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Panel 23: Community Based Corrections for Adults

COST-EFFECTIVENESS OF RESIDENTIAL COMMUNITY CORRECTIONS: AN ANALYTICAL PROTOTYPE

Charles M. Gray
Governor's Crime Commission

Chris Johnston-Conover
Rand Corporation

COST-EFFECTIVENESS OF RESIDENTIAL COMMUNITY CORRECTIONS: AN ANALYTICAL PROTOTYPE [1]

I. INTRODUCTION

The purpose of this paper is to demonstrate a technique for determining whether residential community corrections is a cost-effective alternative to two traditional methods of dealing with adult and juvenile offenders: probation and institutionalization. In this study, three basic classes of residential community corrections facilities are used: halfway houses, probated offenders rehabilitation and training (P.O.R.T.) projects, and juvenile residences. For each major class of residential facility, comparisons are made between residential community corrections projects and probation (or parole) and institutionalization.

The next section outlines the theoretical underpinnings of this research. That is followed by a brief treatment of data acquisition and the empirical findings. The conclusions are contained in the final section.

II. THE ECONOMIC APPROACH TO CRIME

Crime imposes substantial costs upon society. Victims lose something of value, including sometimes life itself; potential victims suffer the disutility of fear; and society bears the costs of operating the criminal justice system (CJS). A guiding assumption in this analysis, then, is that the purpose of the CJS is to minimize the social cost of crime. This assumption is inherent in the economic approach to crime and the criminal

[1] A more detailed treatment of this topic, especially methodology and results, is the subject of a forthcoming Evaluation Unit Research Report of the same title.

justice system.[2] The remainder of this section presents some of the concepts developed by economists and drawn upon in this paper.

A. The Supply of Offenses

Economists have for the most part viewed offenders as behaving rationally.[3] That is, offenders engage in a rational calculation of the expected benefits and costs of a variety of alternative behaviors; sometimes the optimum choice is one which is deemed illegal by society. The factors which impinge upon an individual's decision-making include policy variables amenable to manipulation, such as the offender's estimate of the probability of apprehension or severity of punishment. Additional relevant variables are age, income level, and other possible determinants of behavior.

The likelihood of any person's commiting an offense depends upon the values of these variables. The relationship among the actual number of offenses and the variables is referred to as the "supply of offenses function," which takes the following form:

(1) $O_j = O_j(X_1, \ldots, X_n)$,

where O_j is the number of offenses commited by the jth person in a given time period, and the X_i are the appropriate variables. This supply function exists in time, as depicted in Figure 1, where the vertical distance measures

[2] For example, see Harold L. Votey and Llad Phillips, "Social Goals and Appropriate Policy for Corrections: An Economic Appraisal," Journal of Criminal Justice, 1 (1973), pp. 219-240. The pioneering work is that by Gary Becker, "Crime and Punishment: An Economic Approach," Journal of Political Economy, 76 (March/April 1968), pp. 169-217. See also R.F. Sullivan, "The Economics of Crime: An Introduction to the Literature," Crime and Delinquency, 19 (April 1973), pp. 138-149.

[3] Becker, op. cit.; I. Ehrlich, "Participation in Illegitimate Activities: An Economic Analysis," Journal of Political Economy, 81 (May/June 1973), pp. 521-565.

the number of offenses per time period and the horizontal distance is time. That portion of time from t_{0-n} to t_0 represents a period prior to coming within the jurisdiction of the Corrections Department. The line labelled 0 indicates actual offenses committed by the individual during this pre-treatment period.

The "economic" model suggests that the Corrections Department seeks to alter the values of the relevant policy variables to achieve a reduction in the number of offenses per time period, that is to reduce 0. During the treatment period, the actual number of offenses might be represented by 0^*. In the post-treatment benefit period, offenses are measured by $\hat{0}$. From t_0 to t_{1+m}, 0 is the predicted, rather than the actual, number of offenses.

