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Law & Economics

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12 An Economic Theory of Crime and Punishment

The true measure of crimes is the harm done to society.

CESARE BECCARIA,
ON CRIMES AND PUNISHMENT 64 (1764)

ANY THEORY OF crime must answer two questions: "What acts should be punished?" and "To what extent?" The first question asks for the distinguishing criteria of a crime, and the second question asks to calibrate punishments. In the next two chapters we will develop an economic theory of crime, contrast it with a particular moral theory, and discuss some implications and empirical findings of that economic theory. The economic theory, we argue, gives more convincing and precise answers to these two general questions.

Instead of seeing crime as a challenge to theory, however, most people see crime as a threat to life and property. In the United States, crime directly affects nearly one in three households each year. Inconsistencies in crime reports make international comparisons difficult, but, compared to the United States, violent crime is apparently more frequent in Latin America and Africa, less frequent in Europe and Japan, and probably less frequent in China and India.[1] The rates of theft are apparently similar in the United States and Europe, but the rates are substantially lower in Japan and Korea. Crime, which once seemed rare to many people, is pervasive in many countries. As a result, people argue passionately for reforms to make punishment more certain, swift, and severe. Conversely, people argue equally passionately that more punishment will victimize some people without reducing crime. When U.S. crime rates subsided recently, the proponents of harsh punishments claimed credit for the improvement, whereas their opponents claim that the decline in crime is attributable to other factors and another reason to get rid of harsh punishments.

To advance these disputes, the next two chapters use economic theory to define crimes, distinguish them from civil wrongs, develop models of behavior by criminals and police, examine statistics on crime rates, and survey such important issues as capital punishment, handgun control, illegal drugs, and the deterrent effect of criminal sanctions. Here are some examples of particular issues in criminal law that we will address:

> **Example 1:** Jim Bloggs is convicted of assault for striking and breaking the nose of Joe Potatoes. As punishment, the judge has discretion to choose a stiff fine or a short jail sentence. If the judge believes that each punishment would deter future crime equally, which punishment should the judge use?

[1] See ROBERT COOTER AND HANS BERND SCHAEFER, SOLOMON'S KNOT Ch. 11 (2011).

Example 2: Bloggs is sentenced to jail, but the jail is full and the jailer cannot legally add any more inmates. The state could build another jail or release some current inmates to make room for Bloggs. Which response will lead to the right amount of deterrence of criminals and minimize the social costs of crime?

Example 3: A thief shatters a car window costing $100 and steals a radio worth $75. Is the social cost of the crime $175 (the victim's loss), $100 (the victim's loss minus the injurer's gain), or some other number?

Example 4: Yvonne wishes to increase the security of her home against burglars. She considers three alternatives: (1) install bars on her windows; (2) install a loud burglar alarm; or (3) buy a gun. How will each alternative affect burglaries of her house and of *neighboring* houses? For example, will bars on Yvonne's windows reduce crime in the neighborhood or merely redirect it to other houses? Will an alarm alert neighbors? Will burglars know that she has a gun? Which alternative should the state encourage Yvonne to adopt?

I. The Traditional Theory of Criminal Law

The economic theory of torts in Chapter 6 distinguished between the harm caused by accidents and the cost of preventing it. Law should ideally minimize the sum of the costs of accidental harm and preventing it, thus yielding the "optimal number of accidents." Similarly, the economic theory of crimes distinguishes between the harm caused by crime and the cost of preventing it. Law should minimize the sum of the costs of crime and its prevention, which yields the "optimal amount of crime." This language sounds odd, but it helps answer the two primary questions of a theory of crime: What acts should be punished and to what extent? The central strand of economic analysis focuses on social costs, whose simple measure equals the sum of the cost of the harm from crime and its prevention. An act should be treated as a crime and punished if doing so reduces social costs. The severity of the punishment should be calibrated to minimize social costs.

These answers place the economic theory of crime in the long tradition of utilitarian thought. This tradition contrasts with a moral theory of crime called "retributivism," which gives different answers to the two primary questions of a theory of crime. According to retributivism, criminal law and policy should do what is morally right, regardless of whether doing so minimizes social costs. The right thing to do is to punish people who commit crimes by intentionally harming others, and the wrong thing to do is to punish people who are innocent. Punishment's extent should be proportional to the seriousness of the crime, or to how morally wrong it is. Disproportionate punishment is wrong, even if it reduces social costs.[2]

The usual way that philosophers contrast utilitarian and retributivist theories is by posing hypothetical examples that pit one against the other in a kind of mental tug-of-war. If you could only imprison one person for life, would you choose the one whose

[2] See the book by Michael S. Moore noted at the conclusion of this chapter for the best modern statement of retributivism.

imprisonment would prevent the most harm, such as deterring murders, as suggested by utilitarianism? Or would you imprison the person who committed the worst crime, such as the most heinous murder, as suggested by retributivism? Or suppose that prisoner *A* committed a horrible murder and would never harm anyone again (he's too weak and repentant), whereas prisoner *B* committed manslaughter and would commit crimes again if released (he's strong, hot-tempered, and unrepentant). Would you parole person *A* as suggested by utilitarianism, or would you parole *B* as suggested by retributivism?

Pursued to their logical extremes, utilitarianism and retributivism yield puzzles and paradoxes. Instead of exploring those, we develop the economic theory of crime and apply it to practical questions of criminal law and policy.

In England much of the criminal law was originally part of the common law, but over many decades criminal statutes replaced the common law of crimes. In common law and civil law countries, criminal law is now codified in statutes. This body of law embodies what we might call a traditional theory of crimes, according to which criminal law differs from civil law by the following characteristics:

1. The criminal *intended* to do wrong, whereas some civil wrongs are accidental.
2. The harm done by the criminal was public as well as private.
3. The plaintiff is the state, not a private individual.
4. The plaintiff has a higher standard of proof in a criminal trial than in a civil suit.
5. If the defendant is guilty, then he or she will be punished.

We will describe these characteristics and then show that economic theory provides a useful framework to explain them, whereas retributivism begs the important questions or gives the wrong answers.

Web Note 12.1

The retributivist theory has a long and honorable tradition and deserves further elaboration than we can give it here. On our website, however, we give a much more complete account of retributivism and draw sharper contrasts between that theory and the economic account of crime and punishment.

A. Criminal Intent

A careful driver is not at fault and imposes moderate risk on others, whereas a careless driver is negligent and imposes excessive risk on others. Negligent drivers must compensate those they have harmed. Even careless drivers, however, do not disregard the safety of others or intentionally impose excessive risk on them. A driver who intentionally imposes excessive risk on others is reckless. As we saw in Chapter 7, recklessness can oblige the injurer in some countries to pay punitive damages in addition to compensatory damages.

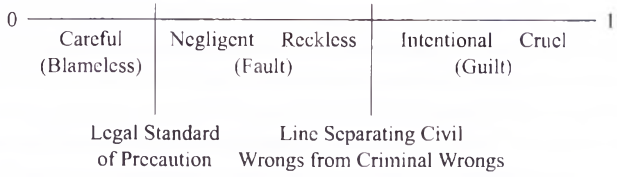

FIGURE 12.1
Culpability scale.

A driver who disregards the safety of others does not intentionally run into someone. Beyond recklessness lies intentional harm. "Even a dog knows the difference between being stumbled over and kicked," and so does the law. The law makes much over the distinction between accidental and intentional harm. Tort law mostly concerns accidental harm, and criminal law mostly concerns intentional harm.

Mens rea (Latin for "a guilty mind") is the legal term for criminal intent. To develop this idea of *mens rea,* we must draw the boundary between accidental and intentional harm.

Consider the ranking of acts along a continuum in Figure 12.1. Starting at the left side of the scale, the injurer is careful and blameless. Moving to the right, the injurer's behavior becomes negligent, then reckless, and then criminal. Careful behavior is less culpable than negligent behavior; negligent behavior is less culpable than intentional harm. According to this continuum, the line separating fault from *mens rea* lies between recklessness and intentional harm. As actors cross this boundary line, they pass from fault to guilt.

Further gradations in criminal intent are sometimes relevant to determining punishment. To illustrate, harming someone intentionally to gain a personal advantage is not as bad as harming someone cruelly and taking pleasure in the victim's pain. There is, thus, a continuous gradation in the moral evaluation of the actor from blameless on the good end to cruel on the bad end.[3] Developing these distinctions has long engaged philosophers and social scientists. Later in this chapter we will describe some contributions of economists when we distinguish between full and diminished rationality, which relates to the distinction between intentional and unintentional harms.

QUESTION 12.1: We defined crime as "intentional harm to persons or property." In communist countries, "crime" was often defined as "socially dangerous" behavior. Can you relate the difference in definitions to the continuum depicted above?

B. Public Harm and Public Prosecution

Proceeding down our list, the second distinguishing feature of a crime is the nature of the harm. In the areas of the law we have examined to this point—property, contract, and torts—most of the harm has been private. In criminal law much of the harm is public. So, a murder threatens the peace and security of society at large and thus puts others besides the victim in fear for their lives. The great eighteenth-century commentator on

[3] We could, of course, extend the line and fill in the gaps with fine distinctions found in criminal law. To illustrate, off the scale to the left lie meritorious acts, and off the scale to the right lie sadistic acts.

the laws of England, William Blackstone, said that "in these gross and atrocious injuries [which we call crimes] the private wrong is swallowed up in the public: We seldom hear any mention made of satisfaction to the individual; the satisfaction to the community being so great."[4]

Later we will connect this traditional discussion of public harm to the economic theory of public goods. Our discussion will criticize the traditional view, expressed by Blackstone, that crime harms the public whereas torts merely cause private harm. For now, however, we explain the traditional view that crime harms the public—a view understood by generations of lawyers.

