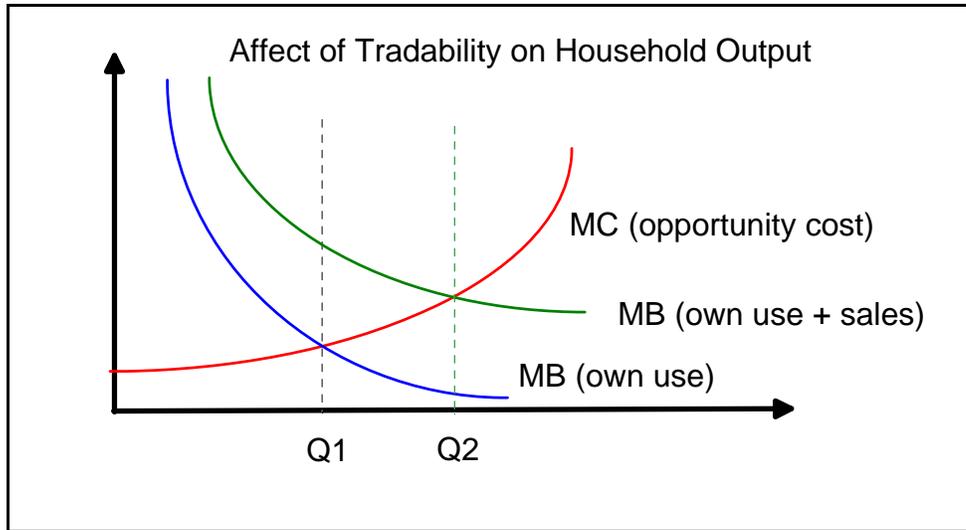


I. Law as a Means of Increasing Specialization and the Productivity of Markets

- A. In the previous lectures, we demonstrated that establishing “rights” to use and exclude can increase economic output by (i) shifting personal resources from unproductive to productive activities (from theft to production) and (ii) encouraging more efficient use of locally available resources (privatizing communal land). We next explore economic reasons why rights associated with exchange and contracts might developed.
- B. The next step in our analysis is to provide an explanation for tradable rights and for places where rights may be sold (stores).
- i. There is a sense in which once rights to use and exclude are established, one might expect trade to take place automatically.
 - But this is clearly NOT the case.
 - For example, most of you have rights to use and exclude others from your bedroom at home (or in your rental housing in Morgantown).
 - Yet few family markets in bedrooms emerges. Indeed, many parents would resist the idea that one of their children might sell their bedroom to his or her brother or sister--and resist even more so the idea of selling one’s bedroom to someone outside the family.
 - Even on smaller portable things, such trades are rare. Children rarely trade their toys to one another, even if it is permitted by their parents.
 - (Note that within families, parents often establish and enforce a family’s intra-familial legal system, which may well be how such systems originated in the distant past.)
 - One can also exclude others from an apartment that one rents, but not be entitled to sell one’s apartment or even sublet it.
 - ii. These examples suggest that tradable rights systems are not always attached to exclusive rights to exclude and use a particular asset. The right to exchange--ability to shifts one’s authority over a good or service to another--is a separate right, not one that is automatically associated with use-rights.
- C. It is likely that “tradable rights” would emerge and be supported in areas of life in which the gains from trade are the greatest and most obvious. The latter suggests that rights to transfer rights would emerge for cases in which physical wealth would be clearly increased by such rules.
- i. Note that mere barter or preexisting goods would not have much affect on physical wealth.
 - There may be gains to trade (improved subjective welfare), but the physical wealth is the same both before and after a trade takes place.
 - This may be one reason why intra-family trading systems are rare.
 - ii. However, in cases in which a tangible output is produced, the opportunity to sell (transfer one’s rights to exclude and use) will increase physical output.
- D. An Illustration: Production and the Right to Sell
- i. Consider the case in which a person makes pots out of clay (a potter).
 - ii. In the absence of the right to sell his or her pots, the potter would make just the number the maximizes his or her household’s net benefits from producing pots for storage and cooking.



- iii. Given the opportunity to trade the pots for other things of value (whether with money or barter transactions), relatively efficient potters would produce more pots and relatively inefficient potters would produce fewer pots but more of other things.
- iv. The figure above illustrates the new net benefits that can be realized when a relatively efficient potter can sell or trade some or all of his or her pots to others. His or her marginal benefits increase from the blue line to the green line, and the quantity of pots produced will increase.
- v. (The marginal cost of producing pots is partly the cost of equipment and clay, but also that it takes time away from other productive activities. Since one can purchase such goods from others who are relatively more productive, the MC of producing pots also tends to decrease somewhat.)
- vi. The right to sell goods that are produced, thus, tends to increase physical wealth and increase specialization.
 - In the illustration, the right to trade one's pots for other things of value (potatoes or wine) increases the potter's output from Q1 to Q2.
 - Note that a similar increase will be induced on the potato farmer or wine maker, who can trade their wine or potatoes for other goods (such as pots).
 - In this manner, allowing exclusion and use rights for produced goods such as pots to be traded tends to increase output as producers produce both for their own use and for markets.
 - Markets for pots evidently emerged very early in human history--well before writing was invented. This is suggested by the fact that remains of ceramic pots that are thousands of years old exist in most parts of the world. Very few such pots would exist without specialization and trade, because of the cost of equipment such as kilns.
- vii. Note that this "trade to wealth and specialization effect" occurs even if not all goods or assets are tradable.
 - The right to sell land, for example, has often been very limited [encumbered] at the same time that produced goods were more or less freely marketed.
 - However, at least two goods have to be tradable for this effect to occur. (why?)

