burglars would serve 67 months. With parole, 90% will serve 37 months if they complete their parole successfully, and 10% 67 months, for a weighted average of 40 months. Hence, parole would reduce the expected penalty by 27 months if all parolees were successful. This not being the case, we must decide upon how to treat parolees returned to prison.

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When a parolee commits a new crime or violates the rules of parole and is returned to prison, does the additional time spent in prison represent part of the penalty for the original crime or only a penalty for the parolee's actions while on parole? The extra time served in prison is served for the original crime. However, being made to serve the additional time is a consequence of the parolee's actions on parole.

If we view the extra penalty as part of the punishment for the original crime, then the expected penalty computed in the above manner will be understated. If we choose the alternative course and view the extra penalty as a punishment for the parolee's behavior on parole, then the expected penalty will not be understated for the general population, but will be for parolees since parolees will be punished more severely than non-parolees.

Which view to adopt depends upon how potential burglars view the expected penalty. If they are simply interested in the time spent in prison before first release, then the former view is correct. If, on the other hand, they are also interested in the probability of staying on parole once paroled, then the latter view should prevail.

The answer to this is not at all clear. If we choose the former case (i.e., that the added penalty is for the original crime), then we must reduce our figure for the reduction in the penalty to account for the added time served in prison. The alternative course would require making an adjustment for the added penalty to be imposed upon all parolees who commit crimes. Since we do not know what percentage of the total potential criminal population parolees account for, the

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former case is preferable on practical (statistical) grounds. Therefore, we shall adopt it.

Under our cost maximizing assumption about absconders and rule violators, the weighted average time served by each burglar is 49 months. Under our benefit maximizing assumption, it is 51.3 months. Hence, the reduction in the penalty is 18 months under our cost maximizing assumption and 15.7 months under our benefit maximizing assumption.

The reduction in the penalty, however, will only be relevant for those sentenced to state institutions or to county institutions for a maximum sentence of not less than two years. All those sentenced to probation, fined, receiving suspended sentences and maximum sentences in county prisons of less than two years are not affected by the parole system.[1] This must be corrected for.

We do know what percentage of burglars receive probation or suspended sentences (37%) and fines (4.3%). Unfortunately, we do not know the percentage receiving maximum terms in the county prisons of less than two years. A crude estimate of this can, however, be made.

During the 1967-68 fiscal year, 26% of all inmates released on parole under the jurisdiction of the State Board of Parole were released from county institutions. If this distribution holds for burglars,

---

[1]Juveniles are also unaffected by the action of the state board of probation and parole. However, our method of estimating the response to the changed penalty excluded juveniles from consideration. The crime rate was taken to be a function of adult penalties. Therefore, when the crime rate changes as the penalty does, the entire change will be a consequence of adult reaction.

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then 143 of the 551 burglars released under the jurisdiction of the State Board of Parole came from county institutions. Since we have assumed that 90% of all inmates eligible for parole are in fact paroled, 159 (143/.9) county prisoners fall under the jurisdiction of the State Board of Parole. What percentage of the relevant cohort of burglars serving sentences in county institutions this accounts for is unknown. We do know, however, that 1,384 convicted burglars were sentenced to county institutions in 1967. If this number is indicative of the size of the cohort under consideration, then 11% of all burglars sentenced to county institutions receive sentences in excess of two years. Since 45% of all those convicted of burglaries are sentenced to county institutions, 40% (45% x 89%) receive sentences in county institutions not exceeding two years. We can conclude then that the activities of the State Board of Parole are of consequence for 18.7% of all convicted burglars.

Under our cost maximizing assumption with regard to the behavior of absconders and rule violators, the expected penalty will be reduced by 3.37 months (.187 x 18). Under our benefit maximizing assumptions, the resulting reduction in the expected penalty will be 2.94 (.187 x 15.7) months.

Since 1,110 burglaries can be expected for each reduction of one month in the penalty, we can expect 3,263 new burglaries to be committed under our benefit maximizing assumption, and 3,740 under

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our cost maximizing assumption.[1] Multiplying by the cost per crime in each case, $5,580,000 will be the cost associated with induced burglaries in our cost maximizing case and $2,326,519 in our benefit maximizing case.

8. The Results

Aggregating over all of our cost maximizing and benefit maximizing assumptions, we find that parole will result in a net benefit ranging from -$2,216,887 to $1,894,346 or, stated differently, parole results in a benefit cost ratio ranging from .67 to 1.7. Table 18 summarizes these results.