The idea that crimes harm the public has several implications. First, it justifies the difference between the plaintiffs in civil and criminal suits. In a civil suit the plaintiff is a private individual (the victim). In a criminal prosecution the plaintiff is society as represented by the public prosecutor or attorney general.

Second, the idea that crimes harm the public implies the possibility of "victimless" crimes, such as gambling, prostitution, and the sale of illegal drugs. The parties to these crimes often engage in voluntary sales for mutual advantage. However, the traditional theory of criminal law holds that these transactions have victims—namely society, whose peace and security are threatened.

Third, the traditional theory of public harm justifies punishing *attempts* to cause harm, even when they fail. When potentially harmful behavior causes no actual harm, the victim's injury is nil, so the victim usually has no cause for a civil suit. However, failed attempts at crime, a so-called *inchoate* crime, cause fear and other harm to the public. The traditional theory of criminal law holds that a person who tries to injure another and fails should be punished.

QUESTION 12.2: Explain why counterfeiting money is a crime. Who is the victim? Is there a private victim as well as public victims?

QUESTION 12.3: Distinguish between (1) imposing risk on others by driving carelessly without an accident actually occurring, and (2) inspiring fear in others by attempting to commit a crime and failing.

C. Standard of Proof

The fourth characteristic of a crime is the high standard of proof imposed upon the prosecution. In a criminal case the prosecutor must satisfy a higher standard of proof than the plaintiff in a civil case. In a civil case in common law countries, as we saw in the last chapter, the plaintiff must prove the case by a preponderance of the evidence—that is, the plaintiff's account must be more believable than the defendant's. In a criminal action in common law countries, the prosecutor, to secure a conviction, must prove the case *beyond a reasonable doubt.*

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[4] WILLIAM BLACKSTONE, COMMENTARIES ON THE LAWS OF ENGLAND, v. IV. p. 6 (1776, reptd. 1977).

The traditional theory gives three reasons for imposing this high standard on the prosecution. First, convicting an innocent person seems worse than failing to convict a guilty person. Criminal law strikes the balance between these two errors—which statisticians call Type II (a false positive—that is, convicting an innocent person) and Type I errors (a false negative—that is, exonerating a guilty person), respectively—in favor of the defendant. Second, the prosecution can bring the full resources of the state to bear on winning. Imposing a heavy burden of proof on the prosecution diminishes this advantage. Third, citizens may need protection from overzealous prosecutors who seek bureaucratic and political advancement.

Compared to common law countries, some civil law countries encourage an intimate relationship between judges and the state prosecutor. In Germany, for example, officials often work as prosecutors before becoming judges, or alternate between these two jobs. One rationale for intimacy is reduction of errors by judge and prosecutor. Knowing the judge's perspective helps prosecutors avoid wasting court time. Also, compared to common law countries, the judge in civil law countries plays a more active role in developing arguments during the trial. Judges are more effective in developing arguments when they have had experience as prosecutors. Reducing mistakes is especially important in criminal cases because the process of prosecution for a crime involves embarrassment and expense for the accused, even if the final verdict is "not guilty." Note that people from common law countries sometimes exaggerate the intimacy of judge and prosecutor in civil law countries by saying that a person accused of a crime in an inquisitorial system is guilty until he proves his innocence. This is strictly false.[5]

QUESTION 12.4: Explain how the confidence of the public in the prosecutor influences the standard of proof in criminal trials.

QUESTION 12.5: Most jurisdictions have two possible verdicts in criminal trials: guilty or not guilty. Scottish criminal trials have three possible verdicts: guilty, not proven, or not guilty. Explain the difference between binary and trinary verdicts, with reference to the standard of proof.

D. Punishment

People who commit crimes expose themselves to the risk of punishment. Punishment can take several forms: confinement to prison, restriction of activities by probation (now called "supervisory release" in U.S. federal law), or monetary fines. These three—imprisonment, probation, and fines—are by far the most common forms of punishment. Other forms of punishment, such as forced labor ("community service"), occur in some jurisdictions. In some jurisdictions, the defendant still faces the possibility of being beaten, mutilated, or executed by the state. Capital punishment is

[5] Article 6 (2) of the *Convention for the Protection of Human Rights and Fundamental Freedoms*, which the European Union requires its members to approve as a condition of joining, asserts the presumption of innocence—anyone charged with a crime is innocent until proven guilty.

prohibited in countries belonging to the European Union, but it persists in other countries such as China, and it was restored by the U.S. Supreme Court in many U.S. states in 1976 after that Court had found it to be unconstitutional in 1972.

Punishment in criminal law is different from compensation in civil law. Compensation in civil law aims to restore the victim's welfare at the expense of the injurer. Punishment in criminal law makes the injurer worse off without directly benefiting the victim. Because the motivation is different, the issues of compensation and punishment are often independent of each other in a given instance. This is easy to see for torts that are also crimes, such as assault. Punishment may be imposed on top of compensation, as when criminal prosecution follows recovery in tort for assault. Alternatively, punishment may be imposed in lieu of compensation, as when the state imprisons a pauper for assault, and the victim does not sue in tort because the injurer could not pay compensation.

In cases involving money, a strict definition illuminates the difference between compensation and punishment. *Perfect compensation* is a sum of money that leaves the *victim indifferent* between the injury with compensation or no injury. In Chapter 7, we defined the parallel concept of *perfect disgorgement*, which is a sum of money that leaves the *injurer indifferent* between the injury with disgorgement or no injury. By definition, punishment goes beyond disgorgement. *Monetary punishment* is a sum of money that makes the *injurer prefer no injury* rather than the injury with payment of the money. To illustrate by Example 3, if a thief shatters a car window costing $100 and steals a radio worth $75, then perfect compensation equals $175, perfect disgorgement equals $75, and punishment is a sum of money exceeding $75. Thus, the criminal might be required to pay $175 as compensation to the victim and also to pay the state a fine of $100.

QUESTION 12.6: For burglary, the victim's loss usually exceeds the injurer's gain, but the opposite is true for breach of contract. Why? What are the implications for relative dollar values of compensation and punishment?

II. An Economic Theory of Crime and Punishment

The traditional theory of criminal law offers reasons for the characteristics of a crime and distinguishes criminal prosecutions from civil disputes, but it does not offer a predictive model of criminal behavior or propose a clear goal for criminal law. The economic theory of crime, which we develop in this chapter, does all of this and more. We begin by distinguishing criminal prosecutions from civil disputes and offering reasons for the characteristics of a crime. Next we develop a predictive model of criminal behavior based upon a theory of the rational choice to commit a crime. Finally, we propose a clear goal for criminal law and policy: It should minimize the social costs of crimes. Using this standard, we identify optimal criminal justice policies.

A. Inadequacy of Tort Law, Necessity of Criminal Law

In Chapters 6 and 7, we discussed how tort law achieves efficient incentives by making injurers—and, in some cases, victims—internalize the cost of accidents. Most

crimes are also torts, which means that most criminals are vulnerable to civil suits. If civil suits made the injurer internalize the costs of crimes, then criminal law would be unnecessary from an economic viewpoint. For several reasons, however, civil suits cannot internalize the costs of crimes. We will explain these reasons in order to justify the existence of criminal law.

The first reason concerns some inherent limitations on compensation. In Chapter 6, we said that compensation is perfect when potential victims are indifferent about accidents in the sense that they would just as soon have the injury and the damages as have no injury and no damages. Perfect compensation internalizes the harm caused by injurers. In Chapter 7 we argued, however, that perfect compensation is impossible for some injuries, such as when someone loses a leg or a child. In those cases, courts awarding damages deter unreasonable risks, but they do not compensate for actual harm. It would be better if these incompensable harms did not occur.

Similarly, criminal punishment aims to deter intentional harms, not to compensate for them. Consider a thought experiment regarding a crime. How much money would you require in order to agree to allow someone to assault you with a hammer? This question does not make much sense. The concept of indifference is difficult to apply to crimes like assault. Consequently, the relevant law cannot take as its goal the perfect compensation of victims and the internalization of costs by injurers. Rather than pricing crime, the goal of punishment is to deter it. The state prohibits people from intentionally harming others and backs this prohibition by punishment. Thus, criminal law is a necessary supplement to tort law when perfect compensation is impossible.

Even if perfect compensation *is* possible in principle, it may be impossible in fact. Let us suppose, for example, that a level of compensation exists that makes Jonny indifferent about whether Frankie lops off Jonny's arm. It would be impossible to prove this level in court. The obstacle to proof is that arms are not bought and sold in a market; there is no objective way to know how much the loss is worth to Jonny. If the court asks Jonny what amount he feels would compensate for the loss, he may not know the answer, or he may answer by exaggerating. When there is no market to induce people to reveal their subjective valuations, economists say that there is a "problem of preference revelation." When perfect compensation is possible in principle, it may be impossible in fact because of the problem of preference revelation.

