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The theoretical remarks about the shadow economy

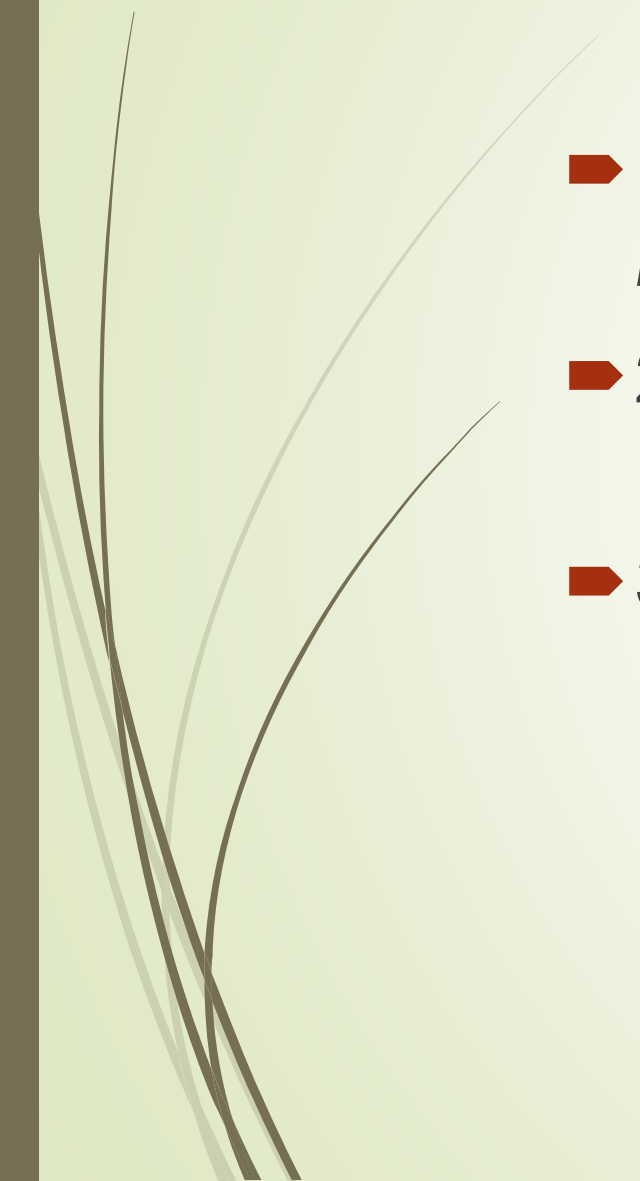
Part VII



ECONOMIC MODELS USED FOR ANALYSIS OF ILLEGAL ACTIVITIES



Outline

- **1. THE MAIN STATEMENTS OF ISAAC EHRlich' S MODEL**
 - **2. CRIMINAL BEHAVIOR AND LIMITED RATIONALITY**
 - **3. OPTIMAL COSTS TO COMBAT CRIME**
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Goal of this lecture:

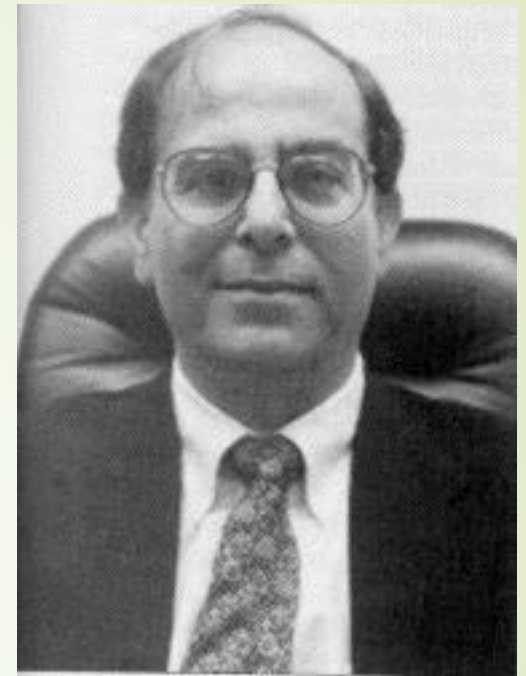
- ▶ Considering the main statements of Isaac Ehrlich' s model
Analyzing the main statements of the model
- ▶ Analyzing the conclusions of Isaac Ehrlich' s model
- ▶ Considering the criminal behavior and limited rationality
- ▶ Analyzing Becker's model on optimal costs to combat crime
- ▶ Defining the tools of restricting criminal activity