---

[1]For our second regression a change in the penalty would apply to 31% of the prisoners (69% are in county institutions serving sentences of less than two years). Under our cost maximizing assumption 3,159 new burglaries would occur and under our benefit maximizing assumption, 2,757.

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TABLE 18

Results of the Cost-Benefit Analysis

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8[a]
	O_{pv}	I_{pv}	$(\Sigma\Sigma P_{kit}C_i)_{pv}$ - $(\Sigma\Sigma P_{jit}C_i)_{pv}$	A_{pv}	$(P.O.)_{pv}$	$(\Sigma\Sigma\Delta N_{it}C_i)_{pv}$	Benefits-Costs
Cost Maximizing Assumptions	$1,280,386	$3,111,393	$112,402	$274,701	$641,563	$5,580,000	-$2,216,887
Benefit Maximizing Assumptions	1,794,716	2,760,950	28,615	274,701	31,485	2,326,519	1,894,346

[a]Col 8 = Cols (2+3) - Cols (4-5+6+7)

IV. AN OPTIMUM PAROLE POLICY

An optimum parole policy will be one which maximizes the net gain (G) which society receives from the operation of the parole system.

$$(1) \quad G = f(O,I,A,P.O.,C,C_i)$$

where O, I, A, and P.O. are as defined above, C is the cost of the crimes committed by parolees, and C_i the cost of the induced crimes; and

$$\frac{\partial G}{\partial O} = 1, \frac{\partial G}{\partial I} = 1, \frac{\partial G}{\partial A} = -1, \frac{\partial G}{\partial P.O.} = -1, \frac{\partial G}{\partial C} = -1, \frac{\partial G}{\partial C_i} = -1$$

G will depend upon the number of inmates (n) who are paroled and

$$(2) \quad \frac{dG}{dn} = \frac{\partial O}{\partial n}\frac{\partial G}{\partial O} + \frac{\partial I}{\partial n}\frac{\partial G}{\partial I} + \frac{\partial A}{\partial n}\frac{\partial G}{\partial A} + \frac{\partial P.O.}{\partial n}\frac{\partial G}{\partial P.O.} + \frac{\partial C}{\partial n}\frac{\partial G}{\partial C} + \frac{\partial C_i}{\partial n}\frac{\partial G}{\partial C_i}$$

$$= \frac{\partial O}{\partial n} + \frac{\partial I}{\partial P.O.} + \left(-\frac{\partial P.O.}{\partial n}\right) + \left(-\frac{\partial C}{\partial n}\right) + \left(-\frac{\partial C_i}{\partial n}\right)$$

where

$$\frac{\partial O}{\partial n} > 0, \frac{\partial I}{\partial n} > 0, \frac{\partial A}{\partial n} > 0, \frac{\partial P.O.}{\partial n} > 0, \frac{\partial C}{\partial n} > 0, \text{ and } \frac{\partial C_i}{\partial n} > 0$$

and, since the average probability of recidivism will increase as more and more inmates are paroled because inmates with characteristics less and less favorable to success will be paroled,

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$$\frac{\partial^2 O}{\partial n^2} < 0,\ \frac{\partial^2 I}{\partial n^2} < 0,\ \frac{\partial^2 A}{\partial n^2} < 0,\ \frac{\partial^2 P.O.}{\partial n^2} < 0,\ \frac{\partial^2 C}{\partial n^2} > 0,\ \text{and}\ \frac{\partial^2 C_i}{\partial n^2} < 0^1$$

To maximize G we set

$$(3)\quad \frac{dG}{dn} = \frac{\partial O}{\partial n} + \frac{\partial I}{\partial n} - \frac{\partial A}{\partial n} - \frac{\partial P.O.}{\partial n} - \frac{\partial C}{\partial n} - \frac{\partial C_i}{\partial n} = 0$$

Rearranging terms we get

$$(4)\quad \frac{\partial O}{\partial n} + \frac{\partial I}{\partial n} = \frac{\partial A}{\partial n} + \frac{\partial P.O.}{\partial n} + \frac{\partial C}{\partial n} + \frac{\partial C_i}{\partial n}$$

where the left hand side of expression (4) is the marginal benefit derived from paroling an additional inmate, and the right hand side the marginal cost.

If the marginal benefits decrease at a faster rate than the marginal cost (the second order conditions), then the solution will result in less than all inmates being paroled. Otherwise, the optimum policy would be to parole all inmates.