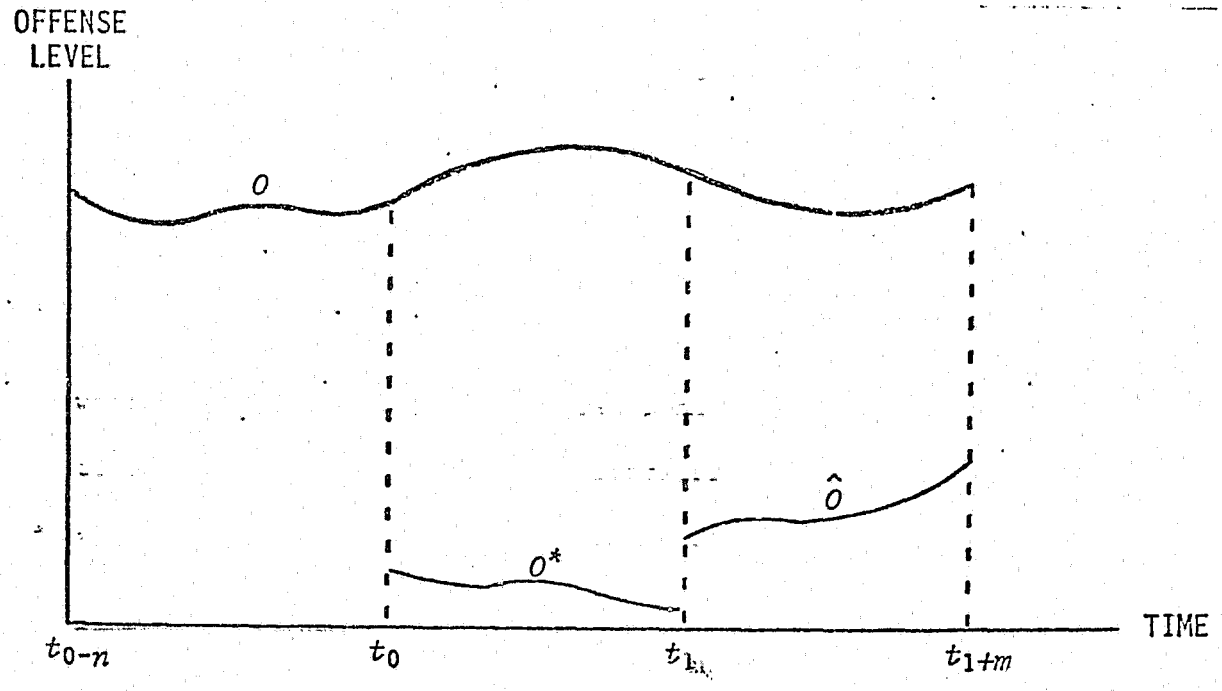

FIGURE 1: Actual and Predicted Offense Levels: Impact of Treatment.

B. Output Determination

Now it is possible to identify a possible output measure for the

Corrections Department. Specifically, recidivism prevented is the measure. More formally, output can be indicated by:

$$(2) \quad R = \int_{t_0}^{t_1} (O_t - O_t^*)dt + \int_{t_1}^{t_{1+m}} (O_t - \hat{O}_t)dt,$$

that is, the total difference between predicted and actual recidivism beginning with the initiation of treatment.

Each treatment mode -- i.e., prisons, community corrections, parole -- consists of a unique process or series of techniques designed to reduce recidivism for each offender. This can be represented by a "production function,"

$$(3) \quad R_i = R_i(P_i),$$

which simply indicates that, given the budget, a treatment mode i can treat P_i offenders to achieve an output of R_i.[4] The total output for the Corrections Department in this case is the sum of the outputs of all treatment modes.

C. Cost Determination

A major constraint operating upon the Corrections Department is its budget. In a given time period, usually a fiscal year, this is relatively fixed, say at B. Then the total costs of treating offenders in all treatment modes cannot exceed B. The costs at each treatment mode depend on the treatment population:

$$(4) \quad C_i = C_i(P_i).$$

The C_i are the treatment mode cost functions. It follows, then, that in this

[4] A production function is more typically of the form $R = R(X_1, X_2, \ldots X_n)$ where the X_i are productive factors such as labor and capital. The assumption implicit in the function used here is that the productive factors are themselves functions of the offender population. That is, if $R = F(L,K)$ and $L = L(P)$, $K = K(P)$, then $R = R(P)$.

case,

(5) $B = \Sigma C_i$.

It will be useful at this point to define several different cost concepts.

(1) Fixed and Variable Costs. A fixed cost is any cost that will remain the same even though the client population within a correctional alternative is changing. For example, a project director's salary would remain fixed even though the number of clients in the project goes up or down during the course of the year. Any cost which fluctuates in response to changes in the client population is considered a variable cost. Food costs are considered variable, since if one client is added to a program or project, s/he must be fed, and therefore food costs will rise.

(2) Very Short-Run Costs. If project or program expenditures are viewed on a short-term basis (for example, week-to-week), the only costs which will be variable are the direct costs of maintaining each client. Food, clothing, medical care and other expenditures that are directly attributable to a particular client would all be variable in the very short run.