Introduction

- ▶ The economic analysis of criminal law began on a very high plane in the eighteenth and early nineteenth centuries with the work of Beccaria and Bentham, but its revival in modern times dates only from 1968, when Gary Becker's article on the economics of crime and punishment appeared. Since then there has been an outpouring of economic work on criminal law, concentrated in the following areas: the optimal tradeoff between certainty and severity of punishment, the comparative economic properties of fines and imprisonment, the economics of law enforcement and criminal procedure, and above all the deterrent and preventive effects of criminal punishment (including capital punishment).

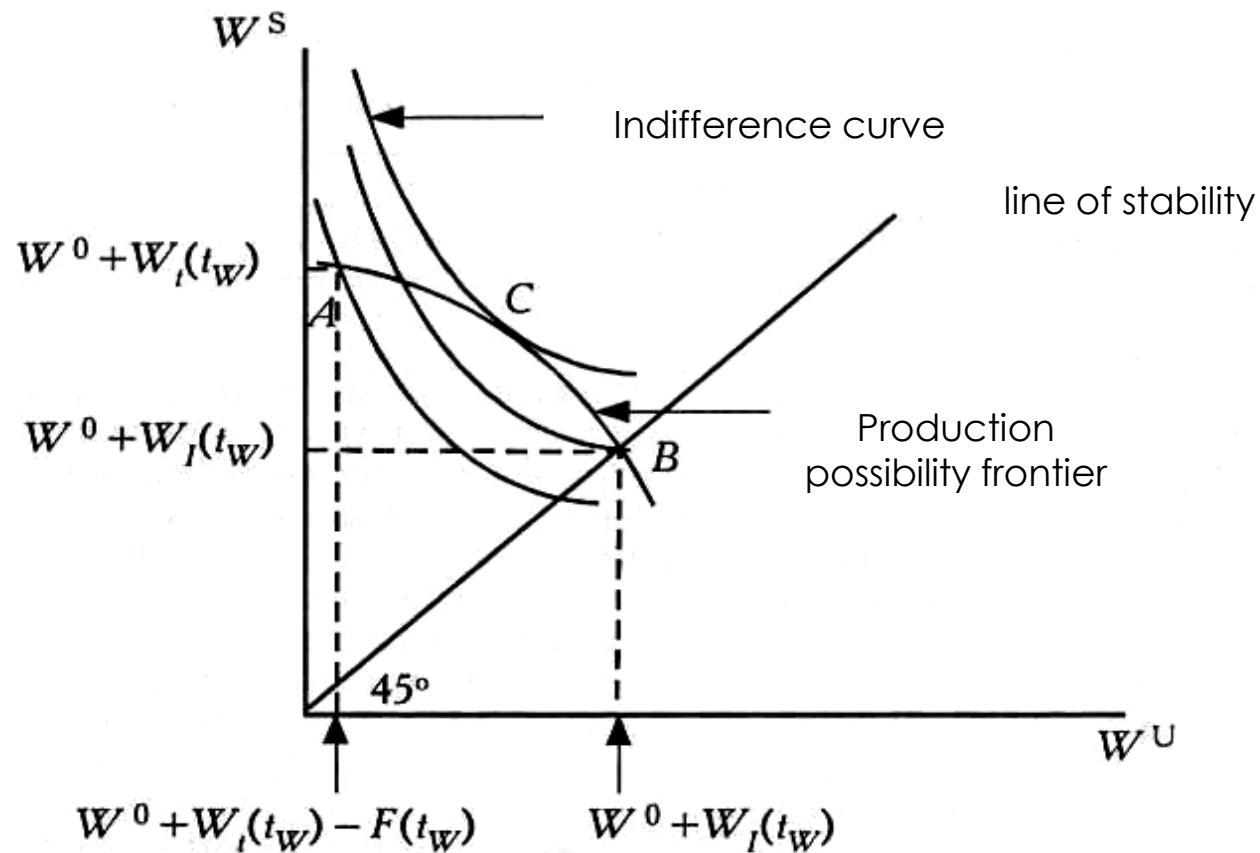
Isaac Ehrlich (born 1938) is an American economist. He has done research in the economics of crime and law enforcement and the economics of deterrence, including the death penalty and its deterrent effects. Ehrlich has served as the Chair of the Department of Economics at the [State University of New York at Buffalo](#) since 2000. His papers on participation in illegitimate activities, corruption and economic growth, insurance and self-protection, the economics of health and longevity, and the death penalty are widely cited. He is widely regarded as an authority on the economics of crime and the death penalty, although his claims regarding the latter have been both vigorously challenged but also corroborated by many researchers. He is also one of the leading authorities on the economics of human capital and serves as the founding Editor-in-Chief of the [Journal of Human Capital](#), published by the University of Chicago Press.