We have justified criminal law where compensation is imperfect. But suppose that perfect compensation *is* possible. Can private law accomplish efficiency without the need for criminal law? The answer is no. To see why, we must consider another argument. In Chapter 4 on property, we distinguished between protecting an interest and protecting a right. Recall that if the law allows trespass on the condition that the trespasser compensates the owner for any harm caused, the law protects the interest of the owner in the property. But the law does not protect the owner's right to use the property as he or she chooses without interference from others. Similarly, if the victims of car accidents were perfectly compensated, their interests in their persons and property would be protected, but their right to go about their business without interference from others would be infringed. Going about your business without interference from others is part of liberty. Protecting interests secures wealth, and protecting rights secures liberty.

There are good economic arguments for protecting rights more vigilantly than interests. In earlier chapters we saw that society is, in general, better off when goods are acquired through voluntary exchange, because such exchange guarantees that goods move to those who value them the most and, in doing so, makes both parties better off. Goods that change hands without the consent of both parties—as by theft—do not carry this same guarantee. The stolen good may be more valuable to its owner than to the thief. The thief need not pay the owner's asking price. Thus, remedies in criminal law should, in part, be set so as to protect and encourage voluntary exchange through markets.

We have argued that two obstacles prevent substituting compensation for punishment: First, perfect compensation may be impossible, and, second, even if perfect compensation were possible, the law may seek to protect the rights of potential victims rather than their interests.

There is a third reason to supplement liability with punishment in some circumstances: Punishment is often necessary for deterrence. To illustrate, assume that a thief is considering whether to steal a $1000 television set. Assume that the probability of the thief's being apprehended and convicted equals 0.5. Assume that the thief is liable in property law but not punishable in criminal law. The expected cost of the theft to the criminal equals the expected liability: .5($1000) = $500. The benefit to the thief equals $1000. Thus, the *net* expected benefit to the thief equals $1000 − $500 = $500. In this example, civil liability without punishment makes theft profitable.

In general, thieves cannot be deterred by the requirement that they return what they have stolen whenever they happen to get caught. In order to deter thieves, the law must impose enough punishment so that the expected net benefit of crime to the criminal is negative. In the preceding example, deterring the thief requires the return of the television set, or its value of $1000, plus an additional fine.

According to the preceding discussion, tort law often aims to internalize costs, such as the risk of accidents. Once costs are internalized, actors are free to do as they please, provided that they pay the price. Internalization, however, is not the proper goal when perfect compensation is impossible in principle or in practice, or when people want law to protect their rights instead of their interests, or when enforcement errors systematically undermine liability. In these circumstances, law's proper goal is deterrence. When deterrence is the goal, actors are not free to pay the price and do as they please. Instead, punishments are calibrated to deter those actors who prefer to do the act in spite of its price.

The connection between the sanction and the actor's psychology tips off the observer as to whether the law aims for internalization or deterrence. As the actor's psychological commitment to the act increases, deterring the actor requires a larger sanction. When the goal is deterrence, a more severe punishment goes with greater psychological commitment to the act. For example, deterrence requires a deliberate act to receive harsher punishment than the same act done spontaneously. Similarly, deterrence requires harsher punishment for a repeated crime than a first offense.

In contrast, the actor's psychological commitment to the act does not affect the goal of internalization. Internalization concerns those costs the actor imposes on others. The cost to others depends on the harm caused by the act, not the actor's

commitment to doing it. As the actor's psychological commitment to the act increases, internalization does not require the sanction to increase. For example, internalization does not require stronger sanctions for the same act done deliberately rather than spontaneously, or for a repeated act rather than a one-time act.

Now we return to the first of our fundamental questions, "What acts should be punished?" Acts should be punished when the aim is deterrence, whereas acts should be priced when the aim is internalization.[6] The law should aim for deterrence when perfect compensation is impossible in principle or in practice, when people want law to protect their rights instead of their interests, or when enforcement errors systematically undermine liability.

QUESTION 12.7: We gave three reasons for having criminal punishments instead of tort liability. Give a concrete example illustrating each reason.

B. Rational Crime

We have offered some economic reasons why criminal law is needed to supplement tort law. Now we develop a predictive theory of criminal behavior, first by explaining how a rational, amoral person might decide whether to commit a crime. (Later we consider the relationship between diminished rationality and crime.) By a "rational, amoral person," we mean someone who carefully determines the means to achieve illegal ends, without restraint by guilt or internalized morality.

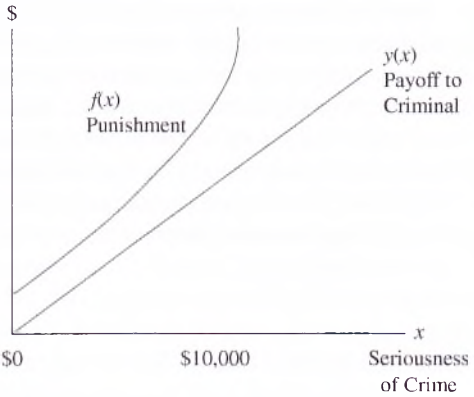
Crimes can be ranked by seriousness. Let x denote the seriousness of a crime, where $x = 0$ indicates no crime and $x > 0$ indicates a serious crime. More serious crimes often have a larger payoff for the criminal. Let y denote the criminal's payoff, where $y = y(x)$ and $y(x)$ increases in x. To be concrete, consider the crime of embezzlement by an accountant in a small company. The seriousness of embezzlement is partly measured by the amount stolen. The accountant can embezzle nothing, in which case $y = x = \$0$, and there is no crime. Alternatively, the accountant can embezzle a lot, say \$10,000, in which case $y = x = \$10{,}000$ and the crime is serious.

Punishment can be ranked by severity. Let f denote the severity of the punishment, where $f = 0$ indicates no punishment and $f > 0$ indicates severe punishment. More severe punishments attach to more serious crimes, so $f = f(x)$, and $f(x)$ increases in x. To be concrete, consider a fine to punish embezzlement. To punish, the fine must exceed the criminal's payoff: $f(x) > y(x)$.

Figure 12.2 depicts these assumptions. The horizontal axis indicates the seriousness of the offense as measured by the amount embezzled, x. The payoff to the criminal, denoted $y(x)$ and measured on the horizontal axis, also equals the amount embezzled. Hence, $y(x)$ slopes up at 45 degrees. The curve denoted $f(x)$ and labeled "punishment" shows the severity of the punishment prescribed by law as a function of the seriousness of the offense. The punishment is assumed to be a fine. The curve $f(x)$ slopes up to indicate that the punishment becomes more severe as the crime becomes

[6] See Robert Cooter, *Prices and Sanctions*, 84 COLUM. L. REV. 1523 (1984).

FIGURE 12.2
Payoff and punishment.



more serious, and $f(x)$ lies above the payoff $y(x)$ because the sanction is a *punishment*—that is, it exceeds the criminal's payoff.

If every crime were punished with certainty, committing crime would not pay. Hence, the criminal would choose x to equal zero.

Criminal Corporations?

Corporations regularly commit torts. For example, much of the law of consumer-product liability concerns torts by corporations. When a corporation commits a tort, liability is imposed upon the organization. But what about crimes? Can a corporation commit a crime? There is a legal obstacle to convicting corporations of crimes: *mens rea*. An individual can have a guilty mind, but it is not clear that organizations can. *Mens rea* requires the intention to do wrong and cause harm. Presumably, organizations lack minds, so they also lack intentions (except metaphorically).

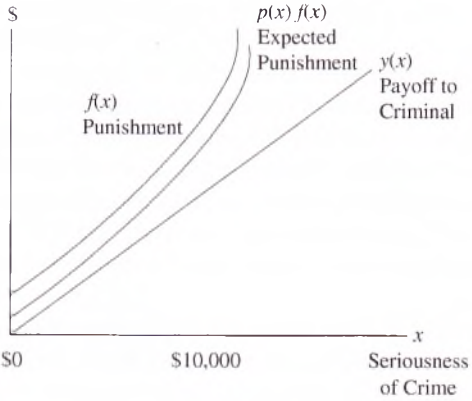
So long as it was thought that organizations could not have criminal intent, the crimes that corporations could commit were limited to so-called *strict liability crimes*. Strict criminal liability does not require intending to do anything wrong. Examples of strict liability crimes are selling uncertified drugs or transporting explosives by forbidden routes. Other crimes, like manslaughter, fraud, or assault, could be committed by the members of the corporation, but not by the corporation itself.

The ability to prosecute corporations for strict liability crimes gives regulators and other officials an additional method for deterring corporate wrongdoing. In a civil suit, the prosecutor only needs to establish liability by the preponderance of the evidence, but damages are limited to compensation for the harm actually caused by the wrongdoing (and, possibly, punitive damages). In a criminal suit, the prosecutor has to prove his case beyond a reasonable doubt, which is harder to do. However, a successful criminal prosecution results in punishment, not just liability.

QUESTION 12.8: Assume that a corporation commits a tort that is also a strict liability crime. How should the state decide whether to bring a civil action or a criminal prosecution?

QUESTION 12.9: What does it mean to say that a corporation intends to do something? Can corporations be punished beyond the value of their assets?

FIGURE 12.3
Payoff, sanction, expected sanction.



