Economics of Crime
Illegal markets

1 Illegal markets

It is illegal to produce and/or distribute and/or consume certain goods:

- drugs
- prostitution
- organ transplants
- alcohol in some places at some times
- protected animals or parts of protected animals
- gambling
- ... (depends on the state you live in)

Most of them are **victim-less crimes**, voluntary transactions between buyers and sellers. Making them illegal is very hard to justify on efficiency grounds. Used justifications are **externalities** (my consumption of the good creates costs for the whole society, and that justifies the power of the state to prevent my consumption) and **paternalism** (limiting and correcting irrational behavior - myopia, self-control problems etc).

EVROPSKÁ UNIE
Evropské strukturální a investiční fondy
Operační program Výzkum, vývoj a vzdělávání

MINISTERSTVO ŠKOLSTVÍ, MLÁDEŽE A TĚLOVÝCHOVY

Interesting topics for economics analysis:

- Markets and organization that cannot rely on public law enforcement and courts to settle dispute (violence, reputation contracts etc.).
  - Very popular research has been done on organization and rule enforcement in drug gangs (Freakonomics). There are many policies to discourage cooperation with the government above all.
  - From more ancient times organization of pirates, plundering and corsairs (how to split the loot, how the captain is elected ...).
  - By making activities illegal and therefore public law system unavailable, regulations may severely damage and be less efficient for some actors involved (prostitution, drugs).
- Effects of the prohibitions.
  - Most stellar example is the prohibition of alcohol in U.S.A. Prohibition leads to what theory predicts, increase in price, decrease in availability and profitable opportunities for illegal behavior leading into formation of gangs and clans.
- Optimal public policy.
  - What should be forbidden and why? Does the benefit for the society overweight the cost of enforcement? How to prohibit something? Ban it, enact prohibitive taxes or regulate the supply chain?
- Large costs of enforcement - does it work?
  - War on drugs. Both USA government and Mexican cartels are trapped in ever-escalating cycle of violence. More enforcement -> decreased availably -> increased price and profit opportunities -> more violence and extreme gang activity -> More enforcement.
- Regulatory arbitrage
  - In Czech Republic its illegal to be a pimp, but prostitution is not explicitly illegal. Therefore it's legal to act as a landlord renting the rooms for the independent collective of ladies.
  - Also it illegal to sell marijuana seeds and germinating equipment in the same shop, but I can open the seed shop next door.
  - Grocery stores over certain m^2 have to be closed on public holidays. Therefore I can bar some sections of the shop and split my shop into multiple independent shops in this day.

1.1 Becker, Murphy, and Grossman 2006

Very insightful analysis of the consequences of drug enforcement, implications of cost of enforcement, and derivation of optimal enforcement policy in a market for an illegal good. Intelligent application of the basic supply-demand framework.

Set-up of the model

- For reasons outside of the model, drugs are made illegal. Supplied by a competitive industry with CRS technology (not that crucial for analysis, just simplification). There is a constant unit cost for each unit of drug.
- E... government expenditures on enforcement
- $c(E)$ ... unit cost of the drug, $c' > 0$. Why?
  - Expected punishments for being caught. More enforcement increases the price.
  - Fraction of drugs that is confiscated.
  - Inefficient scale of production.
  - Underground (more expensive) distribution channels (smuggling).
- $D(P)$ ... demand, $D' < 0$
- Full price of the drug is $P_e = c(E)+T$, where T is **cost for users** imposed trough reduced convenience or criminal punishment.
- Without any enforcement, setting up the parameters to $T = E = 0$ price is just $P_e = c(O)$, equal to the unit cost.
- With war on drugs, where $T = 0$ and $E > 0$ price $P_e = c(E)$, $c(E) > c(0)$. $D(c(E)) < D(c(0))$. Therefore less is demanded for higher price, standard supply and demand framework till now.

Unlike a tax, the enforcement raises the real cost of producing and marketing drugs (confiscating and destroying drugs is a clear example). The only exception is punishment of drug dealers by a monetary fine (e.g. a probabilistic tax), which however is not the predominant punishment. Perhaps also bribes to public officials (transfer).

Tax does not affect the real unit cost, imposing the tax reduces quantity produced and therefore the total cost spend on the production of the good.