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- viii. Since many things that people use are produced in one way or another, a general right of to sell produced goods will increase outputs of such goods, including intermediate goods that might be used as inputs for productive activities (potter wheels and hunting arrows).
 - Markets for weapons (both defensive and offensive) might also emerge, since most of the tools of war are also produced.
 - The latter provides a **military rationale** for making produced goods tradable, at least within one's community.
 - The military rationale implies that communities that fail to adopt such rights systems (or manage to obtain similar outputs through central planning and coercion) will disappear, which helps explain why so many societies that we are familiar with have legal systems in which produced goods may be traded.
 -
- ix. **Specialization** will take place as people produce for sale or trade, because gains to trade would not exist if everyone produced the same product.
 - Insofar as people learn by doing, MC tends to fall and output is further increased as trading rights become well established over things that are produced.

E. Specialization and the Accumulation of Human Capital

- i. Specialization tends to increase output because it allows one to “learn a trade,” that is to invest in human capital so that one become more productive at a particular production process.
 - Although many early trades did not require a lot of training, it is clear that a potter with training and equipment can produce more and better pots than someone without that training.
 - Similarly, farmers who specialize in a few crops, tend to grow them with greater success than person without as much experience or training.
 - House build by persons specializing in construction tend to build houses that are more durable and more useful than those built by amateurs, again because they have more human capital.
 - Note also that this process of specialization makes efficient use of the distribution of talent within a community. A genius may rapidly learn all the early trades and be competent at them all, whereas an average person may learn just one or two trades, yet do those trades as well as a genius.
- ii. The accumulation of human capital thus tends to increase output, by increasing productivity, which lowers MC in the diagram above.

II. The Productivity of Contracts

- A. A good deal of exchange takes place simultaneously. A seller sells a known product at a known price in money terms. Such trades do not require legal support beyond those of transferable use and exclusion rights. Those receiving payment or goods or services simply have to be able to recognize the net benefits of the goods traded.
 - i. However, not exchanges are simultaneous and not all goods received are easily appraised as to value. In such cases, "promises" will often need the support of civil or criminal law in order for such markets to operate.

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ii. Consider the case in which a payment is made before a services are received. In such cases, there will be a strong temptation for the seller to renege on his or her promise. If such behavior is common place, those sorts of markets will not exist.

iii. Illustration:

Timing Problems: Promises Broken and Potential Gains from Exchange

	Bob Pays Today	Bob Does Not Pay
	(A, B)	
Al Produces Tomorrow	(10, 10)	(-2, 0)
Al Does not Produce	(15, -10)	(0, 0)

iv. In the game above, there is a timing problem.

- Bob pays Al to day in exchange for Al's promise to produce or provide something of value for Bob tomorrow.
- There are gains to trade, as represented in the upper left-hand cell.
- If Al fails to produce, he or she keeps the money and Bob receives nothing of value (lower left-hand cell).
- If Al produces something for Bob that Bob does not pay for, he bears a cost without receiving a benefit (upper right-hand cell).
- If nothing is produced and nothing is purchased, then no gains are realized relative to the status quo (lower right-hand cell).

v. Notice that the payoffs imply that only a single Nash equilibrium exists for this type of market, namely the one in which exchange does not take place.

- At the Nash equilibrium there are unrealized gains to trade. $(10,10) > (0,0)$
- Without some kind of enforcement of Al's promise, such "futures markets" will not exist and a variety of potential gains to trade will go unrealized.

vi. Promises can be enforced in a number of ways, not all of which require a legal system.

vii. However, a legal system is one method of solving the problem--and it may be the only one when the temptation to renege on promises is very large.

viii. The effect of enforcement can be represented as a fine on the profits Al would realize by renegeing on his promise. (His payoff in the lower left-hand cell falls from 15 to $15-F^e$.)

Solving Timing Problems with a Legal System

	Bob Pays Today	Bob Does Not Pay
	(A, B)	
Al Produces Tomorrow	(10, 10)	(-2, 0)
Al Does not Produce	$(15-F^e, -10)$	(0, 0)

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- ix. If the expected fine or other penalty is large enough $F^e > 5$, another equilibrium emerges in which Al keeps his or her promise.
- The upper left-hand cell where both benefit from exchange.
 - If $F^e = PF$, where P is the probability of being punished for violating a promise, the fine (F) will have to be larger than the temptation to discourage renegeing on promises in such markets, unless every breach of promise is punished (unless $p = 1$).
 - Discuss how social norms and reputation may also encourage persons such as Al to keep their promises.

B. Another type of market transaction in which enforced promises (contracts) can be useful is that required to realize the benefits of "team production."

- i. Team production occurs when a group of individuals can produce more of a desired output than possible the group members can acting alone.
- To benefit from team production, a variety of problems have to be solved.
- ii. Two that are especially important are the contract problem and the shirking problem.
- The contract problem is similar to that developed in the previous example, except in this case team member provide a service (work) before being paid for their work. If the promise to reward people for their work is routinely broken team production would rarely be used.
 - A second problem, is the shirking problem. To get team members to work productively rather than goof off (shirk) requires a conditional reward system (conditional contract) of some kind.
 - There are more or less "efficient" ways to divide up the teams output, which is to say some sharing rules generate more output from the team than others.

C. An illustration of the shirking problem and how shirking can be reduced through conditional shares of team output.

- i. The game matrix below illustrates why a simple sharing rule may not solve a team's shirking problem, even if the promises made to team members are kept.
- The team's output is assumed to be $1.5(L_a + L_b)$ where L_a is the number of hours worked by Al and L_b is the number of hours worked by Bob.
 - Under an equal sharing rule, each person gets half of the output = $0.75(L_a + L_b)$
 - The opportunity cost of working, the members cost of labor, is assumed to be $4 - L$
 - Their net benefits from working are thus: $NB(L) = 0.75(L_a + L_b) - (4 - L)$
 - The payoffs in the matrix are simply the net benefits realized by the each of the team members for different combinations of hours worked.
 - (The algebra needed to produce the payoffs is pretty straight forward, but no necessary to understand the dilemma.)

