Measuring the Costs and Benefits of Crime and Justice

by Mark A. Cohen

ABSTRACT

Cost-effectiveness and benefit-cost analyses are tools that have been used by public policy analysts for years. Programs as diverse as environmental and land use regulations, welfare benefits, job training programs, and immunization policies have all been analyzed in this manner. Since the early 1980s, Federal regulatory agencies have been required to conduct benefit-cost analyses on major regulatory initiatives. Despite their widespread use, cost-effectiveness and benefit-cost analyses have not been staples of the criminal justice policy analyst's tool kit. This is rapidly changing in response to both increasing public demand for accountability of government agencies and the availability of new data and analysis techniques for identifying the costs of crime. This chapter reviews state-of-the-art techniques for estimating the costs and benefits of criminal justice and prevention programs. Although official government estimates of the cost of street crime have been available for many years, recent studies have attempted to go beyond government statistics by incorporating the monetary value of pain, suffering, and lost quality of life. Many of these studies use methodologies that are employed by environmental, health, and safety economists. Because these methodologies are new to the criminal justice research community, considerable attention is given to understanding their underlying assumptions, limitations, and alternatives. Cost-benefit analysis has arrived in the criminal justice policy arena, and it will not go away. Forcing analysts to quantify

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expected costs and benefits sheds new light on the merits of alternative programs and will undoubtedly change the focus of the debate in many criminal justice program areas. Whereas one could previously claim that "prevention is cheaper than prison" or "three strikes and you're out pays for itself," the benefit-cost framework allows decisionmakers to examine these claims more carefully and begin to make more rational, scientifically based judgments.

ABSTRACT

Benefit-cost analysis is a tool that has been in use by public policy analysts for many years. Its origins have been traced back to economists in the 19th century, and its use has been documented in the United States as early as the 1940s in evaluating alternative river development projects.[1] Programs as diverse as environmental and land use regulations, welfare benefits, job training programs, and immunization policies have all been analyzed in this manner. Schools of public policy and departments of economics teach courses devoted solely to the intricacies of benefit-cost analysis.

Since the early 1980s, Federal government regulatory agencies have been required to conduct benefit-cost analyses on major regulatory initiatives. These requirements have been adopted through Executive order and implemented by the Office of Management and Budget.[2] Recent proposals in Congress would legislatively mandate similar requirements.[3] Thus, benefit-cost analysis has become a routine tool in the development of environmental, health, and safety regulations.

Cost-effectiveness analysis is a somewhat less ambitious but equally important policy tool. Unlike benefit-cost analysis, which requires all benefits and costs to be expressed in monetary terms, cost-effectiveness only requires that costs be monetized. Benefits still need to be expressed in some common denominator—such as comparable crimes, comparable injuries, lost years of life, and so forth. For example, one might compare the cost-per-life-year-saved of two different programs. Both of these methods require rigorous estimates of effectiveness—e.g., the number of crimes estimated to be averted by the policy under consideration. Such estimates are standard currency in most regulatory programs. For example, the Consumer Product Safety Commission estimates the number of injuries avoided by a recall, and the Environmental Protection Agency estimates the number of cancer cases averted. To date, criminal justice agencies have rarely been held to this high a standard. Researchers in sociology, psychology, and criminology are often content to show correlations or significance levels and seldom quantify "effectiveness" with measures such as the percentage reduction in recidivism or frequency of psychological trauma.

Because the academic literature now contains methodologies for doing benefit-cost analysis in the criminal justice arena, and there is growing literature applying benefit-cost analysis, the next generation of criminal justice students will soon be learning about these tools in courses on criminology and criminal justice policy.

When used properly, cost-effectiveness and benefit-cost analyses can be valuable tools that help inform the public policy debate. However, when used improperly, they can become nothing but rhetorical ammunition in an ideological debate.

Despite its widespread use elsewhere, cost-effectiveness and benefit-cost analysis have not been staples of the criminal justice policy analyst's tool kit. This is rapidly changing in response to both increasing public demand for accountability of government agencies and the availability of new data and analysis techniques for identifying the costs and benefits of criminal justice policies. Criminal justice researchers and policymakers will increasingly be confronted with cost-effectiveness and benefit-cost analyses—whether they like it or not. Ultimately, benefit-cost analysis might be required for newly proposed criminal justice policies. Because the academic literature now contains methodologies for doing benefit-cost analysis in the criminal justice arena, and there is growing literature applying benefit-cost analysis, the next generation of criminal justice students will soon be learning about these tools in courses on criminology and criminal justice policy.

Benefit-cost analysis is an art that is built on many important assumptions. It is important to understand some of these assumptions before attempting to either conduct such a study or to interpret a study that has been done by others. The purpose of this chapter is to assist researchers and policymakers in understanding the value and pitfalls of both cost-effectiveness and benefit-cost analyses. It also provides a vision for future research in this area by highlighting the key issues that have yet to be resolved. When used properly, cost-effectiveness and benefit-cost analyses can be valuable tools that help inform the public policy debate. However, when used improperly, they can become nothing but rhetorical ammunition in an ideological debate. My goal in writing this chapter is to promote the former while discouraging the latter.