(3) Short-Run Costs. If a longer-term perspective is used (for example, month-to-month), then other costs are considered variable. For example, in the very short run, all staff costs can be considered fixed, since no increase or decrease in staff can be expected to result from even a large temporary deviation from the average daily number of clients in the project. In the short run, however, if the deviation persists, new staff might be hired in order to handle the additional load. Thus, some salary costs will be considered variable in the short run, but not all (e.g., the project director's salary will still be fixed).

(4) Long-Run Costs. In the long run (year-to-year, or longer), all costs are considered variable by definition. For example, even rental costs may move up or down if a project is relocated in a different area. Similarly, all staff costs are variable since drastic increases or decreases in staff size may occur as the result of a change in program philosophy or techniques. The long run also takes into account the replacement cost of capital used in a project once it has worn out. For example, in the very short run or short run, the cost of acquiring a vehicle would have to be considered fixed since it will not change later on as a result of increasing or decreasing the client population. However, in the long run one must take into account the fact that the vehicle must be replaced after its usable lifetime is over.

In the long run, a discount rate is used to reflect the "opportunity cost" of funds spent (or rental earnings foregone) on capital used in correctional programs. For example, if the state purchases a house to be used as a residential facility for adult offenders, then the "opportunity cost" of the house is the purchase cost plus an amount equal to the earnings which could have been obtained by investing the funds in some other activity (e.g., long-term Federal Treasury bonds). Even if the house is donated, this opportunity cost still exists, for in the absence of using the facility for corrections, the house could have been earning rent for its former owner or for the state, so the "cost" remains even though the state did not formally pay for the building. The discount rate may be viewed either as the income that could have been earned by using the house for something besides a correctional facility or as the amount of interest the state must pay over the lifetime of the facility if funds were borrowed to purchase it.

(5) Social Costs. Social costs refer to all money and nonmoney costs of undertaking an activity, including the "opportunity costs" of all productive factors. Opportunity cost is the valuation of a factor in its best alternative use. A social cost is incurred whenever there is a net transfer of goods or services between nonfamily members. For example, if individual A donates an hour of his/her time to help individual B, then the opportunity cost, and hence a portion of social cost, of that action is equivalent to whatever A could have earned in the same amount of time. If A could have worked overtime for $5.00 an hour, then the opportunity cost of her/his one hour of donated time is $5.00 since that is what s/he could have earned had he not helped B. However, if individual A donates 1 hour of time to B in exchange for a $5.00 piece of jewelry, no social cost is incurred since A and B are both equally well-off as before the exchange (assuming that A values the piece of jewelry at exactly $5.00). In this analysis, those who donate small amounts of leisure time for helping others are not assumed to incur a cost (e.g., Big Brothers, etc.). However, those who are publicly subsidized to make donations of time or who spend a large portion of potential working hours donating time are assumed to incur social costs.

D. Output Maximization

The optimality rule for allocating offenders among treatment modes can be obtained by constructing the Lagrangian:[5]

$$(6) \qquad L = \sum_{i=1}^{n} R_i(P_i) + \lambda \left[B - \sum_{i=1}^{n} C_i(P_i)\right]$$

[5]For a discussion of this technique, see J. Henderson and R. Quandt, Microeconomic Theory: A Mathematical Approach, 2nd edition, (New York: McGraw-Hill, 1971).

and differentiating with respect to the P_i, then setting the partials equal to zero.

$$(7) \quad \frac{\partial L}{\partial P_1} = R_1'(P_1) - \lambda\, C_1'(P_1) = 0$$

$$\frac{\partial L}{\partial P_2} = R_2'(P_2) - \lambda\, C_2'(P_2) = 0$$

$$\cdots$$

$$\frac{\partial L}{\partial P_n} = R_n'(P_n) - \lambda\, C_n'(P_n) = 0.$$

It follows from this that

$$(8) \quad \frac{R_1'(P_1)}{C_1'(P_1)} = \frac{R_2'(P_2)}{C_2'(P_2)} = \cdots = \frac{R_n'(P_n)}{C_n'(P_n)},$$

i.e., optimality -- maximum output -- is achieved when offenders are allocated so that the ratio of marginal product to marginal cost is the same in all treatment modes.

This is illustrated diagrammatically in Figure 2, where various combinations of treatment mode population yield various output levels.