A Team Production Problem					
(Shirking or Free Riding, with an equal shares contract)					
		Bob's effort at production			
Al's effort		0 hours	1 hour	2 hours	3 hours
0 hours		4, 4	4.75, 3.75	5.5, 3.5	6.25, 3.25
1 hour		3.75, 4.75	4.5, 4.5	5.25, 4.25	6, 4
2 hours		3.5, 5.5	4.25, 5.25	5, 5	5.75, 4.75
3 hours		3.25, 6.25	4, 6	4.75, 5.75	5.5, 5.5

-
- The result is a “shirking dilemma.”
- The upper lefthand cell is the Nash Equilibrium of this game.
- “Too little” time is invested in team production, because both would benefit if they each worked harder, but there is no incentive to do so given the efforts of the other team member.
-
- (Note the similarity between this game and the Hobbesian conflict game. In both cases, too little time was spent in the productive activity.)

D. Once contract laws exist and it can be taken for granted that they will be enforced, incentives to use contracts to solve problems like the above emerge.

E. One possible solution that might be accepted by all team members would be to pay persons according to how many hours (or how hard) each person worked on team production.

- i. An hourly wage of \$1.25/hour would generate a new payoff matrix with a better equilibrium.
 - Moreover, there is a residual that could be used to pay for organizing this system. If each person works 3 hours, they produce $1.5(3+3) = 9$, but are only paid $(1.25)(3+3) = 7.5$.
 - So 1.5 units of net benefits (dollars) are available for covering the cost of this more complicated payment system and/or for rewarding an entrepreneur who figures a contract (like the wage contract) that does so.
- ii. Of course, if an entrepreneur did so, his wage contract would still have to be enforced.
 - This might be a matter of community law, as is often the case.
 - However, not every contract is enforced solely through formal legal codes and court systems.
 - Keeping one's promises would be wise (long run net benefit or profit maximizing) if the same sort of transaction happens repeatedly.
 - In such cases, “continuous dealings” where each player decides whether to participate on this team or not depending on whether team members have been properly paid in the past encourages entrepreneurs to keep their promises. If it was widely known that they did not, no team members would join their firms/organizations.

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- (In most cases, enforcement is a mixture of private contract design, continuous dealings, and court proceedings.)
- iii. Specialization may occur among teams (different teams may produce different goods and services) and also within teams.
 - “Team production” often involves specialization among team members, as on sports teams. In such cases, it would be more difficult to substitute one team member for another and more important that the team production problems be solved.
 - Because enforceable contracts encourage specialization and innovations in contracts, such “labor contracts” tend to further increase output by reducing production costs and increasing specialization.
- iv. (The fact that we do not routinely use court systems suggests that there are margins at which norms of honesty, continuous dealings, and posting bonds operate. Yet if courts help, it must be the case that in at least some important cases, such informal systems of enforcement fail to solve all such problems. Discuss what these might be. Use a game matrix to illustrate cases in which norms work and in which they fail.)

F. SUMMARY: To this point, we have found that there are **economic, social net benefit, and Paretian rationales** for legal systems that (i) give use and exclusion rights to individuals (or small groups) over land, (ii) the creation of transferable rights of use and exclusion for goods and services that are produced, and (iii) make promises (contracts) enforceable, by threatening fines or imposing other fees on persons who violate (renege) on their promises (contracts).

- Communities that have such systems will tend to be far more prosperous than those that do not.
- Such communities will also tend to be better able to defend themselves from attacks than ones with fewer resources.
- Both these effects tend to make such communities more likely to survive in the long run.
- i. Thus through “survivorship” and also through incentives to copy legal systems that work, such property systems would tend to become more and more common through time.
 - [In this sense at least, they may be regarded as “natural rights.”]
- ii. We next examine in a bit more detail how formal law-enforcement systems operate.

III. On the Economics of Judicial Systems: the Economics of the Courts and Police

A. At this point in the course, it is time to think about formal mechanism for enforcing the above rights systems.

B. From the analysis developed to this point, it is clear that communities devise formal enforcement systems will tend to be far more prosperous than those that do not.

- i. Productive activities, specialization, and team production are encouraged through such systems.
- ii. Prosperous communities are also better able to defend themselves from attacks (and also to attach their neighbors (although they may also attract more such attacks).
 - These effects tend to make such communities more likely to survive in the long run.

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- iii. Thus through “survivorship” and also through incentives to copy legal systems that work, such property systems would tend to become more and more common through time.
 - [In this sense at least, they may be regarded as “natural rights.”]
 - The provides a partial explanation for the fact that so many ancient and contemporary societies have adopted various forms of court proceedings as a method of enforcing property and contract systems of law.
- C. How to enforce such rights is by no means obvious, and most societies have developed complex court and police systems to do so.
 - The systems in place separate judicial from policing activities.
 - The systems in place use “hearings” at a particular place to determine “the facts.”
 - The systems in place use testimony from the persons directly involved and other “witnesses” who have information that is relevant for determining whether a crime or other illegal activity has taken place and who is guilty.
 - Those proceedings normally have tough penalties for lying in court (perjury).
 - The systems separate responsibilities for (i) bringing person to court (arrests, summons, etc.) from (ii) the determination of guilt or innocence, and (iii) from creating the law itself.
- D. The courts are information producing (truth producing?) institutions.
 - i. Court officials (judges) often determine exactly what the law is in a given case.
 - Is property A, really Mr X’s or Mrs Y’s, and what rights over that property does the owner have?
 - ii. Courts often determine whether there has been a violation of the law and exactly what law was violated.
 - It is not always obvious whether a crime has been committed or not.
 - Nor is it always obvious what the proper punishment should be if a crime has taken place.
 - In criminal court, the proceedings normally identify the guilty (or innocent).
 - In civil court, the proceeding normally determine who is at fault and whether compensation has to be paid or not.
 - iii. Courts normally determine what punishments are associated with a particular crime.
 - They are normally constrained by legislation on such matters, but normally they have some discretion over the extent of the fine or other punishment.
 - This is partly through direct control over the fine is delegated to the courts and partly because determining what crime or civile problem has occurred determines what the allowed range of punishments is.
 - The penalties for involuntary manslaughter are different than ones for murder.
 - iv. The penalties vary by law and are sometimes collected by the court and sometimes transfers from one of the parties in court to others.
 - In criminal cases, fines normally go to the local government or court system.
 - In civil cases, court decisions tell one party how much and what is owed another.
 - (Note that as far as incentive effects are concerned, both systems have similar effects on the person paying the fines or paying the settlement damages. It provides incentives not to engage in the illegal activity.)