In reality, punishment is probabilistic, not certain. The offender may escape detection, apprehension, or conviction. A rational decision maker takes the probability of punishment into account when contemplating the commission of any crime. The *expected* punishment equals the probability p of punishment times its severity: pf. To illustrate, if the fine for embezzling $1000 equals $2000, and the probability that an offender will be caught and convicted equals .75, then the expected punishment equals .75($2000) = $1500. The expected punishment curve pf in Figure 12.3 necessarily lies *below* the actual punishment curve f, because the probability p is less than 1.

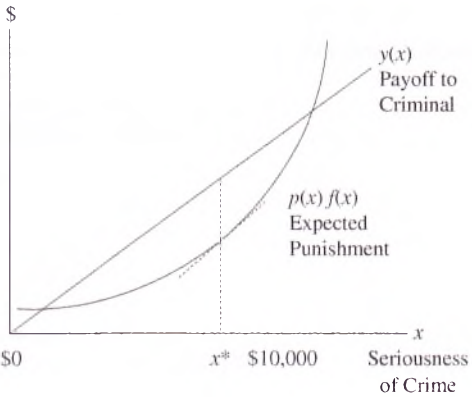
Efforts to detect, prosecute, and convict criminals normally increase with the crime's seriousness. Thus, the probability p of a sanction is a function of the crime's seriousness, $p = p(x)$, and $p(x)$ increases in x. Also the punishment $f(x)$ increases with the crime's seriousness. Thus, the expected sanction $p(x)f(x)$ increases with the crime's seriousness, as depicted in Figure 12.3.

The difference between the criminal's payoff $y(x)$ and the expected punishment $p(x)f(x)$ equals the criminal's expected net gain from crime. The expected punishment curve $p(x)f(x)$ in Figure 12.3 lies above criminal's payoff $y(x)$ for all values of x, which means that crime does not pay for a person facing the expected punishment as depicted in Figure 12.3.

Most people are in the situation most of the time in which crime does not pay. However, sometimes a person is in circumstances in which crime pays. Crime pays, for example, when a person has the opportunity to commit the crime with little chance of getting caught. Crime also pays in circumstances where the criminal suffers relatively little from the punishment. Figure 12.4 depicts someone in circumstances where crime pays. The criminal's payoff function $y(x)$ lies above the expected punishment $p(x)f(x)$ for some values of x. Consequently, embezzling low amounts of money yields an expected net gain. As the seriousness of the crime increases, the actual payoff increases more slowly than the expected punishment. Consequently, embezzling large amounts of money yields an expected net loss.

Exactly how much will a criminal embezzle? We can read off Figure 12.4 exactly how serious the most profitable offense is. The expected profit from the offense equals the difference between the payoff $y(x)$ and the expected punishment $p(x)f(x)$, which is

FIGURE 12.4
Rational crime.



represented on the graph by the vertical distance between these two curves. The vertical distance is maximized when the seriousness of the offense equals x^*. Consequently, the rational criminal embezzles x^*.

This conclusion can be expressed in marginal values. So x^* solves

$$\max\ y(x) - p(x)f(x).$$

The marginal benefit to the criminal from increasing the seriousness of the offense by a small amount is given by the slope of a tangent line to the payoff curve, which we denote y'. The marginal expected cost to the criminal is equal to the expected increase in punishment from increasing the seriousness of the offense by a small amount, which is given by the slope of a tangent line to the expected punishment curve, which we denote $p'f + pf'$. The criminal maximizes the net benefits of the crime by embezzling an amount of money up to the point at which the marginal benefit of an additional amount embezzled equals the marginal expected punishment:

y'	$=$	$p'f + pf'$.
criminal's marginal benefit		criminal's marginal expected cost of punishment

For values of x below x^*, the marginal benefit exceeds the marginal expected cost to the criminal, so the criminal will increase the seriousness of the offense. For values of x above x^*, the marginal expected cost exceeds the marginal benefit, so the criminal will decrease the seriousness of the offense. For x equal to x^*, the marginal benefit equals the marginal expected cost, so the criminal maximizes his net payoff by not changing the seriousness of the offense.

The marginal expected punishment for embezzling an additional dollar has two components: the change in the probability of punishment, p', multiplied by the fine; and the change in the severity of punishment, f' multiplied by the probability of punishment. We can attach signs to these two components. More serious crimes attract greater enforcement effort by the authorities, so the probability of punishment usually increases with the seriousness of the crime. Thus, p' is usually a positive number. Furthermore, the severity of the punishment almost always increases with the seriousness of the

crime, so f' is a positive number. Because p' and f' are usually positive, the expected-punishment curve in Figure 12.3 slopes up.

We can use this analysis to predict the response of criminals to changes in marginal costs and benefits. An investment of more effort in enforcing criminal law can increase the marginal probability p' of punishing the criminal. Similarly, an investment of more effort in punishing criminals, such as improving the system of collecting fines, can increase the marginal severity f'. According to the preceding equation and graphs, an increase in p' or f' will decrease the seriousness of the offense committed by the rational criminal. More certain and severe punishment reduces the seriousness of crime.

Now consider a change in the opportunity to commit crimes like embezzlement. The marginal benefit of crime falls when the opportunities to commit lucrative crimes diminish. According to the preceding equation, a decrease in the marginal benefit of crime, y', will decrease the seriousness of the offense committed by the rational criminal. Conversely, when the opportunity to embezzle increases, the rational criminal increases the seriousness of his offense until the risk of punishment rises to a level commensurate with his improved opportunities for crime.[7]

QUESTION 12.10: How do Figures 12.3 and 12.4 change if the police become more efficient and catch a larger proportion of criminals? What does the change in the figures indicate about a change in criminal behavior?

QUESTION 12.11: Assume that the punishment function $f(x)$ increases by a constant k, so that $f(x)$ becomes $f(x) + k$. What is the effect on the criminal's behavior?

QUESTION 12.12: Assume that the payoff function $y(x)$ increases by a constant k, so that $y(x)$ becomes $y(x) + k$. What is the effect on the criminal's behavior?

C. Applying the Model of Rational Crime to Public Policy

Our discussion has focused on the crimes' seriousness, not the number of crimes committed. With a slight adjustment, our model of the seriousness of crimes can become a model of the quantity of crimes. Instead of interpreting x as the seriousness of a crime that someone commits, we interpret x as the number of crimes of given seriousness that someone commits. In the case of embezzlement, instead of x's indicating the amount of money embezzled in a single crime, let x represent the number of times that a single criminal embezzles a given amount of money. Thus, x might represent the number of times that an accountant steals $1,000 from the monthly payroll.

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[7] See if you can explain why there might be systematic variations in the opportunities to commit, say, embezzlement. What effect might improvements in the technology of tracking a firm's resources have on the opportunities for crime? Also, explain how opportunity costs influence the decision to commit a crime.

Reinterpreting x as the number of crimes of given seriousness, rather than the seriousness of the crime, does not change the shape of the curves. For crimes of given seriousness, the criminal's payoff y is an increasing function of the number of crimes that he or she commits, $y = y(x)$; the criminal's punishment f is an increasing function of the number of crimes that he or she commits, $f = f(x)$; and the probability of punishment p is an increasing function of the number of crimes that he or she commits, $p = p(x)$. As before, the criminals commits the number of crimes x^* that maximizes the net payoff $y(x) - p(x)f(x)$.

Summing the number of crimes of a particular type committed by each criminal gives the aggregate number of these crimes in society, denoted X where $X = \sum x$. Aggregate crime responds to punishment just like the response of the underlying individuals. An increase in the marginal probability or seriousness of punishment causes a decrease in the aggregate number of crimes. Thus, Figure 12.5 depicts aggregate crime as a decreasing function of expected punishment.

The demand curve for goods slopes down because, when the price rises, some people buy less of the good and others stop buying it. Similarly the crime curve in Figure 12.5 slopes down because, when the expected punishment rises, some criminals commit fewer crimes and other criminals stop committing them. The proposition that the demand curve for goods slopes down bears the august title, the "First Law of Demand." Similarly, the proposition that an increase in expected punishment causes a decrease in crimes is the "First Law of Deterrence."

Perhaps you think that the First Law of Deterrence is false because people commit crimes passionately, irrationally, or ignorantly. In laboratory experiments, even rats obey the First Law of Deterrence, and people at their worst are more rational than rats at their best. Economists have a lot of confidence in the First Law of Deterrence, just as they have a lot of confidence in the First Law of Demand.

The interesting question for economists is not whether people commit less crime when the expected punishment increases. Rather, the interesting question is "How much do crime rates respond to increases in expected punishment?" In other words, the interesting question concerns the *elasticity* of the supply of crime. (See the discussion of price elasticity in Chapter 2.) When the supply of crime is elastic, policymakers can reduce crime significantly by moderate increases in expected punishment. When the supply of crime is inelastic, however, the variables encompassed by the economic model of rational

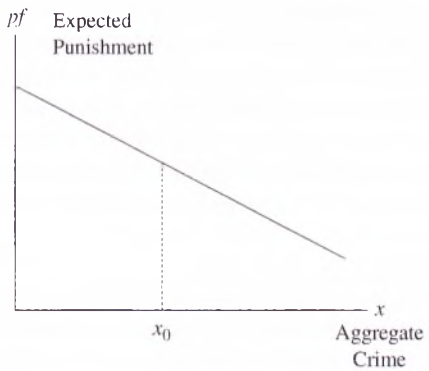

FIGURE 12.5
Aggregate Crime.

crime are less important than other variables, such as employment rates, family configuration, drug addiction, quality of schooling, and so on.