Once we know how many inmates to parole, the question arises as to when they should be paroled.

$$\frac{\partial O}{\partial t} > 0,\ \frac{\partial I}{\partial t} > 0,\ \frac{\partial A}{\partial t} > 0,\ \frac{\partial P.O.}{\partial t} > 0,\ \frac{\partial C}{\partial t} > 0,\ \frac{\partial C_i}{\partial t} > 0$$

---

[1] $\frac{\partial^2 C_i}{\partial n^2}$ will probably be less than zero since the parole of those who fail does not result in as large a reduction in the penalty as does the parole of those who are successful. In addition, as more inmates are paroled the penalty decreases and hence the cost of an induced crime. Offsetting this, however, is the fact that as more and more inmates are paroled, causing Y_n to increase, persons with higher and higher opportunity costs will be induced to commit crimes.

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and

$$\frac{\partial^2 O}{\partial t^2} = 0, \frac{\partial^2 I}{\partial t^2} = 0, \frac{\partial^2 A}{\partial t^2} = 0, \frac{\partial^2 P.O.}{\partial t^2} = 0, \frac{\partial^2 C}{\partial t^2} = 0, \frac{\partial^2 C_i}{\partial t^2} \gtrless 0^1$$

where t is time.

$$(5) \quad \frac{dG}{dt} = \frac{\partial O}{\partial t} + \frac{\partial I}{\partial t} + \left(-\frac{\partial A}{\partial t}\right) + \left(-\frac{\partial P.O.}{\partial t}\right) + \left(-\frac{\partial C}{\partial t}\right) + \left(-\frac{\partial C_i}{\partial t}\right)$$

Setting $\frac{dG}{dt} = 0$ and rearranging terms

$$(6) \quad \frac{\partial O}{\partial t} + \frac{\partial I}{\partial t} = \frac{\partial A}{\partial t} + \frac{\partial P.O.}{\partial t} + \frac{\partial C}{\partial t} + \frac{\partial C_i}{\partial t}$$

where the left side of expression (6) is the marginal benefit derived from paroling inmates one time period earlier and the right side the marginal cost of so doing.

Second order conditions require that marginal cost cut marginal revenue from below. This condition will be satisfied if $\frac{\partial^2 C_i}{\partial t^2} > 0$. If not, then the length of the parole period should be maximized.

The data we have worked with in this study do not permit us to specify the behavioral relations necessary to implement an optimum parole policy for the Pennsylvania Board of Parole in the manner described above. If we assume, however, that all parolees in each of our behavior categories behave the same (i.e., that each individual recidivist will, for example, earn the same income regardless of the

---

[1]As the length of incarceration is increased persons with higher opportunity costs will be induced to commit crimes. This will tend to make $\frac{\partial^2 C_i}{\partial t^2} > 0$. Offsetting this, however, is the reduced cost of an induced burglary resulting from the lower penalty.

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probability of the particular individual becoming a repeater), we can use the calculations from our study to say something about an optimum parole policy.

Table 19 gives the cost and benefits associated with parole per parolee in each behavior category under our cost maximization assumptions. Table 20 gives the same information under our benefit maximizing assumptions. Columns 2-5 of both tables were found by dividing the total costs and benefits by the number of parolees in each behavior category. Column 7 requires some explanation.

Under our cost maximizing assumption, the penalty is reduced only for those successful on parole since all others will be made to make up their released time. The penalty is reduced by 30 months for a successful parolee. If we take the total number of burglars convicted during the 1967-68 fiscal year as representative of the total population of convicted burglars, a single successful parolee represents .003% of the total. Therefore, the parole of an inmate who will be successful on parole will result in a reduction in the penalty of .009 months. Since 1,110 new crimes can be expected for each one-month reduction in the penalty, 10 new crimes can be expected to result from the parole of an inmate who will be successful. Multiplying by the cost per induced burglary, $14,920 will be the cost associated with the burglaries induced by the parole of an inmate who will be successful.[1]

---

[1]How many inmates are released will affect both the opportunity costs of prisoners and the length of the penalty and thus the cost of an induced crime. As more prisoners are released the average opportunity cost increases, but the average length of incarceration decreases. The cost of an induced burglary will only be constant if these two factors offset each other.