The chapter is organized as follows: The first section discusses the conceptual underpinnings of this line of research, asking questions such as: Why put dollar values on crime? Whose costs and whose benefits are relevant? What criticisms have been offered against the economic approach to measuring the impact of crime and the use of benefit-cost analysis? The second section reviews alternative methodologies to measure the costs of crime and society's response to crime. The third section reviews the existing empirical literature on estimating the cost of crime and criminal justice programs, and the fourth section reviews the application of cost-effectiveness and benefit-cost analysis to

criminal justice, crime prevention, and offender treatment programs. The fifth section considers issues related to implementation that must be considered before using any cost or benefit estimates for policy analysis. A final section contains concluding remarks.

Criminal justice policy decisions always involve choices between two or more alternatives, each having its own costs and benefits. The enumeration of those costs and benefits puts the various alternatives on a level playing field and can help policymakers make more informed decisions that enhance society's well-being.

Conceptual Issues in Costs and Benefits of Criminal Justice Policy

Despite the fact that benefit-cost analysis has been used for many years, there are still many unresolved issues—both in terms of theory and application. This section reviews the most important theoretical issues raised concerning the methodology. I first consider why measurement of the costs and benefits of crime and criminal justice policies is worthwhile. Second, I discuss the difficulty of defining social costs and introduce the notion of external costs imposed by crime. Third, I examine *whose* costs and benefits should be considered in conducting benefit-cost analysis of a criminal justice policy. Fourth, I discuss the differences among average, marginal, and aggregate costs of crime. Finally, I consider some of the criticisms that have been articulated against the use of this methodology, both in general and in the context of criminal justice programs.

Why should we measure monetary costs and benefits?

The idea of measuring the monetary costs of crime and the monetary benefits of crime reductions has been around for many years. Gray (1979) reviews the history of the cost of crime and reports that one of the earliest estimates was published in a government-sponsored study in 1901. Subsequent Presidential commissions have been called on to report on the cost of crime. Many of these reports noted the difficulty and lack of progress over the years in adequately capturing the full costs of crime. However, they also acknowledged the importance of continuing this line of research.

To most economists, there is no question that crime costs should be estimated. Economics involves the allocation of scarce resources in society. Criminal

justice policy decisions always involve choices between two or more alternatives, each having its own costs and benefits. The enumeration of those costs and benefits puts the various alternatives on a level playing field and can help policymakers make more informed decisions that enhance society's well-being. Of course, if the enumerated costs and benefits are inaccurate, there is a risk that more information can lead to worse decisions. Further, many noneconomists would argue that there is neither a moral justification nor adequate empirical basis for placing dollar values on intangible factors such as pain, suffering, and lost quality of life. I will return to these issues later in this section. For now, I assume that such intangibles can be measured and consider three important policy-relevant purposes of measuring costs and benefits:

- Comparison of the relative harm caused by type of crime.
- Comparison of the aggregate harm from crime with that of other social ills.
- Benefit-cost analysis of alternative crime control policies.

Martin and Bradley (1964) provide a more detailed discussion of the importance of identifying and quantifying the costs of crime.

Relative harm by type of crime

Policymakers are often interested in comparing the harm caused by different types of crime. For example, most advocates of sentencing guidelines rely on victim harm as one component of their sentencing structure. Those who subscribe to a "just deserts" philosophy combine harm with culpability, whereas those who advocate a utilitarian approach combine harm with detectability and deterrability. Although one can tally up the various harms associated with each type of crime (e.g., value of property stolen, physical injuries, mental health-related injuries), without a common metric such as dollars, it is difficult to objectively compare these harms.

A few nonmonetary metrics have been proposed for comparing harms, such as the number of days for a victim to recoup from the financial loss or the number of life-years lost (see, e.g., Maltz 1975). These are primarily designed to overcome the perceived unfairness of valuing harms according to the wealth of the individual being harmed.[4] However, these proposals also suffer from not having a common metric. One is still unable to compare 10 lost workdays with 10 lost life years.

Without a common metric to compare harms, the generally accepted approach to ranking the severity of crimes has been to survey the public (see Wolfgang et al. 1985; Cullen, Link, and Polanzi 1982; Rossi et al. 1974; and Rossi and Berk

1997). These surveys ask respondents to rank the seriousness of various crimes and result in relatively consistent rankings over time and across populations. However, they are based on subjective public perceptions concerning the severity of crimes—which may include misperceptions about the frequency of injuries in typical criminal events. For example, Cohen (1988b) argues that public perception surveys tend to underestimate the harm associated with violent crimes relative to property crimes. These studies are also generally unable to distinguish between the generic harm associated with an injury and the actual consequences of any particular victimization. This would be particularly important if one were interested in the extent to which the consequences of victimization vary across different segments of the population (e.g., age or sex), for example. Thus, although public perception surveys are useful for determining the public's attitudes toward crime, the surveys are limited in their ability to objectively measure and compare the seriousness of crimes.