The main statements of Isaac Ehrlich's model

- ▶ 1. An individual can spend his time on engaging in two kinds of income-generating activities: legal and illegal; while both types of activities can be combined by the individual in any proportion.
- ▶ 2. The income from illegal activity is a stochastic magnitude, since there are two possible outcomes: unfavorable for the offender, in which his activity will be suppressed by law and he will suffer punishment, and favorable, in which his illegal activity will not be prevented. The income from legal activity is not a random one.
- ▶ 3. The expected revenues from both activities are monotonically increasing functions of the time that the individual spends on each of them.
- ▶ 4. The perpetrator subjectively assesses the likelihood that he will be detained and will be punished.
- ▶ 5. Punishment of any type can have a monetary value.

The distribution of the individual's time between criminal and legal activities



The model explains the rationality of recidivism: the more time a person spends on illegal activities, the less time he has for legal activities and, consequently, the lesser expected income from activities limited by the law, and the greater the expected income from illegal activity.



Main conclusions

- ▶ **First**, the tendency of individuals to illegal activity is inversely proportional to the expected severity of punishment and the likelihood that the offender will bear this punishment. At the same time, for risk-neutral individuals, an equal increase in the expected probability and severity of punishment will give the same deterrent effect. For individuals who are not prone to risk, the severity of punishment is a more powerful deterrent compared with the probability of its occurrence, for risk-prone individuals, on the contrary, the deterrent effect of increasing the probability of punishment is higher than the deterrent effect of increasing responsibility for the crime committed. Moreover, the strengthening of the expected severity of punishment in some cases can not restrain, but stimulate the criminal activity of risk-prone individuals



Main conclusions

- ▶ **Second**, an increase in the expected returns from illegal activities stimulates individuals (regardless of their attitude to risk) to this kind of activity, while the growth in the expected income from activities within the law (including by reducing the probability for an individual to remain without work), other things being equal, reduces the tendency to criminal behavior.



CRIMINAL BEHAVIOR AND LIMITED RATIONALITY



Sah R. K. statements about crimes in the economy

- 1) the relevant information for the individual is limited;
- 2) the main source is the environment of the individual;
- 3) the current assessment of the probability of punishment p is a reflection of an objective assessment of r , which is more or less remote past, but not real;
- 4) such an assessment may not coincide with an objective assessment of the probability of punishment in the current period, since it can vary from period to period for a variety of reasons.

The probability that an individual prefers to violate the law in the period T is described by the following relationship:

$$\rho(t, T, h, u) \equiv g(\Theta(t), \dots, \Theta(T-1), r(t), \dots, r(T-1), h, u),$$

where t - the first period of life in which the individual begins to make independent economic decisions;

$T-1$ - the period preceding the period T ;

$\Theta(t)$ - crime rate in the period t ;

$\Theta(T-1)$ - crime rate in the $T-1$ period (crime rates in different periods depend on the resources that society spent on combating crime in the relevant periods);

$r(t)$ - the objective probability of punishing the offender in period t ;

$r(T-1)$ - the objective probability of punishing the offender in the period $(T-1)$;

h - an individual parameter reflecting the degree of confidence of the individual in the information coming to him from different sources;

u - "relative utility of the crime"



u - "relative utility of the crime"

$$u \equiv \frac{u_1 - u_0}{u_1 - u_2},$$

where U_0 - the utility of the individual if he refuses to violate the law;
 U_1 – utility of the individual if he commits a crime, but does not bear punishment for him;
 U_2 – utility of the criminal in case he is caught and punished
($u_1 > u_0 > u_2$).



Main conclusions

- **First**, the current tendency of the individual to commit crimes is higher if the level of crime in previous periods was high or the society spent less resources on combating crime.
- **Secondly**, "past crimes generate current crimes", the level of crime in the present period is higher than in previous periods.
- **Thirdly**, if two societies are completely identical in their current parameters, this does not mean that the level of crime in them should be the same, since in previous periods their parameters could differ.