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TABLE 19

Benefits and Costs Per Parolee
(Cost Maximizing Assumptions)

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8[a]
	O_{pv}	I_{pv}	A_{pv}	$(P.O.)_{pv}$	C	C_i	Benefits-Costs
Recidivists	$ 262.07	$ 471.54	$ 398.55	$ 97.23	$ 885.05	--	-$ 647.22
Rule Violators	1,775.62	3,770.90	366.67	777.57	--	$7,012.00	- 2,609.72
Absconders	1,722.92	8,324.49	301.56	1,716.52	--	14,920.00	- 6,890.67
Successful Parolees	4,626.62	8,324.49	809.44	1,716.52	--	14,920.00	- 4,495.05

[a]Col 8 = Cols (2+3) - Cols (4+5+6+7)

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TABLE 20

Benefits and Costs Per Parolee
(Benefit Maximizing Assumptions)

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8[a]
	O_{pv}	I_{pv}	A_{pv}	$(P.O.)_{pv}$	C	C_i	Benefits-Costs
Recidivists	--	$ 471.54	$ 398.55	$ 5.37	$ 225.31	--	-$ 157.69
Rule Violators	--	433.82	366.67	4.98	--	--	61.21
Absconders	$5,626.07	8,324.49	301.56	94.92	--	$7,130.00	6,424.08
Successful Parolees	5,626.07	8,324.49	809.44	94.92	--	7,130.00	5,916.15

[a]Col 8 = Cols (2+3) - Cols (4+5+6+7)

The sentence of absconders is also reduced by 30 months. The cost in terms of induced burglaries, then, will also be $14,920 per absconder.

Violators have their sentence reduced by an average of 14 months. Since each violator represents .003% of the total convicted burglar population, the parole of each violator results in a reduction in the penalty of .0033 months and results, therefore, in the commission of 4.7 new burglaries. The cost of the induced burglaries associated with the parole of one inmate who turns out to be a violator is $7,012.00.

Since the net reduction in the penalty for recidivists is zero, we can expect no burglaries to be induced by their parole.

Under our benefit maximizing assumptions, the reduction in the penalty is still 30 months for successful parolees and absconders, and still zero for recidivists. Violators, however, are now made to serve their released time and hence their parole does not induce any new burglaries.

Since the cost per burglary under our benefit maximizing assumptions is $713, the parole of each successful parolee and of each absconder results in an induced crime cost of $7,130.

Column 8 of each table gives the net results of paroling an inmate who will fall into each behavior category. A prediction table, which would give the probability of a given inmate falling into each category, could be used in conjunction with Tables 19 and 20 to determine whether the inmate should be paroled. If the expected gain is positive, then the individual is paroled; otherwise, he is not.

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Under our cost maximizing assumptions, parole should not be employed since the parole of even those who succeed results in a loss to society. Under our benefit maximizing assumptions, the parole of all but the recidivist results in a net gain to society.

If there were only two categories--success and failure (recidivist)--then the optimum probability of failure could be found. Let x = the optimum probability of failure. Then under our benefit maximizing assumptions:

$$x(-\$157.69) + (1-x)\ (\$5,916.15) = 0$$

for an optimum. The parole board in this case should parole anyone whose characteristics indicate that he will fail with probability of .97 or less.

It is not possible to tell how the Pennsylvania Board of Parole has fared with regard to an optimum policy since (a) we do not know the true benefit cost ratio; and (b) we do not know what the probability of the marginal parolee being a repeater is. The fact that the analysis may tell us to parole those whose characteristics indicate a probability of recidivism of less than x% tells us nothing about what percentage of the inmate population should be paroled.

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V. SUMMARY AND CONCLUSIONS

We have developed a theoretical framework within which we have evaluated the Pennsylvania State Parole System as it operates with respect to burglars. Our study was conducted for a group of burglars paroled during the 1967-68 fiscal year. The benefits of the parole system were viewed in terms of the added production and reduced incarceration costs resulting from the early release of imprisoned convicts, while the costs were viewed in terms of the administration of the parole system, the crimes committed by parolees, the crimes induced by the lowered penalty which results from parole, and the reduced in-prison production. An added possible benefit or cost--the differential probability of recidivism between parolees and mandatory releasees resulting from the special treatment which parolees receive--was discussed, but not measured because of a lack of data. When insufficient data precluded a direct measurement of one of the terms in our cost-benefit expression, interval estimates were calculated. In each case assumptions were made which served to maximize both benefits and costs, thereby enabling an interval estimate of the final benefit-cost ratio to be obtained.