Aggregate costs and benefits

One of the most common—yet probably least important—reasons for estimating the costs of crime is to tally up the aggregate cost to society. Multibillion dollar cost estimates can easily make their way into the popular press and political debate. There are two basic problems with tallying up the costs of intentional injury. First, having been told that crime costs the United States $450 billion per year, what are we to do with this information? If we are successful in fully estimating the aggregate cost of crime, we can compare this total cost estimate with that of other social problems (e.g., cancer, auto crashes, homelessness). Whether one agrees that this is a useful exercise or not, various advocacy groups do compare "cost of crime" estimates with the cost of other social ills in an effort to affect policy decisions. Unfortunately, misuses of these data occur on both sides of the political debate.

Until recently, most estimates of the cost of crime (including estimates published by the Bureau of Justice Statistics) have significantly underestimated costs. For example, Irwin and Austin (1994) use the "official" estimate of $19 billion to illustrate that crime is less of a problem than other social ills and to argue against increased prison sentences. A more comprehensive cost study sponsored by the National Institute of Justice (NIJ) reports that the annual cost of crime to victims is $450 billion (Miller, Cohen, and Wiersema 1996). A *New York Times* article about that study quoted a Republican Congressman as saying the report "demonstrates that the cost of building prisons and adding police are justified" (Butterfield 1996). Despite the rhetoric, neither small nor large cost-of-crime numbers demonstrate that the cost of building more prisons is justified or that alternatives to incarceration are better than more prisons!

Even if properly measured,[5] one cannot simply compare aggregate cost estimates of crime with estimates of the cost of other social ills and arrive at policy recommendations for future public spending priorities. Suppose, for example, that the cost of crime in the United States was estimated to exceed the cost of auto crashes. This does not necessarily mean that society should increase expenditures on crime prevention relative to the prevention of auto crashes. If the costs of preventing crimes and auto crashes are factored into the equation, it might be found that society is already spending too much on the former and not enough on the latter. The more relevant question is how much additional reduction in crimes (or auto crashes) would we observe if we spent more on prevention. This can be answered only if we know such things as the deterrent and incapacitative effect of various sanctions, increased police patrols, and so forth.

Subject to the previously mentioned caveat, comparing cost estimates of crime with other social ills can provide a basis of comparison on a common metric. For example, a study by Streff and colleagues (1992) estimated that the total cost of traffic crashes in Michigan was approximately three times the total cost of crime in that State. Although no immediate policy implications should be drawn from this comparison, it does help begin the process of identifying public policy priorities, and it puts crime in proper perspective. Over time, it might also be possible to quantify the magnitude of any change in crime rates by comparing costs per year.

A second problem with tallying up the costs of crime is that the true cost of crime is more than the sum total of its parts. If there were no more robbers or rapists, hitchhiking probably would be a way of life for a huge portion of the population. If violence was eliminated from society, organized crime might evaporate (as it depends on the threat of violence for its survival), and the standard of living for many inner-city residents would increase as businesses returned to previously abandoned storefronts. These massive changes in social structure could come about only with equally impressive changes in social behavior. Thus, any aggregate estimates of the cost of crime would need to account for these factors.

Cost-effectiveness and benefit-cost analysis of crime control policies

Perhaps the most important and controversial use of monetary estimates of the cost of crime is to compare the benefits and costs of alternative crime control policies. There is no shortage of crime prevention and crime reduction programs and proposals that would benefit from government funding. However, the government can only fund so many of these programs. One of the benefits

of using dollars as a common metric for analyzing criminal justice policy is that society spends dollars to try to prevent crime from occurring. Society's ability to control criminal behavior and reduce the incidence of victimization is limited by its ability to pay for police, courts, corrections, and prevention programs. In an effort to reduce crime and the severity of its consequences, society has undertaken many criminal justice experiments, including intensive probation, electronic monitoring of offenders, shock incarceration, targeted and community policing, and spouse arrest programs for domestic violence. As new policies are tested and options considered, one must be able to apply objective evaluation techniques.[6] If two options have identical crime control effects but differing costs, the choice is simple. Unfortunately, few policy alternatives are so easily compared. In a more realistic case where a new policy reduces crime at some additional expense (or increases crime at a savings), one of the key questions is whether the reduced (increased) crime is worth its cost. Only by monetizing the cost of criminal victimization can one begin to answer that question.

One of the most compelling reasons to monetize the costs and benefits of crime control programs—and to attempt a benefit-cost analysis—is the consequences of *not* doing so. Whenever a criminal justice or prevention program is adopted or not adopted, society is implicitly conducting such an analysis and placing dollar values on crimes. For example, suppose one program costs $1 million and ultimately will prevent 100 burglaries from occurring. Whether explicitly stated or not, the policymaker adopting that program has determined it to be worth spending at least $10,000 to prevent each burglary ($1,000,000 divided by 100 burglaries). If another $1 million program that was *not* funded would have prevented 50 serious physical assaults, the policymaker is implicitly determining that each assault is worth *less than* $20,000 ($1,000,000 divided by 50). Thus, even the policymaker who has ethical concerns about placing dollar values on crime and conducting benefit-cost analyses *implicitly* makes a value judgment about the monetary value of crime.

Social versus external costs of crime

One of the most confusing and misunderstood concepts in the cost-of-crime literature is the difference between "social costs" and "external costs." Many authors ignore this distinction or sweep it under the rug, making it difficult for the reader to know how to compare different estimates. This is not surprising, because there is no real agreement on which crime costs are social costs. Neither is there full agreement on whether social costs should be the relevant criteria for assessing the monetary cost or seriousness of crime. Indeed, I argue that the relevant concept for analysis of crime control programs is external cost, not social cost.

