Economics of Crime: Basic models of the criminal system

Economic concepts of crime

- Positive economic analysis:
  - Useful for analyzing any type of illegal behavior
  - The law imposes a ``price'' on such behavior
  - Irrespective of the type of law or harmfulness/harmlessness of the behavior
  - E.g. drunk-driving under administrative/criminal law; distributing Charter08 in China

- Normative analysis
  - Crime = externality
  - Optimal policy against harmful behavior (criminal sanctions? Administrative sanctions? Tort law?)
  - Victimless crimes - problematic

Crime and policy choices

- Crime is costly

- Fighting crime is costly

- Alternative policy tools
  - Deterrence (police, court, prisons, fines)
  - Reducing illegal gains
  - Increasing legal gains (education, labor market policies)
  - Medical treatment

- Economics provides a framework for assessing effectiveness of alternative policies

Crime and policy choices

- Normative question: should the government spend more on police or prisons?

- Positive question: Which of the two measures will bring a greater reduction in crime?

- Inevitably an empirical question => necessary to know the magnitudes of the effects

Key concepts

- Economic concept of "crime"

- Deterrence

- (sufficiently) rational criminals

- Assessing trade-offs between crime-fighting policies

Aim of models and economics modeling

Why do we need models?

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- ▶ We need to find out all relevant facts answering our questions.
- ▶ Finding the source of variance in the data.
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    - ▶ How often, on average, people go to shop for groceries.

Workhorse of Economics of Crime: Becker's model

Gary S. Becker, Crime and Punishment: An Economic Approachm Journal of Political Economy 76, no. 2 (Mar. - Apr., 1968): 169-217.

Becker (1968): What is the socially optimal level of crime deterrence?

- What are the values of p (the probability of catching and convicting criminals) and f (the punishment imposed on criminals when caught) that optimally deter criminals from committing crime?

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- When we increase p or f, we must trade-off the benefits of reduced crime against the higher costs of apprehension or punishment.

Assumptions I.

Let O be the number of offenses.

i) $H = H(O)$, $H' > 0$ be the total social harm from offenses, which is increasing in the number of offenses.

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iv) The costs apprehension (detecting, catching and convicting criminals, or put simply, the costs of police) is $C(p, O)$ where:

$$
\frac{\partial C}{\partial p} = C_p > 0
$$
$$
\frac{\partial C}{\partial O} = C'_O > 0
$$

Assumptions II.

v) The criminals are rational and they have full information about the probability of being caught and the resulting penalty if caught. An individual j has a private supply function of offenses:

$$O_j = O_j(p_j, f_j, y_j)$$

where p is the probability of being caught and convicted, f is the punishment, and y is a vector of all other relevant variables, such as moral objections against crime, earning opportunities in the private sector, etc.

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vi) The aggregate supply of offenses is $O = O(p, f, Y)$

Assumptions III.

vii) Any punishment can be expressed in a monetary equivalent, so from the offender's perspective, we can treat punishments as fines. However, different forms of punishment have different social costs for a given cost to the offender. If the cost to the offender is f, the cost to society is bf, $b \geq 0$. For fines, $b = 0$, since fines represent a pure transfer from the criminal to the state without any social cost (realistically, b is somewhat greater than zero even for fines since there are some administrative costs of collecting the fines). For prisons, $b > 1$ since the prisoner suffers a loss f plus the state spends resources on prison buildings, guards etc.

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viii) There is some exogenously given maximum possible level of punishment, $f_{\max}$. If the punishment takes the form of a fine, the criminals are able to pay $f_{\max}$.

Solving the model

The ideal criminal justice system should look like:

$$\min_{p,f} L = D(O) + C(p, O) + bpfO$$

Why?

Look at the assumptions again.

Solving the model

The ideal criminal justice system should look like:

$$\min_{p,f} L = D(O) + C(p, O) + bpfO$$

We take the derivative with respect to p and f and set it equal to zero (second order conditions?).

$$\frac{\partial L}{\partial f} = D'O_f + C_O O_f + bpO + bfpO_f = 0$$

$$\frac{\partial L}{\partial p} = D'O_p + C_O O_p + C_p + bfO + bfpO_p = 0$$

Working with solution

which can be expressed in terms of elasticities

$$D' + C_O = -bfp\left(1 - \frac{1}{\varepsilon_f}\right)$$

$$D' + C_O + \frac{C_p}{O_p} = -bfp\left(1 - \frac{1}{\varepsilon_p}\right)$$

where

$$\varepsilon_f = -\frac{\partial O}{\partial f}\frac{f}{O}$$

is (the absolute value of) the elasticity of offenses with respect to fines and

$$\varepsilon_p = -\frac{\partial O}{\partial p}\frac{p}{O}$$

is (the absolute value of) the elasticity of offenses with respect to the probability of conviction.