We have explained how the rational, amoral criminal responds to changes in a few variables—the probability of punishment, the severity of punishment, and opportunities to commit crimes. Our model of rational crime simplifies reality in various ways in order to reason carefully about causes and effects. Empirical research requires a more complicated analysis. Crime has multiple causes, so empirical research on crime should especially rely on multiple variable analysis. We cannot develop more complex models here, but we will briefly discuss some of our simplifying assumptions.

We assume an informed criminal, who knows the costs, benefits, and probabilities associated with the crime; we assume a risk-neutral criminal; and we assume that all the criminal's costs and benefits are monetary. Most criminals are imperfectly informed about the benefits of crime and the probabilities and magnitudes of punishment. Criminals are unlikely to be neutral toward risk. Most people are risk-averse, although criminals may be unusually risk-loving. (Later we discuss more about risk.) Many crimes have nonmonetary punishments and rewards, such as disapproval in the larger society and prestige within the society of criminals. These remarks indicate some complications to the simple model required for empirical research.

D. Criminal Behavior and Criminal Intent

Economists usually describe the economic model of decision making as an account of behavior, not as an account of subjective reasoning processes. Thus, consumers are said to act *as if* they were computing marginal utilities. Similarly, criminals are said to act *as if* they were comparing marginal benefits of crime and expected punishments. The commission of most crimes, however, requires criminal intent. To commit crimes, it is not enough for people to act *as if* they had criminal intent. They must actually have it. So, criminal law concerns reasons, not just behavior.

Notwithstanding its focus on behavior rather than reasons, the economic model of rational choice remains useful as an account of the criminal mind. Criminal intent is often distinguished according to the level of deliberation. To illustrate, a crime may be committed spontaneously in the sense that the criminal did not make any plans in advance. Spontaneous criminals do not search out opportunities to commit crimes, but when opportunities come their way, they avail themselves of them. At the opposite extreme, crimes may be carefully planned out in advance and all the possibilities weighed. Thus, a premeditated crime shows a greater degree of deliberation than a spontaneous crime.

The economic model may be understood as an account of the deliberations of a rational, amoral person when deciding in advance whether to commit a crime. In the case of premeditated crimes, the economic model may correspond to the actual reasoning process of the criminal. In the case of spontaneous crimes, where there is no deliberation, the economic model may nevertheless be understood as an account of the criminal's behavior but not of his reasoning. For spontaneous crimes, criminals may not actually reason as in the economic model, but they may act as if they had. By saying that criminals act "as if they had deliberated," we mean that when presented with the opportunity to commit crimes, they respond immediately to benefits and risks as if they

had weighed them. If they respond in this way, their behavior can be explained by the economic model, even though their reasoning processes are only a fragment of it.

Much of criminal law focuses on criminal trials, which concern individual defendants and their alleged intent when committing particular crimes. The focus on individuals committing particular crimes, however, is not the only perspective in criminal law. General policies toward crime must be set by legislators and officials in the criminal justice system. For example, police have to decide where to send patrols in a city, and prosecutors have to decide which crimes to prosecute. Such general policies must be formulated with an eye to their aggregate effects, such as the social costs of crime.

We have asserted that the economic model of choice describes the deliberation of rational criminals when their crimes are premeditated, and we have asserted that rational criminals behave as if guided by the economic model when they commit spontaneous crimes. If this assertion is true, empirical investigations should demonstrate that crime rates respond to the considerations identified in our model, specifically, that crime rates respond in the predicted manner to punishments and payoffs. This is an empirical question to be answered by facts, not logic. Fortunately, there is a great deal of evidence on this matter, and we shall present a summary of the literature on deterrence in the next chapter. Now we turn to crime that is not so rational.

QUESTION 12.13: Why should the law punish a person more severely for committing the same crime deliberately rather than spontaneously?

QUESTION 12.14: Laboratory experiments demonstrate that rats respond in an economically rational way to punishment, yet rats cannot legally commit crimes. Why not?

E. Diminished Rationality—Saturday Night Fever[8]

The economic theory of behavior begins with super-rationality, but it need not end there. Many crimes and torts occur under conditions of diminished rationality, which economists have begun to model. For example, many crimes result from *lapses*, which are temporary aberrations in behavior that we discussed in Chapter 7. Thus, young people often commit crimes when they temporarily lose control of their emotions and act impulsively. We call this behavior "Saturday Night Fever." The proof of Saturday Night Fever is that a person wakes up on Sunday morning and thinks, "I can't believe what I did last night!"

In this section, we develop an economic model for this type of lapse. Prudence involves giving reasonable weight to future events, whereas imprudence involves giving unreasonably little weight to future events. Occasional imprudence is a kind of lapse in which the actor temporarily discounts the future consequences of his or her behavior at a much higher level than ordinarily would be the case. When the act in question is illegal, a high discount rate prevents the actor from giving as much weight to future punishment as he or she would ordinarily give.

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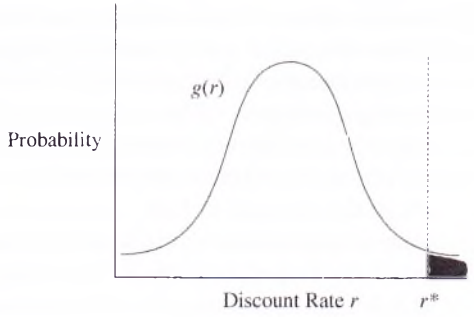
[8] Robert Cooter has developed this model in several papers, most recently *Models of Morality in Law and Economics: Self-Control and Self-Improvement for the Bad Man of Holmes*, 78 B. U. L. REV. 903 (1998).

FIGURE 12.6
Tipping point for lapses.



To formalize this idea, imagine that a person draws his discount rate for future costs and benefits from a probability distribution. Most of the time, the person draws a moderate discount rate from the center of the distribution, so he acts prudently and does not commit crimes. From time to time, however, he draws a very high discount rate from the tail of the distribution. In this situation, the person may lapse and commit a crime.

To express this argument in notation, assume that wrongdoing yields an immediate benefit at time 1, denoted b_1, risks future punishment at time 2, denoted c_2 for cost. Let r denote the rate at which the actor discounts costs for futurity and uncertainty.[9] The "tipping point," denoted r^*, is the discount rate at which the immediate benefits equal the expected future costs. Thus, an actor whose discount rate exceeds r^* commits the wrong, and an actor whose discount rate falls short of r^* does not commit the wrong.

As moods shift, a person may discount the future at different rates. The horizontal axis in Figure 12.6 depicts possible values of the discount rate r depending on the actor's mood. The vertical axis depicts the probability distribution $g(r)$ that the actor will have different values of r at any point in time. If the actual value r drawn from the distribution $g(r)$ equals or exceeds r^*, the actor commits the wrong. The small shaded area in the right tail of the distribution represents the probability that the actor commits the wrong. Conversely, if the actual value drawn from the distribution $g(r)$ is less than r^*, the actor does not commit the wrong. The unshaded area in the distribution represents the probability that the actor does not commit the wrong.

Mood, which determines the actor's discount rate for uncertainty and futurity, obeys a mysterious chemistry. In effect, Figure 12.6 assumes that mood is unpredictable at any point in time but distributes predictably over time. With low probability, the actor draws a value of r greater than r^* and commits the wrong. With high probability, the actor

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[9] The discount rate r exceeds 1. To illustrate, the discount rate might be, say, $r = (1 + 0.07)$. Thus, the rational actor follows this rule:

$$b_1 - \frac{c_2}{r} < 0 \Rightarrow \text{do not commit the wrong.}$$

The tipping point occurs where the actor is equally poised between committing the wrong and not committing it. The tipping point value of r, denoted r^*, is found by solving the preceding equation, which implies

$$r^* = \frac{c_2}{b_1}.$$

draws a value of r smaller than r^* and does not commit the wrong. These characteristics of the distribution correspond to the proposition that crime is unusual.

An increase in the variability of moods increases the probability of wrongdoing by the actor. In terms of Figure 12.6, spreading the distribution by shifting density into the tails increases the area to the right of r^*. Greater probability density to the right of r^* implies an increase in the probability of wrongdoing.[10] Having volatile emotions, which corresponds to high variance in the distribution $g(r)$, causes young people to commit disproportionately many crimes. Conversely, a decrease in the variability of moods decreases the probability of wrongdoing. Maturation stabilizes the emotions, which reduces the variance in the discount rate and causes older people to commit fewer crimes.

Will increasing punishment c cause crime to decrease? Whenever the actor draws a discount rate close to the tipping value r^*, a small change in punishment c can tip the decision one way or another. For example, a small increase in punishment causes the actor to decide against committing the wrong, whereas a small decrease in punishment causes the actor to decide in favor of committing the wrong. Thus, punishment deters.

Earlier we explained that the issue for economists, however, is *how much* punishment deters. The probability that the actor draws a discount rate close to r^* is low, whereas the probability that the actor draws a discount rate much smaller or larger than r^* is high. When r is not close to r^*, a small change in punishment cannot tip the decision one way or another.