An external cost is a cost imposed by one person onto another, where the latter person does not voluntarily accept the negative consequence (through monetary payments or otherwise). For example, the external costs associated with a mugging include stolen property, medical costs, lost wages, and pain and suffering endured by the victim. The victim neither asked for, nor voluntarily accepted, compensation for enduring these losses. Moreover, society has deemed that imposing these external costs are morally wrong and against the law.

The concepts of social costs and external costs are closely related but not identical. Social costs are costs that reduce the aggregate well-being of society. In this case, medical costs and lost wages are clearly social costs because they are resources that could have been spent elsewhere in the economy, providing a socially productive activity. Although pain and suffering costs are not actual commodities or services exchanged in the marketplace, individuals are willing to pay real dollars and expend real resources to avoid the pain, suffering, and lost quality of life associated with becoming a crime victim. Thus, to the extent that society cares about the well-being of crime victims, these costs should also be considered social costs of victimization.

The value of the stolen property is more problematic. Some economists have argued that stolen property is an external, but not technically a social, cost because the offender can enjoy the use of the property. For example, Cook (1983) argues that the relevant concept should be the social cost—which would exclude transfers of money or property. However, Cook notes that he "presumes that the criminal is properly viewed as a member of society" (p. 374). In contrast, Trumbull (1990) argues that those who violate the criminal law are not entitled to have their utility counted in the social welfare function, i.e., their gain or loss is to be ignored. McChesney (1993) argues that criminal behavior is akin to "rent seeking" that has no social value. This example highlights the fact that social cost is a normative concept based on a subjective evaluation of whether an activity is socially harmful.

Regardless of whether one considers stolen property a transfer, there are other social costs associated with theft. Consider the case of an auto theft where the auto is never recovered, but the thieves use the car for their own private benefit. Although technically a transfer, the fact that cars are stolen forces potential victims to buy security systems, park in secure lots, and take other preventive measures. If the car or some of its contents are fenced, resources devoted to the fencing operations are considered a social cost, as these resources are diverted from socially productive uses. Thus, the value of stolen property might be used as a proxy for these lost resources, and are thus a measure of social cost (Becker 1968, 171, note 3).[7]

Regardless of whether stolen property is considered a social cost, society has an interest in enforcing property rights and has determined it is a crime to steal. There will be less productive investment—and therefore less social wealth—in a society where property rights are not enforced. The value of the stolen car must certainly be considered a cost of crime. For that reason, many economists who study the cost of crime rely on an external cost approach, including all costs imposed by a criminal on external parties, whether or not they are technically considered social costs.

Even the external cost notion of crime has pitfalls, however. Consider the victimless crime of drug abuse, which does not by itself create an external cost if the user voluntarily purchases drugs and reaps the full benefits and costs associated with its use. Nevertheless, drug abuse imposes many external costs: drug users might be less productive in the workforce and might commit crimes to support their drug habits, dealers might forego socially productive work activities, and society might be burdened with additional medical costs in treating drug addicts.[8] Some of these costs (such as crime committed to support a drug habit and medical costs associated with drug overdoses) are clearly external and/or social costs, irrespective of whether drug use is illegal. However, some costs are social costs only because society has deemed drug use to be illegal. For example, economists generally consider the foregone legitimate earnings of a person in the illegal drug trade to be a social cost due to the socially valuable resources that are wasted. However, because illegal drug sales are voluntary transactions between two parties, these resources would not be considered social costs if drugs were made legal.

Another complicating factor in conceptualizing social and external costs is the fact that many crimes are allegedly committed as a form of self-help because the perpetrator feels wronged by the victim (Black 1998). Examples of this might be collecting on a bad debt, an original owner who steals back his property, and assaults committed in response to violent behavior. Although motives such as revenge or "self-help" do not justify criminal activity, they do raise the question of who is being harmed and whether those harms are external or social costs that society wishes to prevent.

From whose perspective are these costs and benefits to be measured?

The benefits and costs of criminal justice policy accrue to different parties—taxpayers, crime victims, offenders, government agencies, and so forth. Exhibit 1 contains a comprehensive listing of the costs of crime and who bears those costs. Exhibit 2 contains a similar listing of the cost of society's response to

Exhibit 1. Costs of crime

Cost category	Party who directly bears cost*
Direct property losses	
Losses not reimbursed by insurance	Victim
Losses reimbursed by insurance	Society
Administrative cost: Insurance reimbursement	Society
Medical and mental health care	
Charges not reimbursed by insurance	Victim
Charges reimbursed by insurance	Society
Administrative overhead of insurance	Society
Victim services	
Expenses charged to victim	Victim
Expenses paid by agency	Society
Temporary labor and training of replacements	Society
Lost workdays	
Lost wages for unpaid workdays lost	Victim
Lost productivity for paid workdays	Society
Lost schooldays	
Foregone wages due to lack of education	Victim
Foregone nonpecuniary benefits of education	Victim
Foregone social benefits due to lack of education	Society
Lost housework	Victim
Pain and suffering/quality of life	Victim
Loss of affection/enjoyment	Victim's family
Death	
Value of life	Victim
Funeral and burial expenses	Victim's family
Loss of affection/enjoyment	Victim's family
Psychological injury/treatment	Victim's family
Legal costs associated with tort claims	Victim or victim's family
Long-term consequences of victimization	Future victims and society

* Ignores any recovery from offenders through legal action.