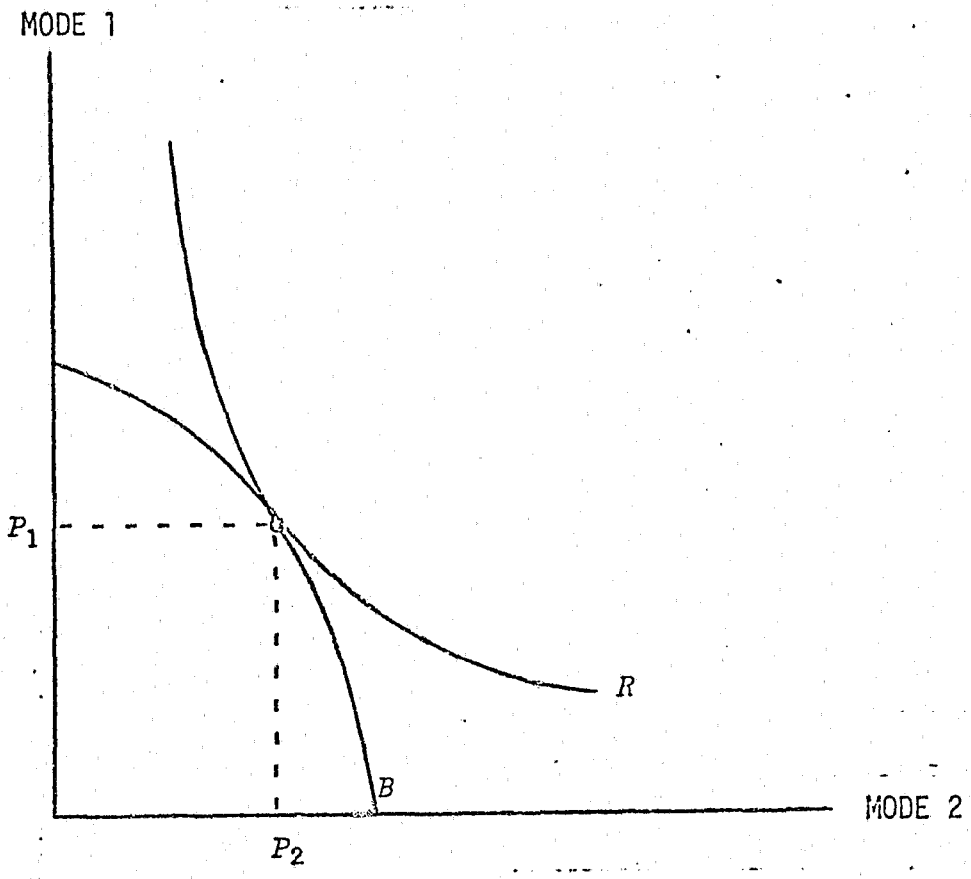

FIGURE 2: CONSTRAINED OUTPUT MAXIMIZATION IN CORRECTIONS

The curved line B represents attainable recidivism reduction, given two treatment modes and the legislative budget. R represents a standard isoquant, a set of different combinations of modes 1 and 2 that yield a constant output, or recidivism reduction.

As drawn, R is the highest output attainable by this corrections department, operating with budget B. The total offender population is allocated

such that P_1 are in mode 1 and P_2 in mode 2. The slope of B at any point is $-\frac{C_2'(P_2)}{C_1'(P_1)}$ and the slope of R is $-\frac{R_2'(P_2)}{R_1'(P_1)}$. At the point of tangency, they are equal, i.e., $\frac{C_2'(P_2)}{C_1'(P_1)} = \frac{R_2'(P_2)}{R_1'(P_1)}$, which is algebraically equivalent to the optimality condition, (8).

III. EMPIRICAL RESULTS

A. Level of Measurement

Any correctional program is made up of three major components. First, there are tasks or activities performed on a day-to-day basis within the program. Second, there are outputs or intermediate products or subgoals which result from the daily activity in the program. Finally, there are outcomes, or final products or goals which represent what a program seeks to achieve. In a prison, for example, the major day-to-day activity is taking care of inmates. An output or intermediate product is "treatment," which begins when an inmate enters the facility and is regarded as completed when the inmate leaves. But treatment is not an end in itself. Treatment is provided in order to achieve a goal or outcome, which in this section is assumed to be reduced recidivism. Thus, one final product or outcome of a prison system is reduced recidivism. Table 1 outlines alternative ways of conceptualizing the distinction between inputs, outputs, and outcomes. Only the results pertaining to the third alternative are reported here.