Insofar as imprudent lapses cause crime, more severe punishment is not a very effective deterrent. Severity is ineffective because the cause of crime is unreasonable discounting of future punishment. In these circumstances, increasing the punishment's severity gets discounted too much to have a large effect on behavior. Alternatively, increasing the certainty and immediacy of punishment may be more effective for deterring crime. For example, if teenagers in the school yard sometimes commit violence against each other, having a disciplinarian present to administer certain and swift punishment may prevent violence more effectively than increasing the severity of future punishment.

Moods are more variable for youth than adults. In terms of Figure 12.6, aging reduces the variance in $g(r)$. Deterrence of youth crime may require certain and swift punishment, whereas severe punishment that is uncertain and remote may deter many kinds of adult crime, such as embezzling. In general, the state should punish differently youthful crime due to lapses and deliberative crime by adults. Certainty of punishment is relatively important for impulsive youths, and severity is relatively important for deliberative adults.

A recent empirical study confirms that young criminals are undeterred by severe, rather than certain, punishments. The severity of punishments prescribed by law jumps up for many crimes when an adolescent turns 18 years old and becomes a legal adult. If severity deters, then people should commit more crimes as they approach their eighteenth

[10] To be precise, the probability of wrongdoing may increase, and cannot decrease, with a mean-preserving spread in $g(r)$.

birthday, and they should commit fewer crimes once they turn 18. Contrary to this prediction, economic analysis of Florida arrest data shows no decrease in the probability of committing a crime when a person turns 18. Youth who become legal adults are undeterred by the discontinuous increase in the punishments that they face. Although longer sentences do not deter, more certain punishment may deter, which suggests that redirecting money away from prisons and toward police might significantly reduce youth crime.[11]

Besides punishment, this model predicts that social policies can reduce crime by reducing variability in moods. To illustrate, chemical stimulants or depressants, such as alcohol and drugs, increase variability in moods. Social policies that reduce episodic use of alcohol and drugs will decrease crime. Psychological testing and counseling and the use of new families of medicinal drugs can help adolescents to stabilize their moods. A regular rhythm to life, such as holding a steady job, presumably reduces variability in moods for most people.

We have explained that emotions cause actors to discount the future unreasonably from time to time. In addition, research suggests that some people—especially some young people—systematically discount the future unreasonably. The most important empirical finding is that people are more consistent about their trade-offs between two future choices than between a present and future choice. To illustrate, assume that a child must choose between a promise to receive one candy on Saturday or two candies on Sunday. He prefers the two candies when he chooses on Monday, Tuesday, Wednesday, Thursday, or Friday. When Saturday arrives, however, the child may switch and choose to receive one candy immediately rather than two candies the next day. Notice that the child's preference for trading one future choice against another conflicts with his preference for trading a present choice against a future choice.[12] The child's trade-off between a present and future choice seems unreasonable compared to his trade-off between two future choices. When people discount the future unreasonably in this way, the immediate gain from doing something wrong attracts them more strongly than the threat of a future punishment. Increasing the severity of the future sanction has little effect on their behavior because the future has little effect on their behavior.

Unreasonable discounting of the future, whether probabilistic or systematic, is a form of diminished rationality that afflicts many people. When rationality diminishes too far, a person becomes insane. An insane person is legally incapable of committing a crime. The insanity defense against a criminal charge in the United States basically follows the nineteenth-century M'Naughten rule: An actor is insane who does not know the difference between right and wrong. A criminal knows the difference and makes the wrong choice, whereas an insane person cannot choose properly because he does not know the difference. While an insane person cannot be punished legally, he can be confined until his insanity no longer threatens other people.

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[11] David S. Lee & Justin McCrary, *Crime, Punishment, and Myopia*, NBER Working Paper 11491 (2006).

[12] Economists call this behavior "time-inconsistent preferences," philosophers call it "akrasia," and psychologists call it "hyperbolic discounting." For a policy application, see Jonathan Gruber & Botond Koszegi, *Tax Incidence when Individuals Are Time Inconsistent: The Case of Cigarette Excise Taxes*, 88 J. PUB. ECON. 1959 (2004).

The set of people who cannot tell right from wrong presumably is not identical to the set of people who cannot be deterred. The threat of confinement presumably deters some people who are legally insane from harming others. Perhaps psychologists and economists will someday improve our ability to distinguish between the insane who can and cannot be deterred. Special policies might be devised to deter the former, just as we recommend special policies for young criminals that emphasize the certainty and not the severity of punishment.

F. The Economic Goal of Criminal Law

Crime imposes various costs on society, which we reduce to two basic kinds. First, the criminals gain something, and the victims suffer harm to their persons or property. The resulting social harm, according to the standard view among economists, equals the net loss in value. To illustrate by Example 3 at the beginning of this chapter, if a thief shatters a car window costing $100 and steals a radio worth $75, then the criminal gains $75 and the victim loses $175, for a net social loss of $100. The net loss equals value destroyed, not value redistributed. Second, the state and the potential victims of crime expend resources to protect against it. For example, homeowners install bars on their windows, and the city employs police officers to patrol the streets.

We described two basic kinds of social costs: the net harm caused by crime and the resources spent on preventing it. The optimal amount of crime, or efficient deterrence, balances these costs. We propose the following simple goal for analyzing criminal law: *Criminal law should minimize the social cost of crime, which equals the sum of the harm it causes and the costs of preventing it.*

These two basic kinds of social costs often suffice for purposes of analysis. When analysis requires more complexity, we can refine and expand the types of social costs. To illustrate, criminal activities divert the efforts of criminals from legal to illegal activities, which imposes an opportunity cost. For example, an accountant who devotes herself to embezzling funds has less time for legitimate bookkeeping. Furthermore, while in prison, an accountant cannot audit books for clients. The opportunity cost of crime among accountants may be large enough to affect the optimal deterrence of embezzlement. From time to time, we will expand the definition of social costs to include such losses as the criminal's opportunity cost, as required by our analysis.

Another complexity concerns the criminal's perceived benefit from crime. According to the standard view among economists, as mentioned, the criminal's benefit partly offsets the victim's cost. Moralists, however, might say that the criminal's illicit gain should not count as a social benefit. Ordinarily people reach different conclusions depending on the details of the case. To illustrate, most people agree that the benefit enjoyed by a person who steals food from an unoccupied cabin to save his life when lost in the wilderness should count as a social gain, and most people agree that the pleasure felt by a rapist (if there is such a pleasure) should not count as a social gain commensurate with the victim's pain.

Unfortunately, many important examples that confront policymakers do not provoke a consensus, even among economists, about the social value of the criminal's

gain. To illustrate, some government regulations on industry promote efficiency by correcting market failures, such as prohibitions against dumping toxic chemicals in rivers, whereas other regulations profit politically favored groups by making competition a crime, such as restrictions on agricultural production. A dramatic example of disagreement over regulations concerns the United States' most creative and profitable financier in the 1970s, Michael Milken, who used high-risk bonds ("junk bonds") to finance leveraged buyouts and hostile takeovers of corporations. He was sentenced to prison for violating technical regulations in security laws. Some economists believe that he did much to help modernize American industry, and other economists believe that he undermined the stock market by engaging in fraud.

When policymakers disagree about the social benefits of crime, a good strategy for economists is to clarify the issues without trying to resolve the dispute. Following this strategy, we will avoid arguments whose conclusions require taking sides in such debates.

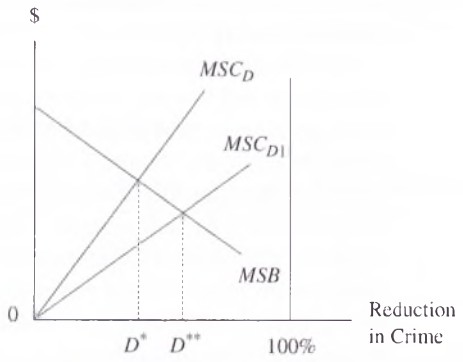
QUESTION 12.15: What are some ways to measure the social costs of the harm caused by murder? (Recall our discussion in Chapter 7 of how to assign value to a life lost in an accident.)

QUESTION 12.16: Compare the simple economic goals of criminal law and tort law.

G. Optimal Amount of Crime Deterrence and of Efficient Punishment

Figure 12.7 depicts how to strike the balance between the net cost of the harm caused by crime and the cost of preventing it. In the figure, the horizontal axis measures reductions in the amount of criminal activity, ranging from no reduction at the origin up to a complete absence of crime at the amount 100 percent. Dollar amounts are measured along the vertical axis. The curve MSC_D represents the marginal social costs of achieving a given level of crime reduction. MSC_D slopes upward because officials

FIGURE 12.7
The efficient level of deterrence.



undertake easy deterrence before resorting to harder deterrence. Consequently, achieving additional reductions in crime becomes increasingly costly. For example, reducing crime by an additional 1 percent is easier when crime has already been reduced 5 percent than when crime has already been reduced 95 percent.

The curve labeled *MSB* measures the marginal social benefit of achieving various levels of crime reduction or deterrence. *MSB* slopes downward because the benefit to society of a small reduction in the amount of crime declines as the total amount of crime declines. Thus, the reduction from, say, 5 percent to 7 percent benefits society more than the reduction from 95 percent to 97 percent.