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E. The separations of responsibilities evidently help to make the judicial system work better by reducing (but not eliminating) errors and corruption.

- i. For example, having the basic laws “set in stone” implies that the courts cannot simply make up laws and use them to punish their enemies or extract rents from them.
- ii. The determination of guilt is made separately from the arrest decision. This allows a second review of the facts (and more facts to be presented) and so reduces the likelihood that an innocent person will be punished. It also reduces the ability of policemen to extort money from persons who they accuse of crimes.
- iii. The court proceedings themselves are organized to collect information quickly and accuracy is increased by making “lying” to the court (perjury) a crime.
 - More or less similar proceedings have been used for thousands of years--although they are revised a bit from time to time.
 - As noted above, the use of witnesses and penalties for perjury to learn the facts of “the case” are ancient devices.
 - (Note that some lying is allowed, but not when under oath.)
 - (Lying itself is not always a crime in business or in the court, even if it is usually unethical!)
- iv. The results are judicial systems in which laws are more or less uniformly applied and enforced.
- v. If the right laws are in place, such systems will encourage economic development and civil society.
- vi. This is not to say that the courts always get it right.
 - To deal with mistakes, most court systems have an appeal process, whereby those who feel that the wrong decision has been made can appeal to a higher court.
 - The frequency of court mistakes can be estimated by the frequency with which an appeals court reverses the decision of a lower court.
 - See Tullock for more on this.

F. Contemporary legal systems also divide the law into a variety of separate areas, many of which have their own courts and legal proceedings, as with civil law, criminal law, and family law.

- i. Property law and contracts are two of the three main parts of civil law.
- ii. Violations of civil law in the course of “ordinary” business is normally dealt with differently than in extreme cases (criminal law).
 - For example under civil law, if one is “wronged” one may sue and recover damages (eg be paid for one’s losses).
 - However, under criminal law, the fines go to the government (court or treasury).
 - (Note that many crimes can be thought of as extreme forms of trespass. Explain.)

G. For now, let us assume that courts are reasonably accurate and that most times it is guilty (law breakers) rather than innocent persons who are punished.

- This allows us to focus attention on how court decisions about penalties affect the behavior of persons thinking about engaging in illegal activities.
- That some mistakes are made simply reduces the probability that a person engaging in an illegal activity will be punished for it.

-
- We will return to several of these issues later in the course.
- For example, Gordon Tullock also argues that the European judicial system is better than the US system, because he believes it to be less costly and more accurate.

IV. Expected Penalties--the Economics of the Law and Law Enforcement

A. To analyze the effect of the laws, economists always begin with the assumption that all actors are “rational.”

- i. That is it is assumed that people “think ahead” when they act and take account of their own costs and benefits.
 - A net benefit maximiser will make choices that increase his or her net benefits.
- ii. For example, in this course we assume that consumers, firms, criminals, voters, and government officials are all rational--they all make decisions which maximize their net benefits..
- iii. Criminals are not assumed to be “crazy” in economic models, as they sometimes are in sociological models, but rather persons pursuing their own net benefits.
 - Most policemen also believe this insofar as they try to identify suspects by thinking about whose interests are advanced by a crime and/or who could undertake the crime at least cost.
 - (Most murder novels make similar assumptions, to make their plots more interesting.)
- iv. Given rational actors, law enforcement will affect the net benefits associated with illegal acts.
 - Law enforcement increases the costs of illegal acts through associated penalties.

B. Economic analysis of criminals suggests that one does not have to use normative analysis to understand criminal behavior. **Criminal Behavior is simply behavior that is illegal, e.g. that is subject to punishment through the courts.**

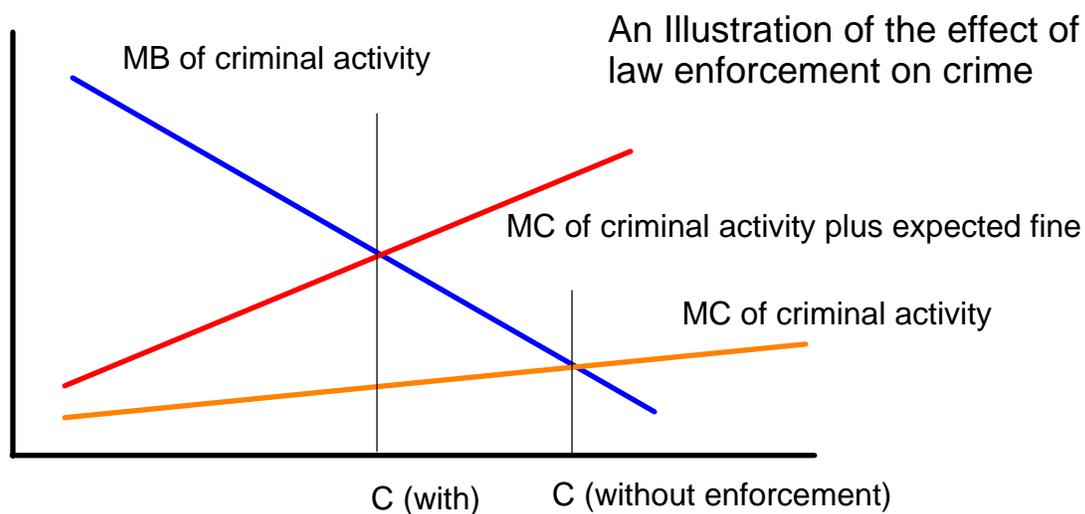
- i. Many, but not all, activities that are illegal can be given an economic explanation. That is “making X illegal increases GNP.”
- ii. Decisions to engage or not in those activities are ordinary in the sense that they can be modeled with our usual maximize expected net benefit tools.
- iii. This approach to analyzing crime was first worked out in Gordon Tullock’s (1971) book and in Gary Becker’s more famous (1974) paper. Many other papers and books have been published since then that uses their model to analyze illegal behavior.
 - According to their approach, every potential "criminal" is a rational agent interested in maximizing his EXPECTED income, net benefits, or utility, given some probability of punishment for his or her crimes (violation of property rights, breach of contract, etc).
 - (Here it bears noting that these models probably work better for property crimes than violent crimes.)
- iv. This is not to say that there is nothing unusual about criminals.
 - Economics implies that criminals are not “random individuals” but persons who differ from non-criminals in their opportunity costs, assessment of risks, time discounting, and/or risk aversion from the perspective of economics.