Source: Cohen, Miller, and Rossman 1994.

Exhibit 2. Costs of society's response to crime

Cost category	Party who directly bears cost*
Precautionary expenditures/effort	Potential victim
Fear of crime	Potential victim
Criminal justice system	
Police and investigative costs	Society
Prosecutors	Society
Courts	Society
Legal fees	
public defenders	Society
private	Offenders
Incarceration	Society
Nonincarcerative sanctions	Society
Victim's time	Victim
Jury's and witness' time	Jury/witness
Victim services	
Victim service organizations	Society/volunteers
Victim compensation programs	Society
Victim's time	Victim
Other noncriminal programs	
Hotlines and public service announcements	Society/volunteers
Community treatment programs	Society
Private therapy/counseling	Society/offender
Neighborhood watch and community prevention programs	Volunteers
Incarcerated offender	
Lost wages	Offender/family
Lost tax revenue and productivity	Society
Value of lost freedom	Offender
Psychological cost to family	Family of offender
"Overdeterrence"	
Innocent individuals accused of offense	Innocent individuals
Restriction of legitimate activity	Innocent individuals/society
Cost of detection avoidance by offenders	Offender/society/victim
"Justice"	
Constitutional protections to avoid false accusations	Society
Increasing detection to avoid differential punishment	Society

* Ignores any recovery from offenders through legal action.

Source: Adapted from Cohen, Miller, and Rossman 1994.

crime and who bears those costs. The terms "costs" and "benefits" are interchangeable depending on whether one is examining the effect of crime or the effectiveness of a crime reduction program. In other words, the cost of a crime is the same as the benefit of a crime that was prevented.

Economists often use the analogy of a market to describe crime (Cook 1986). Potential criminals commit (supply) crime based on the expected cost and benefits. These costs and benefits are determined by the actions (demand) of potential victims (e.g., whether they buy security alarms or take other costly preventative measures) and by the criminal justice community (e.g., the probability of being punished and the expected punishment). Many of the actions by potential victims and the criminal justice community that attempt to reduce the costs of crime are described in exhibit 2. Note that increasing some costs in exhibit 2 are expected to decrease corresponding costs in exhibit 1. For example, imposing longer prison sentences or increasing police protection are expected to decrease the chance of victimization and hence lower victim costs.

Some of the most significant costs of crime are the pain, suffering, and lost quality of life suffered by victims. Economists have long noted that "psychic" benefits and costs are part of individual utility and, hence, social welfare. Individuals are willing to trade tangible goods and services in exchange for some of these psychic benefits. Thus, they represent real social costs and benefits. Similarly, individuals who suffer the pain, suffering, and lost quality of life from becoming a crime victim would be willing to pay real dollars to reduce those psychic costs.

Although I include the lost productivity of the offender who is incarcerated, noticeably missing is the lost quality of life for the offender while he is denied freedom. When an offender is locked up and unable to be gainfully employed, not only does the offender lose wages, but society loses the value of those work hours. Hence, the offender's lost productivity is included. However, the offender's pain, suffering, and lost quality of life while in prison is not considered either an external or a social cost of crime because the offender is the only one who suffers. Although the offender is part of society, the conventional approach ignores the purely private losses. Similarly, although exhibit 1 includes the value of stolen property as a cost of crime that is borne by the victim, it ignores the value of stolen property that is a benefit to the offender who now has the use of the property. As these two examples clearly illustrate, benefit-cost analysis is not a value-free concept but instead involves definitions and explicit boundaries to determine whose costs and benefits matter.

Even though we might be able to identify all external costs associated with crime, some philosophical disagreement may still arise over which costs to

consider. For example, society might determine that we do not care about the negative consequences of imprisonment (psychological trauma, lack of freedom, etc.). Not all would agree with this approach, however, as antiprison activists might care very much about the treatment of imprisoned offenders. They might also care about the monetary and psychic costs to the family of the offender. However, those costs are indeed both social costs and external costs to the extent the family of the offender did not participate in the crime. Thus, to the extent possible, benefit-cost analysis should take into account the negative consequences on the family of the imprisoned offender as well.

On a more practical level, differences over which costs and benefits to consider may have important implications for criminal justice policy. Individual government agencies might ignore consequences that do not come out of their budget and that are not part of their mandate. For example, a public health agency might not budget enough money for drug treatment programs for indigents because it is primarily concerned with the direct budgetary implications of its decisions. However, it is well known that drug addicts have a high propensity to commit property crimes, often to support their habits. Although crime reduction benefits are important social benefits, they might not enter into the decision calculus of the public health agency. Similarly, the criminal justice system might ignore some of the social benefits of drug rehabilitation programs, despite growing evidence that drug courts can be effective mechanisms for reducing both drug abuse and subsequent criminal activity designed to support a drug habit (Sherman et al. 1997, ch. 9).