Enforcement raises the unit cost, all the effects on the total cost are measured by changes in revenue. The total cost may rise or fall depending on whether the revenue rises or falls, i.e., on whether demand is elastic or not.

Let $\triangle x = dx/x$

$$\begin{aligned} \triangle Q &= \epsilon \triangle c \\ \triangle R &= (1+\epsilon)\triangle c \end{aligned}$$

Inelastic demand $\epsilon > -1$: total cost rise, real resources are in fact drawn into the drug business even though the quantity falls.

Optimal enforcement

Like in an externalities problem, the government maximizes social welfare based on the social value of drugs consumed, not on private valuation of drug users. Cutting consumption is an implicit goal since consumption produces an externality.

- $c(0) = c$, the rest of $c(E)$ is derived in the model
- A... private expenditure on avoiding enforcement per unit of output
- E... government expenditure on enforcement per unit of output
- $p(E, A)$ .. probability that a drug producer is caught; in that case they are penalized and drugs are confiscated
- F... monetary equivalent of a punishment to convicted drug sellers per unit of drugs smuggled

Expected unit costs of drugs actually delivered to the market:

$$u = \frac{c + A + p(E, A) F}{1 - p(E, A)}$$

work with the odds ratio

$$\begin{aligned} \theta &= \frac{p}{1-p}, p = \frac{\theta}{1+\theta} \\ u &= \frac{c + A + \frac{\theta}{1+\theta}F}{1 - \frac{\theta}{1+\theta}} = (c + A)(1+\theta) + \theta F \end{aligned}$$

θ has the interpretation of probability of being caught per unit of drugs sold, so the unit cost are linear in the odds ratio.

Producers choose A optimally, market equilibrium:

$$P^*(E) = (c + A^*)(1 + \theta(E, A^*)) + \theta(E, A^*) F$$

E or F have no effect on the equilibrium profits of producers!

Effects of changes in enforcement on equilibrium prices and quantities:

$$\begin{aligned} \frac{dP}{dE} &= \frac{\partial \theta}{\partial E}(c + A^* + F) > 0 \\ \frac{d\ln P}{d\ln E} &= \epsilon_\theta \frac{\theta(c + A^* + F)}{P} = \epsilon_\theta \lambda,\ \lambda < 1 \\ \frac{d\ln Q}{d\ln E} &= \epsilon_d \frac{d\ln P}{d\ln E} = \epsilon_d \epsilon_\theta \lambda \end{aligned}$$

$C(Q, E, \theta)$ ...There's also cost of enforcement, depending directly on the total expenditure, quantity of drugs, and the number of producers caught.

$V(Q)$ ... social value of drug consumption, $V_q < P$, can have $V_q < 0$.

Social objective:

$$\begin{aligned} \max_E V(Q(E)) - u(E) Q(E) - C(Q, E, \theta) &= \\ V(Q(E)) - P(Q(E)) Q(E) - C(Q, E, \theta) &= \end{aligned}$$

First-order conditions:

$$\begin{aligned} V_q \frac{dQ}{dE} - MR\frac{dQ}{dE} - \frac{\partial C}{\partial E} - \frac{\partial C}{\partial Q}\frac{dQ}{dE} - \frac{\partial C}{\partial \theta}\left(\frac{\partial \theta}{\theta E} + \frac{\partial \theta}{\partial A}\frac{dA}{dE}\right) &= 0 \\ C_E &= (V_q - MR)\frac{dQ}{dE} \end{aligned}$$

Marginal cost of enforcement, vs net marginal benefit, which is the benefit from reduced consumption net of the effect on production costs.

Some implications:

Assume $C = 0$ free enforcement. This becomes

$$\begin{aligned} V_q &= MR \\ \frac{V_q}{P} &= 1 + \frac{1}{\epsilon_d} \end{aligned}$$

1. $V_q > 0$ and inelastic demand: impossible as an interior solution, optimal to do nothing. Intuition: drugs have some social value on the margin, by increasing enforcement you cut consumption and thus reduce total value. Since demand is inelastic, by cutting consumption you increase total cost. Extremely likely scenario because all evidence we have so far shows that demand for drugs is sensitive to price yet is inelastic.

   Compare with a tax on an externality: always want to impose a tax if $V_q < P$.