Socially optimal deterrence occurs at the point where the marginal social cost of reducing crime further equals the marginal social benefit. In Figure 12.7 the social optimum occurs at the level of deterrence marked D^*. Notice that for any level of reduction in crime less than D^*, the marginal social benefit of a further reduction exceeds the marginal social cost, so society should reduce crime further. Similarly, for any level of reduction in crime greater than D^*, the marginal social costs of a further reduction exceed the marginal social benefit, so society should allow more crime to go undeterred.

Notice that changes in MSC_D and *MSB* can change the optimal level of deterrence. For example, suppose that the opportunity cost of resources devoted to deterring crime falls, and the marginal social benefit of deterrence remains the same; MSC_D would fall to MSC_{D1} and the optimal level of deterrence would increase to D^{**}.

As long as deterrence is costly, the optimal amount of crime is positive. Costly deterrence precludes a rational society from entirely eliminating crime. If deterrence costs rise, the optimal amount of crime rises. If, however, the net harm from crime rises, the optimal amount of crime falls.

In the next chapter, we describe efforts to determine whether marginal deterrence costs more or less than the resulting savings in the cost of crime in the United States; in other words, these studies try to determine whether the value of D for the United States is above, below, or equal to the optimal value of D^*.

Note that this mathematical representation simplifies the computation of optimal deterrence in several ways. One important simplification is that we have not modeled an optimal schedule of punishments for related crimes. Rather than standing alone, criminal penalties form part of an integrated schedule, which influences their optimal values. Using powerful deterrents on less serious crimes often precludes using them on more serious crimes.

To illustrate, assume that life imprisonment is the maximum punishment available in a society and that the law prescribes life imprisonment for embezzling. Now assume that a policeman runs after an embezzler who has a gun. If the policeman apprehends the embezzler, the criminal will be imprisoned for life as required by the harsh law. So, the embezzler might as well try to shoot the policeman. If he succeeds in killing the policeman, he will escape. If he fails, there will be no additional punishment because the punishment for embezzling is already the maximum. In this example, harsh penalties for minor crimes undermine the deterrence of serious crimes. Unfortunately, taking such facts into account when calibrating punishments requires mathematics beyond the scope of this book.

Harsh penalties may violate the moral and constitutional rights of criminals. For example, a law imposing the death sentence for embezzling petty cash would create a large disparity between the severity of the punishment and the seriousness of the offense. Most people would regard the law as immoral, and U.S. judges would probably declare it unconstitutional. Such noneconomic considerations can operate as constraints upon the computation of optimal deterrents.

QUESTION 12.17: Assume the acquisition of computers by the police increases the force's efficiency. How would Figure 12.7 change?

QUESTION 12.18: Assume the acquisition of computers by criminals increases their elusiveness. How would Figure 12.7 change?

H. Mathematics of Optimal Means of Deterrence

Having shown how to determine the optimum amount of deterrence, we next turn to an analysis of the optimal *means* of deterring crime. There are many allocation decisions to be made, such as the choice between foot patrols and car patrols by police, the choice between more police and more prosecutors, and the choice between more fines and more incarceration. We shall examine several of these choices to bring out some underlying principles.

First, consider a choice between allocating resources to make punishment more certain or more severe. For example, allocating more resources to police makes punishment more certain (in that it makes deterrence, detection, and conviction more likely), and allocating more resources to prisons permits longer—more severe—sentences. Recall that the expected punishment equals the probability of punishment multiplied by its extent. For example, the four rows in Table 12.1 represent combinations of a punishment f, which might be a fine denominated in dollars, and a probability p, that result in expected punishment $p \times f$ equal to 10.

When the probability of punishment is multiplied by its severity, the result is the expected punishment. To keep the analysis simple, assume that the amount of crime is constant when the expected punishment is constant. By assumption, all four combinations of fines and probabilities in the preceding table result in the same amount of crime. Consequently, the socially efficient combination is the one that costs less. The one that costs less is almost certainly the fine of $100 applied with probability 0.10. The reason

TABLE 12.1
Expected Punishment for Crimes

f(Punishment)	*p*(Probability)	$p \times f$(Expected Punishment)
10	1.00	10
20	.50	10
40	.25	10
100	.10	10

Insurance for Criminals?

We explained that the state should deter crimes through fines rather than imprisonment whenever possible. The inability of the criminal to pay a fine limits its use. The criminal's bankruptcy forces the justice system to resort to imprisonment. Insurance can overcome the bankruptcy constraint. For example, a $100,000 insurance policy against criminal fines would enable a person with only $10,000 in wealth to pay a $50,000 fine.

It might seem, then, that the state would encourage insurance against criminal fines. In fact, the law in the United States and elsewhere typically forbids writing insurance policies to cover criminal fines. Apparently, officials fear that insurance, because of moral hazard, will cause criminals to commit more crimes because the punishment will fall upon the criminals' insurers. According to this argument, insurance blunts deterrence. If insurance against criminal fines were allowed, however, the insurance companies would want to monitor policyholders to make sure that they do not commit crimes. Thus, private enforcement by insurance companies would supplement public enforcement by the police. Private enforcement by insurance companies might be effective in deterring crime. This body of law needs rethinking.

is that a higher probability requires more expenditures on police and prosecutors, whereas a large fine costs not much more to collect than a small fine. Indeed, fines are so cheap to administer that they yield a profit to the state, at least so long as the fine is not too large relative to the offender's wealth. Because certainty of punishment is costly for the state to achieve relative to severity of punishment by a fine, large fines with low probability are typically more efficient than low fines with high probability.

So far, our discussion assumed that criminals have the ability to pay fines. Many criminals are too poor to pay a fine commensurate with the seriousness of their crimes. These circumstances require punishment by incarceration. In economic jargon, we say that the incarceration enables the sanction to escape the criminal's bankruptcy constraint. However, fines are cheap for the state to collect and incarceration is very expensive. This fact has an important consequence for the optimal combination of fines and jail sentences: It seldom makes sense to put someone in jail until the state first exhausts its ability to collect a fine from the criminal. If the state violates this rule and incarcerates someone with the ability to pay a fine, the state could have saved taxpayers' money and held deterrence constant by increasing the fine to the maximum and reducing the prison sentence by an offsetting amount. The optimal combination of fines and incarceration includes the maximum fine that the criminal can pay. This fact prompts policymakers to look for ways to increase the capacity of criminals to pay fines. In the next chapter we describe a system developed in northern Europe, called the "day fine," which attempts to overcome the criminal's bankruptcy constraint that limits his ability to pay a fine.

Our earlier discussion explained that unreasonably high discounting between present and future weakens the ability of the threat of future punishment to deter. We apply this insight to incarceration. When the punishment in question is incarceration, a more severe punishment means longer incarceration. With unreasonably

high discounting, adding time at the end of the prison sentence has little deterrence value.[13]

Does America have the combination of police and prisons that roughly minimizes the sum of the harm caused by crime and the cost of preventing it? In America the cost of one additional policeman roughly equals the cost of incarcerating someone for three years. If hiring an additional policeman and reducing average prison sentences by three years results in less crime, then America could reduce the amount of crime at no additional cost to taxpayers by hiring more police and shortening prison sentences. Some states like California have sharply increased lengths of prison sentences for repeat felons—the policy of "three strikes and you're out." The fact that young criminals discount the future unreasonably suggests that more police and shorter prison sentences would reduce the cost of violent crime committed by youths in California.[14]

QUESTION 12.19: Explain in words when efficiency requires severe punishments with low probability, and when efficiency requires mild punishments with high probability.

QUESTION 12.20: How does full employment reduce the cost of deterring crime?

I. Private Deterrence

Private individuals, not public officials, deter much crime. Thus, Example 4 at the beginning of this chapter concerns whether Yvonne should protect herself by (1) installing bars on her windows, (2) installing a loud burglar alarm, or (3) buying a gun. The example raises the question of whether private citizens have incentives to invest optimally in deterring crime. In general, the answer is "no." Private citizens are mostly concerned with private costs and benefits, which do not necessarily align with public costs and benefits.

To illustrate, suppose that Yvonne installs a brand *X* double-bolt lock on her front door. Installing the lock has private value for her if it prevents the burglary of her house. Call this effect *private deterrence* because it benefits the private investor in precaution. Installing the lock has public value for Yvonne's neighbors if burglars tend to avoid neighborhoods in which some houses have brand *X* double-bolt locks. Call this effect *public deterrence* because it benefits the public. Installing the lock has little social value if it prevents the burglary of Yvonne's house by causing a burglar to rob the house next door. Call this effect *redistributing crime*. Redistributing crime has no net social benefit.

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[13] We report on some additional empirical evidence on these matters in the next chapter.

[14] Space does not allow us to discuss the relationship between discounting future events and discounting uncertain events. Unreasonable discounting of the future may go with unreasonable discounting of uncertainty. These two forms of unreasonable discounting reinforce each other with respect to deterrence in that each one requires a large increase in the length of incarceration to offset a small decrease in the certainty of punishment.

Modern Bounty Hunters?

People complain about increasing crime. Would privatizing enforcement help? Consider this privatization plan: Whoever apprehends a criminal receives the fine the criminal owed to the state. Instead of relying on police, society would rely upon bounty hunters to apprehend criminals whose crimes are punishable by fines. To keep the bounty hunters under control, they would be bonded and held liable for any harm that they cause by apprehending the wrong person.