Main conclusions

- ▶ **Fourthly**, within the same society, social groups that are isolated from each other can differ in crime rates, even if they are very similar in their economic or other parameters.
- ▶ **Fifth**, additional funds spent by society to fight crime in the present, contribute to reducing the level of crime not in the present, but in the more or less distant future.




OPTIMALITY CONDITIONS

OPTIMAL COSTS TO COMBAT CRIME



The founder of the economic theory of crime and punishment G. Becker became the first economist who solve the problem of optimizing public expenditures to combate crime.

The relevant parameters and behavioral functions have been introduced, and the stage is set for a discussion of social policy. If the aim simply were deterrence, the probability of conviction, p , could be raised close to 1, and punishments, f , could be made to exceed the gain: in this way the number of offenses, O , could be reduced almost at will. However, an increase in p increases the social cost of offenses through its effect on the cost of combating offenses, C , as does an increase in f if $b > 0$ through the effect on the cost of punishments, bf . At relatively modest values of p and f , these effects might outweigh the social gain from increased deterrence. Similarly, if the aim simply were to make "the punishment fit the crime," p could be set close to 1, and f could be equated to the harm imposed on the rest of society. Again, however, such a policy ignores the social cost of increases in p and f .



What is needed is a criterion that goes beyond catchy phrases and gives due weight to the damages from offenses, the costs of apprehending and convicting offenders, and the social cost of punishments. The social welfare function of modern welfare economics is such a criterion, and one might assume that society has a function that measures the social loss from offenses. If

$$L = D(\Theta) + C(p, \Theta) + bpF\Theta.$$

Here, θ - the number of crimes;

D - social costs of committed crimes;

C - society's costs of combating crime;

p - the average probability of disclosure of the crime (the ratio of the number of crimes solved to the total number of crimes);

F - average cost of punishment for the offender;

b - a coefficient showing how many times the cost of punishment for a company (F') is higher than the costs incurred by the offender in connection with the punishment ($F' = bF$). In other words, $bpF\theta$ - total social costs associated with the punishment of criminals;

$C(p, \theta)$ - a function of the dependence of public expenditure on the capture and exposure of criminals from the number of crimes committed and the level of disclosure;


$D(\theta)$ - the dependence of social losses on crime from the number of crimes committed.

$$\frac{\partial L}{\partial D} > 0, \frac{\partial L}{\partial C} > 0, \frac{\partial L}{\partial (bF)} > 0, \frac{\partial D}{\partial \theta} > 0, \frac{\partial C}{\partial \theta} > 0, \frac{\partial C}{\partial p} > 0.$$

Analytical convenience suggests that p rather than C be considered a decision variable. Also, the coefficient b is assumed in this section to be a given constant greater than zero. Then p and F are the only decision variables, and their optimal values are found by differentiating L to find the two first-order optimality conditions,

$$\frac{\partial L}{\partial F} = D'(\Theta) \frac{\partial \Theta}{\partial F} + C'(\Theta) \frac{\partial \Theta}{\partial F} + bpF \frac{\partial \Theta}{\partial F} + bp\Theta;$$

$$\frac{\partial L}{\partial p} = D'(\Theta) \frac{\partial \Theta}{\partial p} + C'(\Theta) \frac{\partial \Theta}{\partial p} + \frac{\partial C}{\partial p} + bpF \frac{\partial \Theta}{\partial p} + bF\Theta = 0.$$



From here

$$D'(\Theta) + C'(\Theta) = -bpF \left(1 - \frac{1}{\mathcal{E}_F} \right);$$

$$D'(\Theta) + C'(\Theta) + \frac{\partial C}{\partial p} \frac{\partial p}{\partial \Theta} = -bpF \left(1 - \frac{1}{\mathcal{E}_p} \right).$$

The term on the left side of each equation gives the marginal cost of increasing the number of offenses θ : in equation (1) through a reduction in f and in (2) through a reduction in p .