Solution and what does it says?

$$D' + C_O = -bfp\left(1 - \frac{1}{\varepsilon_f}\right)$$

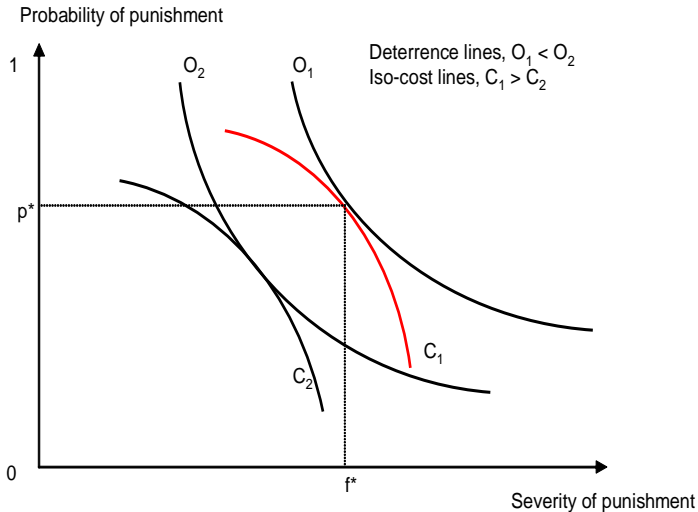$$D' + C_O + \frac{C_p}{O_p} = -bfp\left(1 - \frac{1}{\varepsilon_p}\right)$$

Looking at the signs, following holds for the elasticities:

$$\left(1 - \frac{1}{\varepsilon_f}\right) < 0 \Rightarrow \varepsilon_f < 1$$

$$\left(1 - \frac{1}{\varepsilon_p}\right) < 0 \Rightarrow \varepsilon_p < 1$$

$$\varepsilon_p > \varepsilon_f$$

In an efficiently designed system, **criminals are more sensitive to the probability of punishment rather than its severity.**
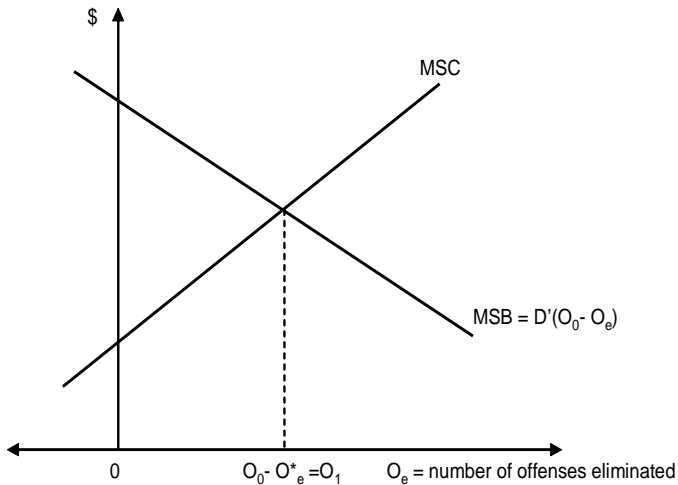
Graphical representations

Figure: Trade-offs between policy measures

Probability of punishment

Deterrence lines, $O_1 < O_2$
Iso-cost lines, $C_1 > C_2$

O_2

O_1

1

p^*

C_1

C_2

0

f^*

Severity of punishment

Graphical representations

Figure: Marginal social costs and benefits of crime reduction

MSC

MSB = $D'(O_0 - O_e)$

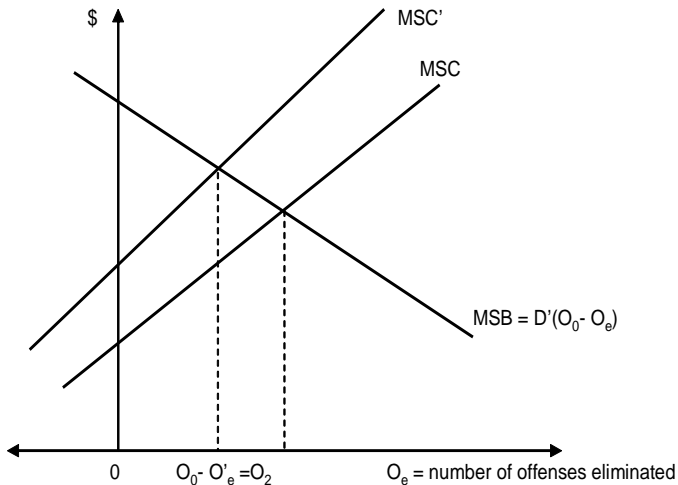0 $O_0 - O^*_e = O_1$ O_e = number of offenses eliminated