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- (Initially, we'll ignore internal norms that a person may have. An honest person may not care about the fine or probability of being caught, but simply that an activity is illegal or immoral.)
- (Most economic analysis of the law assumes that people do not have such internalized norms, which is not always a good characterization of behavior.)
-

C. A model of criminal choice

- Assume that there is a MB curve that describes the benefits of criminal activity (which may be increases in personal income or some other benefit).
- Assume that there is a MC curve that reflects the potential law-breaker's opportunity cost of



engaging in crime.

- Assume that there is a law enforcement system in place that detects and punishes crimes and let the expected punishment (fine) be: $F^e = PF$ or $F^e = P(C)F(C)$
- In the second case, the marginal expected fine increases with the level of crime (C) because the probability of punishment rises and the fine itself rises with the level of crime engaged in.
- [As an exercise, choose some numerical examples of probability and fine combinations that can generate an expected fine of \$200.]

D. The figure below illustrates the geometry of criminal choices and has a number of interesting and clear implications.

- Among the implications are the following:
 - First, penalties matter. An increase in expected marginal penalties decreases crime.
 - Second, personal opportunity cost matters, a decrease in personal opportunity costs increases crime.
 - Third, other things being equal wealth persons engage in fewer crimes than poor people.
 - [Use a diagram similar to the above to demonstrate these points.]
- Note that the MC of crime may simply be a criminal's opportunity cost wage rate.

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- The lower that wage rate, the higher will be his crime rate.
 - It may also reflect “internalized” norms, so that the more “honest” or “rule following” a person is the higher his or her marginal opportunity cost for crime tends to be.
 - [Use the diagram to show that internalized norms of honesty or law-abiding behavior also tend to reduce crime rates (and explain the results)].
- iii. Note that in rational choice models of crime, an increase in expected penalties always reduces crime. [Explain why.]
- iv. A punishment’s effect on an individual’s choice depends on the size and nature of the penalty (cash or jail time), the probability that one will be caught and punished, and his or her degree of risk aversion.
- a. If the fine is “jail time” then a person with a high opportunity cost wage will face both a higher MC and a higher $MC + F^E$ and so commit fewer crimes than a poorer person.
- b. Time discount rates also matter if a punishment occurs well after the crime.
- The expected present value of a fine of amount F in T years is $F^e = (P) (F)/(1+r)^T$
 - The higher the discount rate and higher T are, the lower is the expected present discounted value of the penalty. (Why?)
- v. In the absence of fines or fees ($F > 0$) for theft, trespass, murder, etc and in the absence of enforcement of ($P > 0$), self-interested agents will *choose whatever methods they which to minimize their production costs* and/or maximize their net benefits.
- The results tend to be unproductive, poor, societies. (Remember the Hobbesian Dilemma. }
 - Many of today’s poorest societies today are ones in which basic property and contract law are not well enforced (or in some cases well defined).
- vi. This does not mean that laws are perfectly enforced in prosperous societies, only that they are more systematically (and more honestly) enforced than in less prosperous societies.
- E.** In the real world, fines are imperfectly enforced, and potential law-breakers know this.
- As noted above, the probability that the person or group will be caught, convicted and punished whenever he, she, or they violate the law also matters.
- F.** As far as economic models of human behavior are concerned, the law creates systems of “conditional rewards and punishment” that affect rates of return from different activities at the margin.
- i. It is through these incentive effects that laws influence behavior.
- ii. The laws for example, specify under what conditions one might be punished (theft, trespass, contract breach, fraud, etc) and also the punishments associated with those actions.
- From an economics point of view, it is the punishments that generate the behavioral effects rather than the laws themselves.
 - That is to say, law enforcement increases the marginal costs (marginal opportunity) cost for actions deemed illegal.
- iii. In rational-choice based models **of crime there are tradeoffs between the probability that a law violator (criminal) will be caught and punished and the size of the punishment. $F^e = PF$**

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- The higher the probability of being caught and punished the smaller the fine (or other punishment) can be.
- (Evidently the persons who drafted the code of Hammurabi believed that high “fine” (the death penalty) would be sufficient to discourage most crimes even if enforcement is imperfect. Would it? Doesn’t it still depend on the expected benefits of crime and probability of being caught and punished?)
-

G. Note that “criminal” activity in an economic model of crime simply means a law-violating choice.

- All sorts of peoples and organizations may violate laws when the expected MB exceed the expected MC over part of the range of interest.
- For example, it may be rational for firms to violate environmental laws, to cheat on their taxes, or break contracts.
 - In a setting with imperfect enforcement of the law, the firm's expected profits equal its (certain) Revenues less its (certain) Production Costs less its Expected Fines.
$$IF = R - C - F^e \quad \text{where } F^e = PF$$
 - Extra output normally increases revenues, so $MR > 0$.
 - Extra output also normally increases costs, so $MC > 0$.
 - Extra output also normally increases the probability that one will be detected and the fines that one will be subject to.
- Similarly, “ordinary” individuals may drive faster than posted speed limits on highways, talking on cell phones, and so on..
- For those who have had public finance or public economics, there is clearly a similarity between Pigovian taxes and efficient enforcement of an effluent mandate or standard.
 - If a regulation is set to achieve Pareto efficiency, Q^{**} , then the **smallest fine** sufficient to induce the target Q^{**} has the **same** expected value as a **Pigovian tax** at Q^{**} .
 - [Draw a diagram with a Pigovian tax, then use a regulation and fine to obtain the same outcome. Note that the smallest expected fine sufficient to achieve this result is one that equals the Pigovian tax.]