TABLE 1

CONCEPTS USED IN COST-EFFECTIVENESS ANALYSIS

	FOCUS OF ANALYSIS		
	HOW	WHAT	WHY
ALTERNATIVE CONCEPTUAL-IZATIONS:	Activity Task Inputs Inputs	Objectives Subgoals Intermediate Products Outputs	Goals Final Goals Final Products Outcomes
EXAMPLE:	Group Counseling Food and Clothing Recreation →	"Treatment" or "Rehabilitation" →	Reduced Recidivism
COST MEASURE:	Input Cost	Output Cost	Outcome Cost
EXAMPLE:	Cost per Day	Cost per Case	Cost per Reduced Arrest

B. Outcome Costs

Cost figures were obtained from a variety of sources, including institutional budgets, project surveys, and other studies. Costs per client treated were calculated, and here these are tied to recidivism data to show how outcome costs may be used as a basis for policy decision-making. Table 2 illustrates the methodology used for estimating cost per reduction in recidivism in juvenile correctional programs. This same approach is applicable to adult corrections.

Costs per reduction in recidivism are calculated for five measures of recidivism by juveniles: offenses sustained, offenses filed, nonstatus offenses sustained, seriousness of offenses sustained, and severity of offenses sustained.[6] The results in Table 2 show that, for clients who have never been institutionalized, under all five measures of recidivism, probation appears to be more cost-effective than community-based residential

[6]For further clarification of these measures of recidivism, see the discussion of juvenile recidivism in Residential Community Corrections Programs in Minnesota and the Appendix to the forthcoming expanded report.

TABLE 2

COST PER REDUCTION IN RECIDIVISM
FOR CORRECTIONAL ALTERNATIVES

CORRECTIONAL ALTERNATIVE	Cost per Client Treated		Net Reduction in Offenses Sustained Due to Treatment		Cost per Reduced Offense Sustained	Cost per Reduced Offense Filed	Cost per Reduced Nonstatus Offense Sustained	Cost per Reduction in Seriousness of Offenses Sustained	Cost per Reduction in Severity of Offenses Sustained
Juvenile Probation									
Very Short Run	$ 504	÷	4.3	=	$ 117	$ 105	$ 180	$ 4	$ 81
Short Run	504	÷	4.3	=	117	105	180	4	81
Long Run	661	÷	4.3	=	154	138	236	9	107
Residential Clients--No Prior Institutionalization									
Very Short Run	$ 739	÷	4.2	=	$ 176	$ 154	$ 352	$ 14	$ 101
Short Run	836	÷	4.2	=	199	174	398	16	114
Long Run	3,649	÷	4.2	=	869	760	1,738	68	500
Residential Clients--Prior Institutionalization									
Very Short Run	$ 1,132	÷	6.2	=	$ 183	$ 283	$ 1,415	$ 25	$ 166
Short Run	1,281	÷	6.2	=	207	320	1,601	28	188
Long Run	5,592	÷	6.2	=	902	1,398	6,990	123	822
Juvenile Institutions									
Very Short Run	$ 621	÷	6.3	=	$ 99	$ 109	$ 222	$ 8	$ 65
Short Run	2,597	÷	6.3	=	412	456	928	34	412
Long Run	12,641	÷	6.3	=	2,006	2,218	4,515	165	1,317

treatment. This conclusion holds for the very short run, the short run, and the long run. The results also show that, without exception, institutional placement of juveniles is more cost-effective than residential community corrections projects in the very short run. In contrast, with the sole exception in which recidivism is measured in terms of nonstatus offenses sustained, residential community corrections projects are more cost-effective than are institutions in both the short run and long run. These results cast some doubt on a policy of using community corrections to deal with clients who otherwise would have been placed on probation. They also raise serious questions about the desirability of new construction of juvenile institutions.

This analysis of outcome costs illustrates the utility of combining cost information with recidivism results in order to make cost-effective policy decisions. Further use of this type of analysis, of course, would require extensive involvement of policy decision-makers, so that policies under consideration are certain to be evaluated. Finally, it should also be noted that the utilization of cost-effectiveness analyses ultimately depends upon the extent to which policy decisions will be based on the results of these analyses.

IV. CONCLUSIONS

Public policy-makers are becoming aware of the difficulty of choosing among pressing public policy options. This is particularly the case in the area of criminal justice, an extremely emotional topic for the average citizen. Moreover, since substantial public expenditures are made in this sector, attention to the most efficient and effective means to allocate such resources is imperative. This report has attempted to demonstrate that economic reasoning can be a useful tool in clarifying the issues pertaining to correctional

alternatives.

This genre of analysis highlights factors which are susceptible to manipulation by policy-makers, rather than factors inherent to the clients themselves which are either difficult, or perhaps even impossible, to change or are perhaps not socially desirable as alternatives. In short, economic reasoning offers considerable promise to policy-makers by focusing on the central objectives of the criminal justice system, and then empirically defining these objectives so as to increase the overall productivity of the system.

END