The issue of whose perspective to consider when calculating costs and benefits is far more complex than suggested by this example. For example, some of the funds for a criminal justice program might come from a Federal Government grant designed to expand the use of such programs. This will reduce the perceived costs of the program to the local agency. The result may be an overinvestment in that type of program—even if it is not socially beneficial but borne primarily out of political concerns. This might be one explanation for why police departments continue to staff Drug Abuse Resistance Education (D.A.R.E.®) officers despite the fact that there is little evidence the program reduces drug abuse. Although there is considerable evidence that increasing the number of police officers on the street can reduce crime, a police chief may not consider reducing D.A.R.E.® staff in exchange for more officers on the street, as the cost to the local community of hiring an additional D.A.R.E.® officer is considerably less than putting an officer on the street.

Average costs, marginal costs, and aggregate costs

Oftentimes, a distinction must be made between the average cost and marginal cost of a program. Conceptually, all costs of a crime prevention program should be included in a cost analysis *if* those costs would not otherwise be incurred. In practice, this requires an understanding of *incremental* (or *marginal*) costs versus *fixed* costs. It also requires an understanding of *opportunity* costs.

Fixed costs do not vary with the number of participants in the program. Thus, the annualized cost associated with maintaining a criminal court (compensation for the judge, debt retirement on the building, etc.), might not be affected by the number of cases actually tried in any year. Other costs, such as a drug rehabilitation program or feeding an incarcerated offender, vary with the number of participants. These are considered incremental (or marginal) costs. Unless fixed costs change with a policy decision under review, they should be ignored for purposes of assessing that policy.

A cost that is incremental for one decision might be fixed for another. For example, consider the problem of whether to increase the average sentence for violent offenders. If prison capacity is not a binding constraint, the incremental costs are primarily the cost of food, medical care, and so forth for these offenders. However, if this policy will require additional prison capacity, then the annualized cost of prison cells is part of the incremental costs.

There is a fundamental economic principle at work here: only the costs (and benefits) that vary with the decision should be considered. This is a general rule that should be applied to virtually any policy decision. However, implementing this rule is often less than straightforward, and it requires a careful analysis of which costs and benefits vary with a decision. For example, suppose a local court is considering whether to establish a new drug rehabilitation program that will serve as an alternative to incarceration for first-time nonviolent offenders. In that case, the analyst might want to compare the *average* cost of drug treatment with the alternatives because both fixed and incremental costs will vary with the decision about whether to start this program. Suppose the alternative is incarceration for those offenders, and there is adequate prison space available. In that case, we would compare the *average* cost of the drug treatment program with the *incremental* cost of incarceration. Because there are plenty of prison beds available, the fixed costs associated with prison construction and maintenance do not vary with our decision about whether to institute this drug treatment program. Hence, the fixed costs of incarceration are irrelevant in this case. Of course, this may not be true if the alternative to a drug treatment program is to build a new prison. On the other hand, average costs in some instances are irrelevant. For example, suppose a drug rehabilitation program is already

operational, and there is excess physical capacity. In this case, the only relevant costs to be considered in the decision to expand the program are the *incremental* costs of adding program participants.

Note that when estimating the cost of incarceration (or savings due to less incarceration), whether the annualized cost of constructing a prison cell should be included depends on the capacity constraint. If there are empty beds, the opportunity cost of the prison cell is zero, and the only costs are food, electricity, medical care, and so forth for the additional prisoner. In that case, the cost of the prison space itself is a "sunk" cost that is not relevant to the costs and benefits of the proposal under consideration. The financing cost of the prison will be incurred regardless of whether another drug abuser is incarcerated; thus, there will be no savings from diverting the drug abuser to a nonincarcerative treatment program. On the other hand, if the prison is operating at full capacity and lack of prison space is forcing authorities to incarcerate fewer individuals than they otherwise would, the annualized cost of the prison cell might be considered an opportunity cost that is saved by diverting the offender. In that case, money is indeed being saved by not having to build another cell and/or by not enduring a higher crime rate due to the inability to incarcerate other offenders.

Finally, for many types of policies under consideration, there are a host of cost categories that can be ignored. These aggregate costs of crime include fear of crime, deterioration of the quality of neighborhoods, and so forth. Unless a policy will have a significant impact on these communitywide costs, they can be ignored for purposes of considering any one policy.

Critiques of benefit-cost analysis and monetizing crime costs

Although few would disagree with the fact that *enumerating* costs and benefits is a worthwhile exercise, there is less agreement on whether costs and benefits should be *measured* and, if so, how much weight benefit-cost analysis should be given in policy analysis. At one extreme, many economists would argue that virtually any cost and any benefit can be measured—albeit with some uncertainty and often using indirect methods. Some economists might even argue that benefit-cost analysis should be the primary criteria used in making policy decisions. At the other extreme, some authors argue that not only is it difficult or impossible to measure some costs and benefits but, even if we could, benefit-cost analysis is inappropriate for use in many policy discussions. Kelman (1981) articulates several concerns over the use of this methodology on ethical and philosophical grounds. He argues that some things simply cannot be valued, such as free speech, pollution, or safety.[9] He also argues that benefit-cost

analysis assumes that economic efficiency is the goal, at the expense of other socially desirable goals such as equity or fairness. This is not a criticism of the methodology—only of those who want to impose benefit-cost analysis as the sole criteria for public decisionmaking. Instead, when viewed as one policy tool available to policymakers, benefit-cost analysis has many benefits and only limited costs. Indeed, most texts on benefit-cost analysis include an analysis of the "incidence" of costs and benefits—i.e., who bears the costs and who reaps the benefits—as an integral part of benefit-cost analysis.