V. The Optimal Expected Penalty and Level of Crime

A. We now switch from positive to normative analysis of criminal justice systems. We attempt to determine the social net benefit maximizing penalty and crime rate.

B. Detecting law violations, identifying law breakers, and punishing law violators are all costly activities.

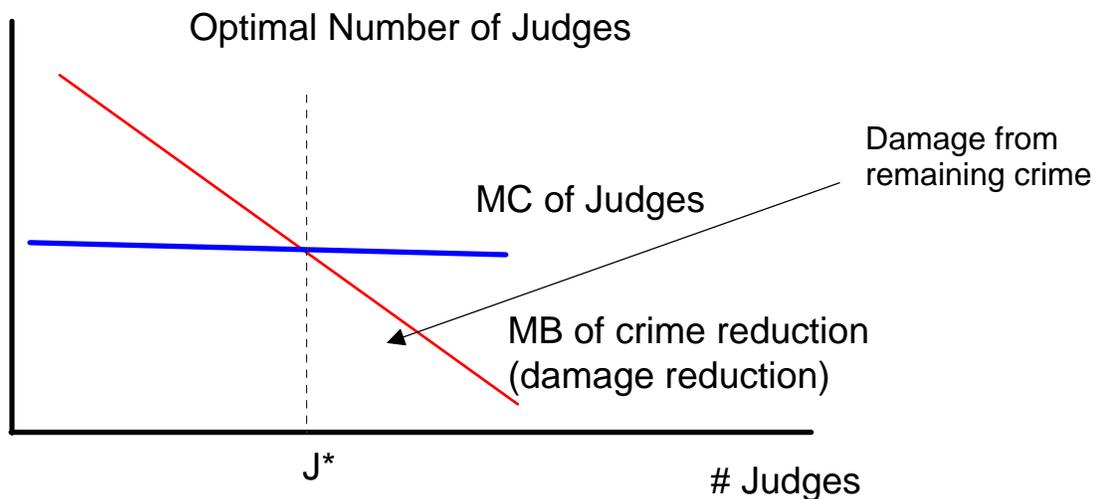
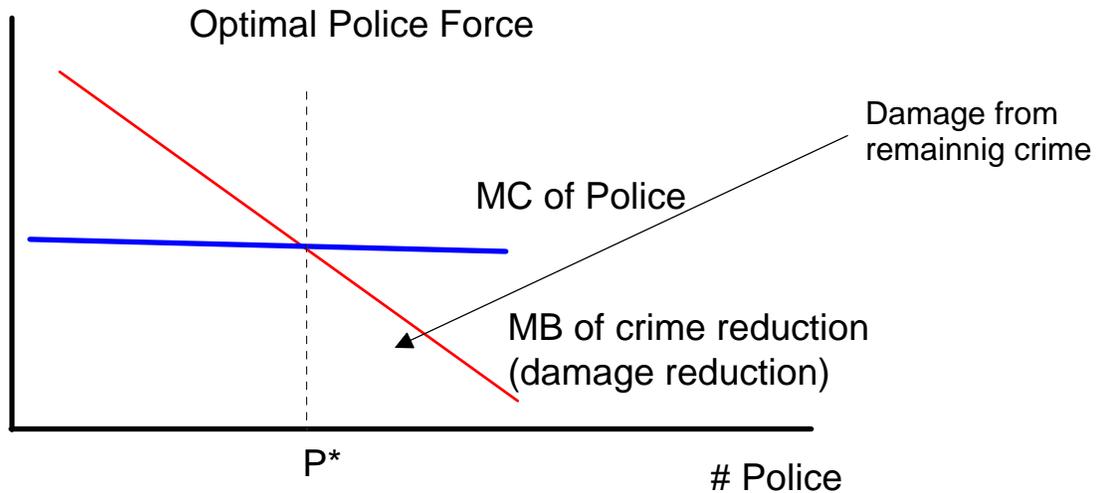
- One needs, police, courts, jails, and an institutional structure that keeps them more or less honest.
- In addition, there are other costs associated with law enforcement efforts, which might be regarded as externalities or mistakes, such as punishments imposed on the wrong persons, traffic accidents induced by pursuit, inconvenience for those wrongfully brought to court, unnecessary production of fear, and so on.

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iii. The fact that criminal justice systems are costly to run implies that the optimal level of crime tends to be greater than zero.

C. Given what we have done so far, it makes sense to characterize an efficient criminal justice system and then determine the optimal level of crime.

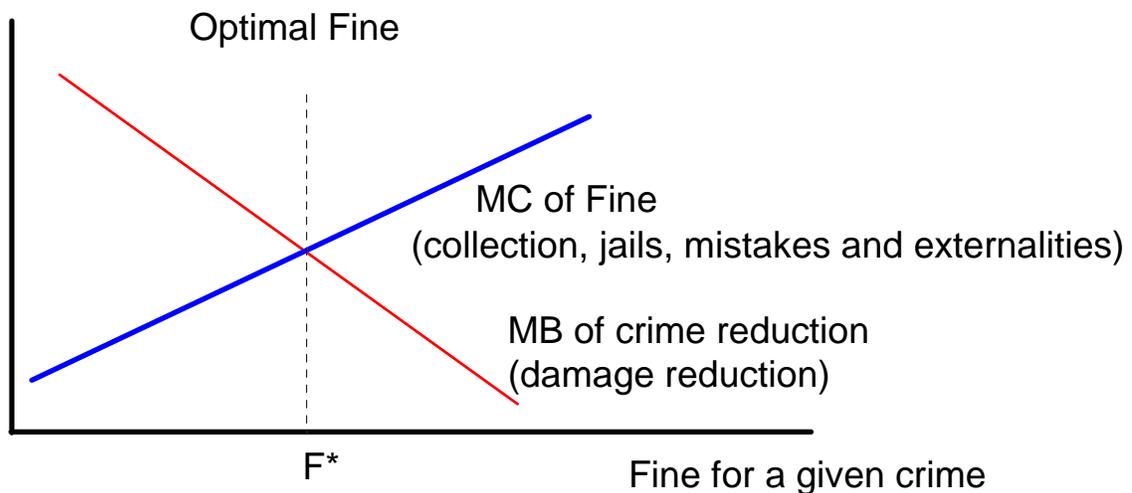
- i. Similar diagrams can be used to characterize the optimal level of policemen (and related staff) and the optimal level of judges (and related staff).
- ii. The curves, however, all have somewhat different meanings.



iii. These diagrams represent the marginal benefits of additional police and judges, which are the extent to which damages from crime are reduced through their effects on “P” the probability that a law-breaker will be punished (for a given penalty).