This system has a defect much like open-access fishing, which results in overfishing the sea. Giving the full fine to a private bounty hunter might attract too many bounty hunters. To eliminate the defect and prevent excessive bounty-hunting, the state could retain part of the fine and pay the remainder to the bounty hunter. By continually adjusting this "tax," the state could induce optimal private-enforcement effort. This system could work well, for example, in apprehending people who flout parking and motor vehicle laws.

Private investment in preventing crime usually has all three effects: private deterrence, public deterrence, and redistribution. The state should encourage private investments that contribute to public deterrence. The state need not encourage private investments that contribute to private deterrence. The state should not encourage private investment that only redistributes crime.

A simple condition determines whether the redistributive effect is small or large. Before committing a crime, the criminal can observe some private precautions. For burglary, examples of *ex ante observable precautions* include lights on walkways, bars on exterior windows, and exterior alarms. *Ex ante* observable precautions tend to redistribute crime—the mugger avoids lighted streets, and the burglar avoids houses with barred windows and visible alarms. Criminals cannot observe other private precautions until they begin committing the crime. For burglary, examples of *ex post observable precautions* include locks on interior doors, interior alarms, identification marks on valuable objects, and guns owned by residents. *Ex post* observable precautions promote public deterrence by reducing the average profitability of crime. These facts lead to a definite prescription about private investment in preventing crime: *The state should encourage* ex post *observable precautions, and the state need not encourage* ex ante *observable precautions.* (We will discuss the special case of guns—including whether they should be encouraged as an *ex post* observable precaution—in the next chapter.)

QUESTION 12.21: Classify the following precautions against crime into *ex ante* observable and *ex ante* unobservable, and explain your answer: private guards in stores, auto alarms, "quick-dial" emergency phone systems (911 numbers in the United States), hidden cameras, and plainclothes detectives.

QUESTION 12.22: Assume that burglars correctly believe that many people in your neighborhood keep guns. How might this fact increase your security? How might this fact endanger you?

J. Bad Crimes and Good People

Much legal thinking concerns deterring bad people from committing crimes. The law's success in deterring bad people, however, depends on the support of good people to help the police and other legal officials. Civic acts such as helping the police to solve a crime often involve personal sacrifice of time, effort, convenience, or safety. Unless good people make the sacrifice, the police and other officials become ineffective and crime rates soar. The reluctance of citizens to support the police perpetuates high crime rates in some neighborhoods and encourages gang activities. Understanding the prevention of bad crimes requires analyzing the behavior of good people.

The vertical axis in Figure 12.8 represents the amount a person would sacrifice to do his or her civic duty. Sacrifice is measured by the amount the citizen would be willing to pay, which is the money equivalent of time, effort, opportunity, inconvenience, or risk. The horizontal axis represents the proportion of citizens willing to pay the price. According to the graph, roughly 80 percent of the citizens will pay something to do their civic duty and roughly 20 percent will sacrifice nothing.

The sacrifice required of each person to do a civic duty often decreases with the number of people who do it. Figure 12.9 depicts the case where costs decrease

FIGURE 12.8
Willingness to pay to do a civic act.

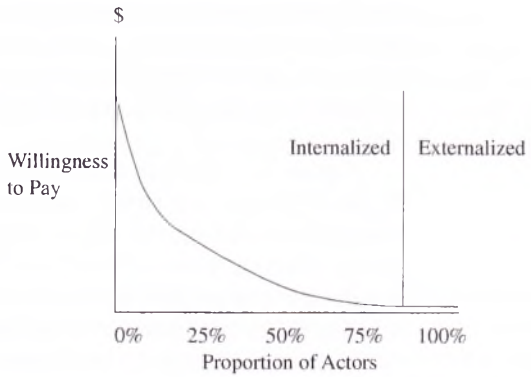


FIGURE 12.9
Cost of doing a civic act.

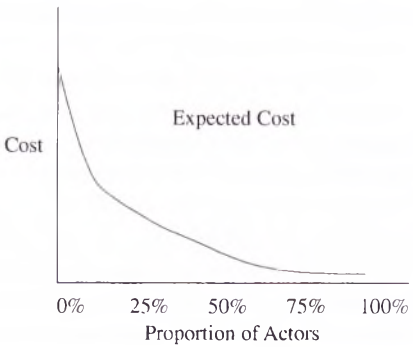
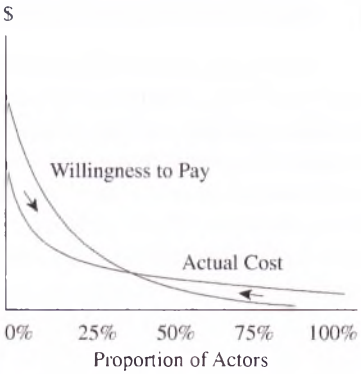


FIGURE 12.10
Stable interior equilibrium.

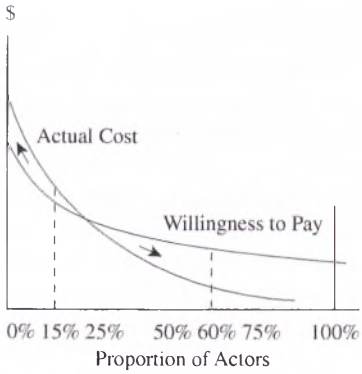


with the number of people who obey the norm. The decrease has a simple explanation: People are notoriously responsive to group pressures, variously described as conformity, herd effects, or social solidarity. With group pressures, an increase in an act's popularity lowers its cost. When most people help the police, a person who does so may feel that others will back him, so he runs less risk of retaliation from the criminal. When most employees in a company will report wrongdoing by their bosses, such as embezzling funds or disregarding environmental laws, each employee has less fear of retaliation and more hope of promotion from making such a report. As fewer people break the rules against smoking in airports, nonsmokers feel less risk of confrontation when asking smokers to stop breaking the rules.

Figure 12.8 depicts a demand curve (willingness to pay) for civic acts, and Figure 12.9 depicts a supply curve (cost of supply). Figure 12.10 combines them. The demand and supply curves intersect roughly at 40 percent, which indicates the equilibrium level of civic acts. If the actual proportion equals 40 percent, people are willing to pay exactly what doing the civic duty costs, so no one changes his or her behavior. Furthermore, we can see that the equilibrium is stable. If the actual proportion is below 40 percent, people are willing to pay more than it costs to perform the civic act, so the proportion of actors increases towards 40 percent. If the actual proportion is above 40 percent, people are willing to pay less than its costs to perform the civic act, so the proportion of actors falls towards 40 percent.

In Figure 12.10, the willingness-to-pay curve has the usual downward slope of a demand curve. However, the cost curve in Figure 12.10, which is equivalent to the supply curve, also slopes down, which is not the usual shape of a supply curve. Even so, this account of civic acts closely tracks the usual analysis of demand and supply. Further increasing the supply curve's slope in Figure 12.10 dramatically changes the analysis. A startling effect occurs when the cost curve slopes down *more steeply* than the willingness-to-pay curve, as depicted in Figure 12.11. Instead of having a stable equilibrium at the intersection of the two curves, two stable equilibria exist as the corners of the graph. At one corner, the number of actors who do civic acts is zero, and at

FIGURE 12.11
Corner equilibria.



the other corner, the number is 100 percent. (A footnote explains why there are two equilibria.[15])

The society characterized by Figure 12.11 could end up in a situation where very few or very many citizens do civic acts. These two possibilities correspond to a world where many people help to suppress crime, or few people do so. Besides deterring criminals, law can help good citizens move to an equilibrium where many people perform civic acts and little crime occurs. In economic jargon, the criminal law "coordinates" good citizens so that society achieves a low-crime equilibrium.

This analysis illustrates a common feature of social norms: multiple equilibria. With multiple equilibria, state laws perform the important function of coordinating the behavior of good people, not just deterring wrongdoing by bad people. This brief discussion introduces students to an exciting new area of research in law and economics—the study of social norms.

Web Note 12.2

As we shall see in the following chapter, there are some clear and testable predictions of the economic theory that we have just outlined, and there is a considerable body of empirical work that we shall summarize there. You are no doubt aware that there are alternative theories of the decision to commit a crime. One of the most famous and widely held is what might be called the "socioeconomic" theory. On our website we summarize that theory and give some references to literature regarding it.

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[15] Consider what happens when the number of actors doing civic acts is, say, 15 percent in Figure 12.11. At that point, the actual cost of civic acts exceeds what actors are willing to pay, so the number of actors performing civic acts will fall. The process continues until zero actors are performing civic acts. Alternatively, consider what happens when the number of actors doing civic acts is, say, 60 percent in Figure 12.11. At that point, the actual cost of civic acts is less than what actors are willing to pay, so the number of actors performing civic acts will rise. The process continues until 100 percent of actors are performing civic acts. The cause of this dynamic is greater downward slope of the supply curve relative to the demand curve, which can occur in an industry with rapidly increasing economies of scale.

Conclusion

We began this chapter by discussing the characteristics of a crime as distinguished in law. We then reinterpreted these facts by using an economic theory of criminal behavior. That theory holds that rational criminals compare the benefits of crime and the expected punishment. We used this behavioral theory to develop an economic theory of optimal punishment, based upon the goal of minimizing the sum of the social harm caused by crime and the cost of deterring it. We showed how to determine the optimal level of deterrence and how to allocate society's resources optimally among alternative ways to deter crime. Our task in the next chapter is to show how to use these models in formulating policy in the area of criminal law.

Suggested Readings

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