The right-hand sides of these equations reflect the marginal "incomes" of a society from changing these parameters. ε_F and ε_p are the indices of the elasticity of the number of committed crimes according to the severity of punishment and disclosure, respectively.

$$\varepsilon_F = -\frac{F}{\Theta} \frac{\partial \Theta}{\partial F}, \quad \varepsilon_p = -\frac{p}{\Theta} \frac{\partial \Theta}{\partial p}.$$

$$\partial C / \partial p > 0, \quad \partial p / \partial u < 0,$$

$$D'(\Theta) + C'(\Theta) > D'(\Theta) + C'(\Theta) + \frac{\partial C}{\partial p} \frac{\partial p}{\partial \Theta}.$$

Marginal cost
Marginal revenue

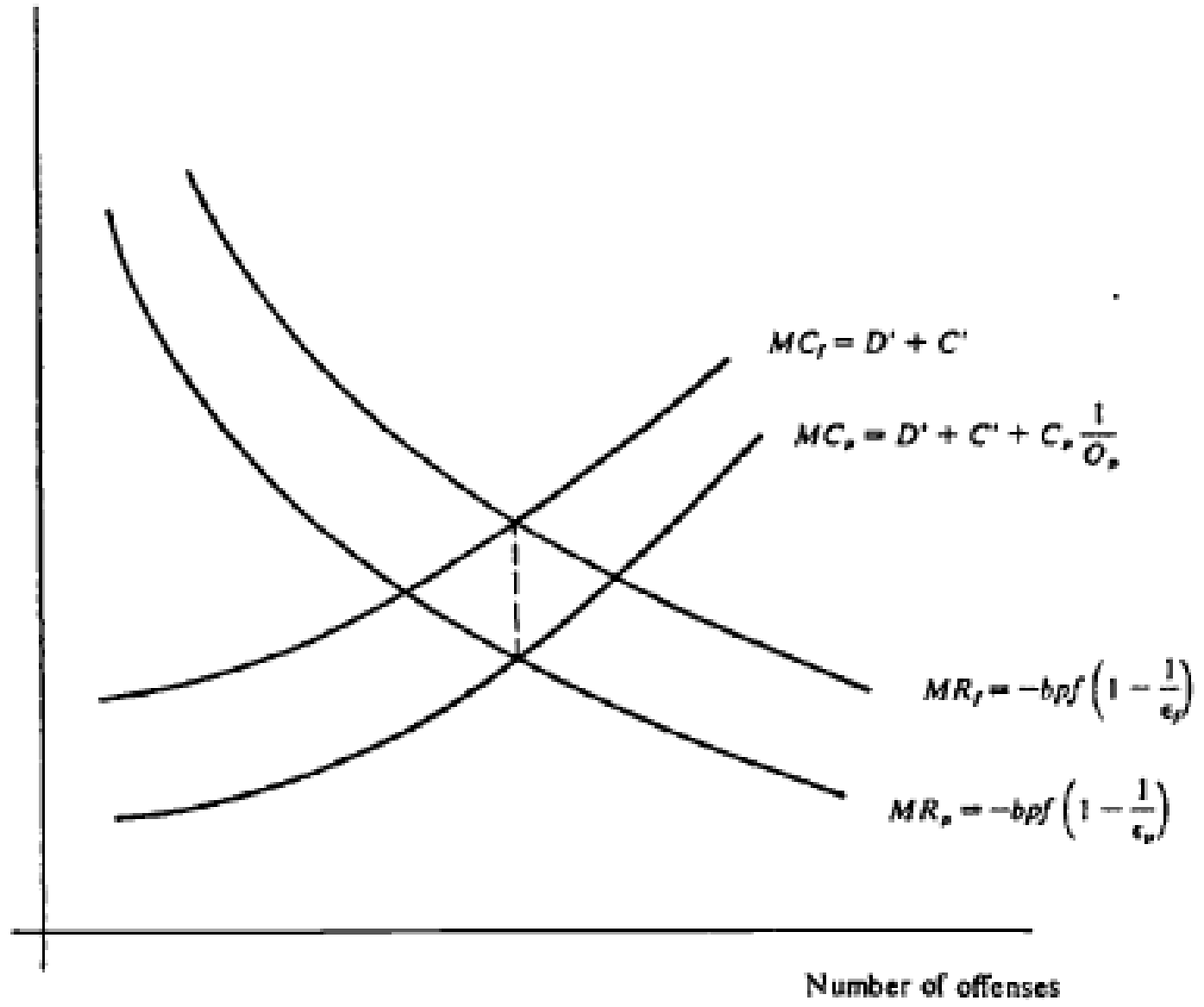




FIGURE 1



Since $C' > 0$ and θ is assumed to be in a region where $D' > 0$, the marginal cost of increasing θ through f must be positive. A reduction in p partly reduces the cost of combating offenses, and, therefore, the marginal cost of increasing θ must be less when p rather than when f is reduced (see Figure 1); the former could even be negative if p were sufficiently large. Average "revenue," given by $-bpf$, is negative, but marginal revenue, given by the right-hand side of equations (1) and (2), is not necessarily negative and would be positive if the elasticities were less than unity. Since the loss is minimized when marginal revenue equals marginal cost (see Figure 1), the optimal value of Cf must be less than unity, and that of elasticity could only exceed unity if C , were sufficiently large. This is a reversal of the usual equilibrium condition for an income-maximizing firm, which is that the elasticity of demand must exceed unity, because in the usual case average revenue is assumed to be positive.



Since the marginal cost of changing θ through a change in p is less than that of changing θ through f , the equilibrium marginal revenue from p must also be less than that from f . But equations (1) and (2) indicate that the marginal revenue from p can be less if, and only if, $\varepsilon_p > \varepsilon_f$. As pointed out earlier, however, this is precisely the condition indicating that offenders have preference for risk and thus that "crime does not pay." Consequently, the loss from offenses is minimized if p and f are selected from those regions where offenders are, on balance, risk preferrers. Although only the attitudes offenders have toward risk can directly determine whether "crime pays," rational public policy indirectly insures that "crime does not pay" through its choice of p and f .

Two important conclusions for the effectiveness of government policies to combat crime

- **Firstly**, since according to the very plausible premise of Becker, an increase of 1% of the severity of punishment for the perpetrator of the crime will cost society cheaper than the same increase in the probability of punishment, if criminals were neutral to risk, the aggregate society's losses from crime would be minimal for $p \rightarrow 0$ and $F \rightarrow \infty$. However, guided by the criterion of minimizing the social losses from crime, it is advisable to increase the severity of the punishment only to the point at which the limiting effect of increasing gravity will equal the marginal effect of increasing the probability of punishment. The existence of this equilibrium point is due to the diminishing returns characteristic of both these ways of containing criminal activity.