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- Notice that the optimal combination of police and judges varies with their wage rates (marginal costs) and with their effect on crime and damages associated with crime.
 - If wage rates rise, the optimal number of police officers and judges declines.
 - If their effect on P increases, their optimal numbers increase.
- iv. The optimal fine (or fine schedule [$F = f(C)$]) can be illustrated with a similar diagram. It also depends on their effect on criminals, but also their marginal costs to implement (including mistakes and externalities).
- Note that the optimal fine varies with the MC cost of the fine including interest in avoiding mistakes and punishing the wrong person.
 - The more concerned one is about mistakes the higher the MC of fines tends to be.
 - That concern tends to limit the magnitude of fines and encourage the hiring of more judges.



D. The above system of police, courts, and penalties will imply a particular crime rate through its effects on expected marginal fines.

- That crime level is the **optimal level of crime**.
- Notice that the optimal crime rate is affected by a number of factors: the wage rates of judges and police, their effectiveness (effect on the probability of capture and conviction), the criminal's sensitivity to changes in those probabilities, and the damages associated with the crime.
- The optimal crime rate for a "low damage" crime tends to be higher than that for a "high damage crime," other things being equal, because all the above MB curves are lower.
- **Crime is not eliminated because** doing so (even if possible) would cost more than it generates in benefits (reduced damages).

E. [Draw a criminal choice problem with the above "optimal" expected fine schedule and note the implied crime rate.]

- [In what sense is this crime rate optimal? Why shouldn't this rate be lower?]

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- [Note that the above characterization of the optimal penalty takes account of losses associated the improper punishment of innocent persons. Why?]
- [Many shapes can be imagined for these curves. Think a bit about them and determine if the above “conventional” shapes make sense for these decisions. For example, suppose in the last diagram there is a minimum effective fine, how would that change the diagram? Alternatively, there may be a highest penalty after which increases do not reduce crime, how would that affect the diagram?]

F. Conclusions: Optimal Law Enforcement with Imperfect Policing and Courts.

- i. The probability of being fined is partly determined by the probability of being caught, and also on the probability of being found guilty in a trial.
- ii. Because every criminal faces somewhat different circumstances, there is probably no expected punishments that is large enough to discourage all crimes.
- iii. And if tough punishments are more costly than weaker punishments (as jail time is more expensive than fines), then minimizing the magnitude of punishments makes administrative cost sense, even if error rates (punishment rates for the innocent) are low.
- iv. If trials are not perfectly accurate, as assumed above, then one has to include the probability that a guilty person is actually found guilty in a trial. In this case P is approximately the probability of being caught (affected by the number of police) time the probability of being convicted (affected by court resources).
- v. All these factors suggest that the social net benefit maximizing level of crime is greater than zero.

VI. Appendix A: Laws and Law Enforcement as a Basis for Forming a “Productive State”

- A. Regional governments can be thought of as an organization with the ability to create and enforce rules within a given territory.
- B. One common theory of the emergence of government is based on the above sorts of conflict, commons and externality problems.
 - i. People recognize that independent private decision making is not generating as good a result as they can imagine.
 - ii. So they band together and coordinate their activities.
 - iii. Such individuals might voluntarily agree to create an organization with the power to coerce certain forms of behavior to solve various PD-like problems of life in a community.
 - As shown above, collective enforcement of property rights can mitigate “the Hobbesian dilemma” and the “tragedy of the commons.”
 - Other basically similar problems can also be solved through such organizations. Many of these can be solved by establishing general rights.

C. Obviously, if a group undertakes to form a government, they must also make some decisions about how collective choices will be made.

- i. Even if there is unanimous agreement to provide a particular service, or enforce some property right or rule, there may not be unanimous agreement about the level of service or enforcement that is appropriate, or best.
- ii. Appointing one person, a "czar" or dictator, to make decisions in a particular area is one solution to this, but still the person appointed needs to be chosen, and some method for replacing him or her would, in most cases, be another collective concern.
- iii. Majority rule is one possible rule for making such choices or for selecting government officials. We will analyze such constitutional issues later in the course.
- iv. The *social contract* theory of the state argues that individuals may agree to be coerced (fined or otherwise penalized for free riding) as a necessary part of over coming free riding problems in the team production and in the production of public goods.
 - In such cases, a government (law enforcing institution) is created as productive joint enterprise, through the voluntary agreement of all affected parties.
 - That is, there is a sense in which submitting to coercion can be a voluntary act.
 - Such governments are said to be formed by social contract.
 - (Note that private clubs usually operate on a voluntary basis, but have rules and procedures for enforcing them.)

D. Some Quotes on the Emergence of a Productive State through a Social Contract:

On the nature of anarchy: from Thomas Hobbes, *Leviathan* (1651)

"Whatsoever therefore is consequent to time of Warre, where every man is Enemy to every man; the same is consequent to the time wherein men live without other security than what their own strength, and invention shall furnish them withal. In such condition .. the live of man [will be] solitary, poor, nasty, brutish and short.

From James Buchanan, *Limits to Liberty*, 1975.