$\$

Graphical representations

Figure: Response to democracy: adjustment of p and f
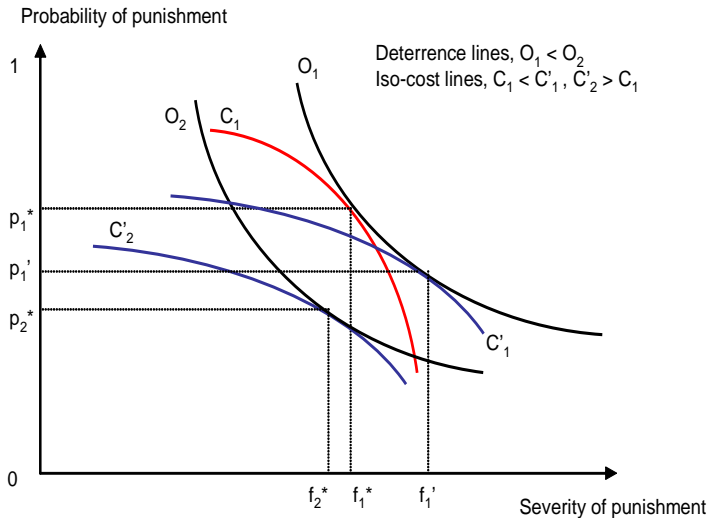
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Figure: Response to democracy: adjustment of crime

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2. Since $C > 0, C' > 0$, the socially optimal number of offenses is positive.

3. For more harmful types of crime (those with higher D') both the probability and the punishment are higher.

4. Exogenous reduction in $p \implies$ higher f.

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3. We can reduce crime not only by conviction and punishment, but also by improving the legal earnings opportunities of criminals, education, etc. - anything that changes the environmental variable Y.

4. What should be the optimal policy? Model tends to recommend server f, low p, trade-offs in costs

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- ▶ Fines are, in fact, expensive to collect because we do not perfectly observe the wealth of criminals. A person committing crime can "insure" himself against the risk of paying fine by nominally transferring his property to relatives etc. The fine may exceed the criminal's wealth.

- ▶ Not much evidence on substitution between p and f (officially)

Extensions of Becker's model:

Why do we see mild punishments?

- **Marginal deterrence** Stigler (1970). If all crimes were punished by equal (and very high) punishment, then once you commit one crime, the marginal costs of committing other crimes is zero. The current punishment structure deters people from committing worse and worse crimes.

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- ▶ **Reasonable doubt** Andreoni (1990) - also an implication of the cost of error and reasonable doubt. Standard of proof: **beyond a reasonable doubt**. As the length of prison term goes up, they really want to make sure they are convicting a guilty person $\Rightarrow$ some guilty guys are released $\Rightarrow$ p is a decreasing function of f. You can buy more deterrence by setting a moderate f and not going through much hassle in the courtroom. Extreme example: death penalty.

Why prisons rather than fines?

- **Incapacitation**
- **Judgement-proof problem**: A person whose wealth is less than the fine behaves as if the fine were only equal to his wealth, and so higher fines have no deterrent effect on him. Therefore, prison is a way how to impose a penalty that exceeds prisoner's wealth.
- In a way, **we do not want the punishment to be too efficient.** Fines are a transfer, so the criminal's loss is the government's gain. Fines would therefore give the government an incentive to prosecute and charge higher fines not just to get deterrence, but also to collect money (and be able to tax less). With imprisonment, the criminal loses and the government also loses (because it pays for the costs of prisons). Therefore, the government essentially **"buys deterrence"** and must weigh some costs and benefits (whether it faces the true costs is another question.)

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Heterogeneity among offenders

- **Why higher punishments for repeat offenders?**
- **Rich versus poor offenders.** There is a reason why to punish the rich with shorter prison sentences than the poor: Their value of time is higher, so they suffer more for a given prison term. To get the same deterrence, we should make the sentences declining in wages. On the other hand, there is a reason why to punish the rich more severely: They are better at releasing themselves from being convicted (can hire better lawyers), so they face a lower probability of conviction.

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