Two important conclusions for the effectiveness of government policies to combat crime

- **Secondly**, the most socially effective means of punishing criminals, according to Becker, are fines, as for penalties $b \rightarrow 0$, while for other types of punishment $b \geq 1$: "Fines have a number of advantages over other forms of punishment: they save resources, simultaneously compensate the society for the damage and punish the criminals, and also simplify the definition of optimal p and F ". However, fines can not be a universal punishment for criminals, because abstracting from the social costs associated with this type of punishment is possible only if the amount of the fine is much less than the income of the person who violated the law. In general, public expenses for imposing a fine are directly related to the size of this fine.




argument against fines

One argument made against fines is that they are immoral because, in effect, they permit offenses to be bought for a price in the same way that bread or other goods are bought for a price. A fine can be considered the price of an offense, but so too can any other form of punishment; for example, the "price" of stealing a car might be six months in jail. The only difference is in the units of measurement: fines are prices measured in monetary units, imprisonments are prices measured in time units, etc. If anything, monetary units are to be preferred here as they are generally preferred in pricing and accounting.



argument against fines

Another argument made against fines is that certain crimes, like murder or rape, are so heinous that no amount of money could compensate for the harm inflicted. This argument has obvious merit and is a special case of the more general principle that fines cannot be relied on exclusively whenever the harm exceeds the resources of offenders. For then victims could not be fully compensated by offenders, and fines would have to be supplemented with prison terms or other punishments in order to discourage offenses optimally. This explains why imprisonments, probation, and parole are major punishments for the more serious felonies; considerable harm is inflicted, and felonious offenders lack sufficient resources to compensate. Since fines are preferable, it also suggests the need for a flexible system of instalment fines to enable offenders to pay fines more readily and thus avoid other punishments.



Those punished would be debtors in "transactions" that were never agreed to by their "creditors," not in voluntary transactions, such as loans, for which suitable precautions could be taken in advance by creditors. Moreover, punishment in any economic system based on voluntary market transactions inevitably must distinguish between such "debtors" and others. If a rich man purchases a car and a poor man steals one, the former is congratulated, while the latter is often sent to prison when apprehended. Yet the rich man's purchase is equivalent to a "theft" subsequently compensated by a "fine" equal to the price of the car, while the poor man, in effect, goes to prison because he cannot pay this "fine."



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