In the context of crime, Zimring and Hawkins (1995) are highly critical of recent attempts to monetize the cost of crime. They argue that the state of the art in economics has not developed to the point where we can adequately characterize the social costs and benefits—either in theory or in practice. Thus, economists have problems both in defining the social cost of crime and in measuring it in any meaningful way. Although there is some validity to both concerns, there is also much confusion about the proper role that benefit-cost analysis can play in policy debates. I will defer a discussion of the empirical concerns raised by Zimring and Hawkins until the section "Review of Literature on the Costs of Crime and the Criminal Justice System," where I discuss monetary estimates of the cost of crime. Here, I will address their theoretical concerns.

Zimring and Hawkins note that recent attempts to estimate the monetary costs of crime fail to articulate a coherent theory underlying its cost estimates. Those who attempt to estimate the cost of crime have perpetuated much of the confusion; indeed, my writings in this area are partly to blame by not thoroughly explaining the underlying theory. Part of the problem is a misunderstanding of the difference between social costs and external costs, a subject that was previously discussed at length. As an example, Zimring and Hawkins (1995, 141) cite the theft of a $50,000 Mercedes whose owner failed to take relatively inexpensive antitheft precautions. Noting that this might be a $50,000 personal loss to the owner, they wonder what the social cost is. As discussed earlier, although there might be some disagreement about whether the $50,000 theft is technically a social cost, there is no doubt that it is an external cost that society has an interest in preventing. Because society has laws making it a crime to involuntarily appropriate the property of others, and the harm to the victim is clearly related to the value of the item stolen, $50,000 is a good estimate of the external cost of the crime.

Next, Zimring and Hawkins raise the concern that "any public expenditure to prevent it up to $49,999 would be justified on a cost-benefit basis." On the contrary, I would *not* argue that society should spend up to $49,999 to prevent this theft. Although a simple benefit-cost analysis comparing the theft with a proposal

requiring an expenditure of $49,999 to prevent the theft would conclude that benefits exceed costs; if alternative measures could prevent the theft at a lower cost, those alternatives would be preferred, and *they* would be economically efficient. To spend $49,999 to prevent a theft that could be prevented for $200 is economically *inefficient*. This example has important practical policy implications. It is *not* appropriate to examine only one policy option. Instead, policy analysts should examine many alternatives to find the one that has the highest benefit-cost ratio, or the most "bang for the buck." Indeed, regulatory agencies are often required by law to consider all technically feasible alternatives to proposed regulations.

The distinction between social and external costs is most apparent with victimless crimes such as drug abuse, prostitution, and gambling. Although economists are often chided for their arguments that these crimes impose no social costs and ought to be legalized, that is a simplistic view of the economic arguments. It is true that there is no direct social cost associated with many of these crimes because they are voluntarily supplied and demanded, and the individuals who consume these illegal products incur both the direct cost and benefit of these products. However, society *has* made them illegal for some reason—often because of the collateral consequences that are socially undesirable, including medical/health concerns, external costs imposed on children or other family members, and so forth. To the extent these *external* costs can be identified and measured, they should be included as the cost of victimless crimes.[10]

Methodologies for Measuring Costs of Crime and Society's Response to Crime

There are many different approaches to measuring society's response to and the costs of crime. Broadly, costs can be classified as either tangible or intangible, and measurement methods can be classified as either direct or indirect. Tangible costs are those that involve monetary payments such as medical costs, stolen or damaged property, wage losses, prison cells, and police expenditures. These are costs that end up being tallied in the gross national product and are normally included in estimates of aggregate or individual wealth. Intangible, or nonmonetary, costs are those not normally exchanged in private or public markets, such as fear, pain, suffering, and lost quality of life. There are many methods for estimating the costs of crime. Broadly, these methods can be described as either direct or indirect. Direct methods use primary sources such as crime victim surveys or budgets of criminal justice agencies. Indirect methods use secondary sources such as property values or jury awards. This section reviews the state of the art in identifying and measuring both the tangible and intangible costs of crime.