"The state serves a double role, that of enforcing constitutional order and that of providing "public goods." This duality generates its own confusions and misunderstandings. "Law," in itself, is a "public good," with all the familiar problems in securing voluntary compliance. Enforcement is essential, but the unwillingness of those who abide by law to punish those who violate it, and to do so effectively, must portend erosion and ultimate destruction of the order that we observe. These problems emerge in modern society even when government is ideally responsive to the demands of citizens. When government takes on an independent live of its own, when Leviathan lives and breathes, a whole set of additional control issues cone into being. "Ordered anarchy" remains the objective, but ordered by whom? Neither the state nor the savage is noble, and this reality must be squarely faced.

VII. APPENDIX B: The Extractive State: an Alternative Model of the Emergence of Property Rights

A. Before moving on, it is worth considering another theory of the emergence of the state and state services.

B. Mancur Olson notes that a good deal of what we have historically observed as governments have been significantly different than the voluntary model noted above. Many do not appear to have a contractual basis, but rather seem to “extract” revenues from their citizens to advance their own purposes.

From Mancur Olson, "Anarchy, Autocracy and Democracy" (1991)

"The conqueror of a well defined territory has an encompassing interest in that domain given by the share of any increase in the territorial income that he collects in taxes. This encompassing interest gives him an incentive to maintain law and order and to encourage creativity and production in his domain. Much of the economic progress since the discovery of settled agriculture is explained by this "incentive."

C. He proposes an alternative model of the emergence of regional governments, based on the quite different incentives of "roving" and "stationary" bandits. His argument is the following:

- i. Suppose that initially, there are a several roving bandits, each with sufficient power to sweep through a farm, village, or town, and steal what ever they want to.
- ii. (This may be thought of as a pleasant life for the traveling bandit: of considerable riches travel and camaraderie.)
- iii. Obviously, the problem is not the lifestyle of the roving thieves but with the impact of these thieves on their victims.
 - a. The victims might organize for their own defense. That is to say they may form a productive state, to build high walls, and guard the gates, to keep the bandits out.
 - b. But if they do not, obviously incentives for investment and saving are limited. Why save if you know that whatever you put aside for the future will be taken by a roving bandit before you get to use it?
 - c. Thus, farmers, merchants, and other productive people, would produce and save less than they would have in the absence of some form of protection from the roving bandits.
 - d. (Show this with an expected benefit expected cost diagram.)
- iv. Another possible escape from the roving bandit dilemma is suggested by Mancur Olson.
 - If no productive state or defense organization can be put together by the victims, it is possible that a very clever Bandit might realize that if he were to take over an area and exclude other thieves from that area he might be wealthier.
 - The *advantage of being a stationary bandit* comes partly from reducing the number of thieves who are trying to steal from the same group of potential victims. Rather than ten bandits "sharing" the "take" from a village in say different months of the year, a stationary victim can take it all.

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- v. There are two significant sources of wealth for a stationary bandit. First, if he can exclude roving bandits from “his community” he can maximize his take from the community. (In effect he is privatizing a commons.) Second, to maximizing his net revenues from his territory, he should encourage growth and development in his territory. The latter will involve creating property rights within the community of various sorts--as for example the excludable forms developed above to solve internal conflict and commons problems.
- a. Steal-able property is, in effect, a commons as far as roving bandits are concerned. In a “den of thieves game” they have incentives to take all the wealth that they can lay their hands on (which is transportable). Anything left behind simply goes to the next bandit that comes through the village.
- b. A stationary bandit can take less than that amount "now," because he can always collect it at a later time if he wants to. This lower “tax rate” has a very important incentive affect.
- Letting potential "victims" keep part of their harvest, livestock, gold, and so forth, of course has an effect on their incentives to accumulate such capital.
 - Instead of expecting to lose all of their wealth to roving bandits, they now expect to be able to keep *and enjoy* at least part of it (at least for a longer time period than before).
 - This encourages them to be more productive, to make more long term investments, to work harder, etc. etc. which increases the "tax revenue" that the stationary bandit can obtain.
- c. A stationary bandit becomes richer because his potential victims become richer.
- (Show figure of a Laffer curve, linking tax/take rates with work and output level.)
- D.** A stationary bandit, has what Mancur Olson calls an **encompassing interest** in the welfare (at least wealth) of his potential victims because he can profit by making them wealthier.
- i. Mancur Olson, "Anarchy, Autocracy and Democracy" (1991) argues that:
- "The conqueror of a well defined territory has an encompassing interest in that domain given by the share of any increase in the territorial income that he collects in taxes. This encompassing interest gives him an incentive to maintain law and order and to encourage creativity and production in his domain. Much of the economic progress since the discovery of settled agriculture is explained by this "incentive."
- ii. The incentive to provide law enforcement and other public services can be characterized in a *diagram* that shows the "profit" or “rent” maximizing service level and extraction rate.
- The optimal service level varies with the tax rate.
 - The greater the tax rate at the margin, the greater is the "encompassing interest" of the dictator in the wealth of his domain.
- E.** (One problem with the Olsonian model of dictatorship is that it ignores the security problems that dictators face. Sometimes there is a trade off between increasing the wealth and welfare of "his" citizenry, and the risk that "he" will be over thrown.)
- F.** The idea of an **encompassing interest** is very important in other applications as well. Clearly, a person whose own direct interest is advanced whenever "your" welfare improves will be a better representative/czar/agent than one whose interest runs at cross purposes.

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- i. It can be used to characterize the Mafia's interest in "law and order" within its domain. (Protection fees can be higher when the value of commercial activity increases.)
- ii. Encompassing interest explains, for example, why some forms of employee stock options and other forms of ownership as in a cooperatives may work. (Again the encompassing interest would generally not be complete, so other incentive problems would remain.)
- iii. Politically, it may explain why citizens often care about such abstract ideas as GNP or average income, insofar as their own income is correlated with those macro-economic variables.
- iv. It may also explain, or at least help explain, some forms of publicly oriented behavior by individuals in many walks of life whose interest is somehow tied to the interest of a larger organization.
- v. Even, to some extent voting in a democracy may be tied to individual perceptions that the welfare of their country is enhanced by their vote, which in turn makes them better off.