2. $V_q > 0$, elastic demand, $V_q < MR$ at the free-market equilibrium. By cutting consumption you reduce total cost, so it pays to do that as long as $MR \geq V_q$ (destroying less than saving on costs). But need really low V_q. if $\epsilon_d = -1.5$, then $V_q/P = 1/3$ if the optimal policy envolves positive enforcement and positive quantity consumed.

   GRAPH: see figure 2 in the paper

3. If $V_q > 0$, and elastic demand, and $V_q > MR$ at the free-market equilibrium, we can have multiple equilibria. $V_q = MR$ is not the optimum, it's in fact the local minimum. From that point, may either go towards higher quantity, increasing cost at a lower rate than adding social value from higher consumption, or may go towards lower quantity, saving more on costs that what is lost on the value of consumption. Optimal to either do nothing or eliminate all consumption.

   GRAPH: see figure 2 in the paper

   3. $V_q < 0$ more plausible to justify enforcement. You create value by cutting consumption, so you always want to do it when demand is elastic (eliminate all consumption), and can also do it when demand is inelastic up to the point when $MR \geq V_q$

Bring in the enforcement cost:

- one extra reason not to cut consumption
- relationship to the demand elasticity:

$$\begin{aligned} MC_E &= C_E + C_Q \frac{dQ}{dE} + C_\theta \frac{d\theta}{dE} = \\ &= C_E + C_Q \frac{Q}{E} \epsilon_d \epsilon_\theta \lambda + C_\theta \frac{d\theta}{dE} \end{aligned}$$

Marginal enforcement costs are higher if the elasticity of demand is small in absolute value. Spend more on enforcement but the number of units sold does not fall much. If demand is very inelastic, MC may be even negative - so much of a cut in consumption that total cost fall.

Other possible extensions:

Heterogeneous producers:

- Must fight the marginal ones since that will indeed change prices and quantities, even though this would make the infra-marginal suppliers (the mafia kings) richer.

Heterogeneous consumers:

- If consumers differ by their respective elasticities, the most inelastic ones are captures and used on the market to outweigh the enforcement costs imposed on producers.

Big picture and lessons from of the model:

1. The model is a possible explanation of why the war on drugs is such a failure.
   The U.S. governments spend (mid-1990's) $20 billion on drug enforcement, 20% of state and 77% of federal prisoners (180,000 people in total; annualized cost around $7.2 billion). The size of the market is estimated between $10 billion to $40 billion. That has not changed much. Surveys of consumption prevalence do not show a large change (about 35% of high school seniors report using marijuana in the past year). Larger and larger enforcement expenditures, higher P, inelastic demand, more resources flow into the drug business, that also raises the cost of enforcement.

2. Simply can't eliminate the demand if it is inelastic, or you can but needs extreme resources. Trying to change demand from inelastic to elastic needs an intervention on the consumer side (substitutes, discouragement, legalization) that its extremely expensive. Inelastically is the main reasons for enacting "efficient" taxes on other goods.

3. Money taxes preferable to prohibition of production because of the inelastically involved.

4. You can get great insights with a simple supply-demand set-up.

Reading list for this chapter

- Becker, G., Kevin M. Murphy and Michael Grossman: The Market for Illegal Goods: The Case of Drugs, Journal of Political Economy, Vol. 114 (1), 2006: 38-60.
- Miron, J. and Jeff Zwiebel: The economic case against drug prohibition, Journal of Economic Perspectives, Vol. 9 (4), 1995: 175-192.
- Benson, et at: Is property crime caused by drug use or by drug enforcement policy? Applied Economics, Vol. 24 (7), 1992: 679-692.
- Levitt, S. and Sudhir A. Venkatesh: An economic analysis of a drug-selling gang?s finances, Quarterly Journal of Economics, Vol. 115 (3), 2000: 755-789.
- Donohue, J. and Steven Levitt: Guns, Violence, and the Efficiency of Illegal Markets, American Economic Review, Vol. 88 (2), 1998: 463-467.

EVROPSKÁ UNIE
Evropské strukturální a investiční fondy
Operační program Výzkum, vývoj a vzdělávání

MINISTERSTVO ŠKOLSTVÍ, MLÁDEŽE A TĚLOVÝCHOVY

Národohospodářská fakulta VŠE v Praze