The interval estimate which was found for our benefit-cost ratio ranged from .67 to 1.7; or, stated differently, the net benefit resulting from the parole of burglars in Pennsylvania ranged from -$2,216,887 to +$1,894,346.

These results can be no better than the data employed in arriving at them. The limitations and possible errors in the data were spelled out in Chapter III. Of all our measurements the number of

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induced crimes is the one most subject to question. Since the costs of these crimes are so high, a large error in their measurement would be of serious consequence for our results. Better data are needed to more accurately measure the variables in our regression equation so that we can estimate the number of induced crimes with more confidence.

The interval estimate which we obtained does not permit us to conclude whether or not the parole of burglars in Pennsylvania is economically justified.

The fact that our calculations ignored many of the costs of particular crimes does not indicate that we are not aware of them or that we believe that they are minor. The absence of a quantification of the intangible costs associated with crimes (fear, depression, loneliness, etc.) leads one to argue that our negative results more closely approximate the actual net result of parole.

On the other hand, we have also failed to determine whether or not the institution of parole reduces the probability of recidivism. If it does, then there may be large benefits unaccounted for in our study. At present, however, there is no evidence that parole has such an effect on the rate of recidivism.

A criticism often leveled at cost-benefit analysis in general is that it ignores redistributive effects of the project under consideration; i.e., projects are evaluated strictly on their cost-benefit ratios. It is argued that, since government in fact cannot always readily effect a compensation of the losers by the gainers, such redistributive effects should not be ignored.

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The main losers from a parole program will be the victims of parolee and parole induced crimes. It will not be possible to identify the latter and may only be possible to identify some of the former because some parolees may avoid detection. All such losers could be compensated, however, if government sponsored mandatory insurance programs were implemented to compensate all victims of crime. Perhaps the use of parole should be contingent upon the implementation of such a program. If such a program is desirable on its own (i.e., with or without parole), then the added cost due to parole will simply be the additional administrative expenditures incurred as a result of parolee and parole induced crimes. Such expenditures would have to be added onto the cost side of our cost-benefit expression.

Even though our interval estimate did not permit us to state whether or not the parole system is economically justified, our results may still be of value. We have provided some measure of the maximum loss or gain which society will encounter. Since policy decisions are generally made from a wider perspective than that of our study, policy makers may decide that "other factors" are of such negative (positive) influence that, even if our benefit (cost) maximizing assumptions are correct, parole should be eliminated (continued).

We have studied the parole system as it exists. Perhaps our attention now should be turned to questions of how to modify the parole system such that it does result in a net gain to society if it does not at present and that it results in a larger net gain if it does at present.

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We have seen that a major benefit of parole is the output produced by parolees. We have also seen, however, that the per capita output of parolees is small relative to that of the general population. This is probably due to the fact that parolees have fewer skills than the population as a whole and that the skills which they do have are often rejected by employers because of their previous incarceration.

The skill problem could be attacked with in-prison training programs. Such programs would, of course, have to be evaluated to be certain that their costs do not outweigh their benefits. In addition to increasing the productivity of parolees, such programs might also reduce the rate of recidivism. The magnitude of this latter benefit would depend on the extent to which recidivism is a function of parolee earnings.

The fact that many employers will refuse to hire ex-convicts may be a more difficult problem to combat. If an employer believes that ex-convicts are less responsible than others, then there will be little reason for him to hire a parolee. There may, however, be many employers who are willing to hire ex-convicts but who are prevented from doing so. An example of this would be the case where an ex-convict is prevented from securing a particular position because he is not bondable. Such difficulties could be met by the state with the provision of state bonds for parolees.

The cost of the crimes induced by the lowering of the penalty resulting from parole is the major component of the cost side of our cost-benefit expression. It may be that convicts should be released from prison in exchange for the payment of a fine, the fine serving to

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offset at least some of the induced burglaries.[1] If it is possible for the convict to pay the monetary equivalent of the remainder of his prison sentence, then no induced crimes would occur. However, it would still pay to parole inmates at lower fines as long as the total benefit of their parole outweighs the total costs.

The last component of our cost-benefit expression subject to control will be the parole administration expenditures. Before we can say anything about such expenditures we must know something about how they affect the probability of recidivism. We have assumed in this study that they have no effect on this probability. If this is so, then such expenditures will represent a misallocation of resources; i.e., individuals should simply be released from prison with no parole supervision.

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[1]Fines could be offered as an alternative to prison altogether. Such punishments have the virtue of being costless.

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