Tangible costs of crime

At first, it might appear that the tangible costs of crime are relatively straightforward to estimate. In fact, aside from data on direct government expenditures on the criminal justice system, this is far from the truth. For example, there is no national accounting system tallying up the out-of-pocket losses to crime victims. The only direct source of crime victim costs is the ongoing National Crime Victimization Survey (NCVS), which interviews households and elicits information from those who have experienced a recent criminal victimization (Rand 1998). NCVS asks crime victims several questions about their out-of-pocket losses, including an estimate of the dollar cost of medical care, lost wages, and property loss. These estimates are periodically published by the Bureau of Justice Statistics (see, e.g., Klaus 1994). Despite their official-looking stature, NCVS crime cost estimates severely understate the tangible costs of crime to victims. First, the reference period for NCVS is crimes committed during the previous 6 months. Because the average crime will have occurred about 3 months prior to being reported, any medical costs are necessarily limited to those short-term costs. Even short-term costs are likely to be underestimated, however, because hospital bills often are sent directly to insurance companies and may arrive months after hospitalization. Second, some cost categories are simply excluded from NCVS. For example, respondents are not asked about mental health care, despite the fact that this is a significant cost of victimization (Cohen and Miller 1998). In addition, the consequences of victimization can be far-reaching and beyond the scope of any government survey. According to Burt and Katz (1985, 330), "During the weeks or months following the (rape), women frequently make costly changes in their lifestyles; this may involve moving to a 'better' neighborhood, buying expensive security systems, or avoiding work situations which they suddenly perceive as dangerous." I am not aware of any study that attempts to quantify these losses. Long-term implications of victimization may also be hidden and underestimated. For example, a recent study by Macmillan (2000) finds that educational attainment and lifetime earnings are lower for victims of childhood physical or sexual assault. These impacts have yet to be incorporated into cost-of-crime estimates.

Because the direct method of estimation is known to exclude significant costs, recent attempts to estimate medical costs and lost wages have relied on indirect methods. Miller, Cohen, and Wiersema (1996) obtained all available data on each crime victim in NCVS (e.g., type of injury, whether hospitalized, age and sex of victim) and combined that information with cost-of-injury data from other sources, such as worker compensation and hospitalization charges. This resulted in estimates of tangible costs that are considerably higher than NCVS—about four times higher in the case of robbery, more than 10 times higher for assault, and 20 times higher for rape (Miller, Cohen, and Wiersema 1996, table 9).

Victims, potential victims, and communities all incur intangible costs of crime. Several approaches have been used to estimate the monetary value of these intangible costs.

Other tangible crime costs that are reasonably easy to measure include police expenditures and the cost of the criminal justice system itself. Although aggregate costs may be available from government statistics, the cost *per crime* is not always available. For some purposes, we might be interested in these costs. For example, in studying the costs and benefits of an early release program, we would want to know the cost of recidivism created by those who are released from prison early. Thus, we might want to know the marginal cost of police resources associated with investigating a crime, as well as the marginal costs to the criminal justice system of having to reprocess a repeat offender. Such studies exist for specific jurisdictions and/or specific time frames. However, these studies are not routinely updated and the costs might vary considerably by location.

Economic/white-collar crimes such as fraud, theft of services, and antitrust violations, are notoriously difficult to quantify because victims often do not know they have been subject to a criminal offense. Even for those crimes in which victims are aware of their losses, there is no central government survey or reporting mechanism to tally these crimes or their costs. Government regulatory or enforcement agencies often collect these figures and may report them as they see fit. However, it is often difficult to verify their methodology and to know if any figures can be compared in a meaningful way. Most estimates of the cost of economic crimes are based on either surveys of potential victims to ascertain their experiences or collection of government data on prosecutions.

Finally, even *potential* victims suffer tangible costs of crime by taking costly preventive measures, such as buying security systems, deadbolt locks, cell phones, guard dogs, and guns purchased for defensive protection. Although direct measures of these expenditures should be relatively easy to obtain through survey methods, one difficulty in doing so is the fact that many of these expenditures serve dual purposes. The guard dog may also be a pet that provides companionship. The cell phone might provide a sense of security to a nighttime traveler, in addition to its use for other purposes. Sorting out the reason for purchase and the value obtained for each reason is not a trivial task.

Intangible costs of crime

Victims, potential victims, and communities all incur intangible costs of crime. Crime victims incur pain, suffering, and lost quality of life following the physical injury and/or psychological trauma associated with victimization. Potential

victims might have increased fear, which manifests as psychological anxiety and/or actual averting behavior (e.g., staying home at night, walking longer distances to avoid certain streets). Communities and businesses might suffer from reduced tourism and retail sales as outsiders perceive the community to be a high crime area. High crime rates might also inhibit economic development as employers and potential employees shun certain communities.

Several approaches have been used to estimate the monetary value of these intangible costs. Perhaps the earliest indirect method was to infer property owners' willingness to pay for a safer neighborhood through higher property values. To the extent that risk of victimization is capitalized in housing prices, we expect higher crime neighborhoods to have lower housing prices, controlling for all other factors that affect house prices (Thaler 1978). The methodology requires detailed location-specific housing characteristics (square feet, number of rooms, age, etc.), housing prices, crime rates, and other location-specific amenities (e.g, tax rates, school quality, distance to center city). Multiple regression analysis isolates the effect of crime on housing prices. The coefficient on the crime variable is then interpreted as the marginal willingness to pay for a reduction in the crime rate. Note that this is a marginal valuation, based on the current crime rate and small changes around that rate.

Data limitations have prevented these property value studies from isolating the cost of any individual crime type. Instead, studies to date have estimated the cost of an aggregate measure of crime such as the Federal Bureau of Investigation's (FBI's) Uniform Crime Reporting Index. In theory, a comprehensive dataset could isolate the effect of each crime type on housing prices. Property value studies necessarily rely on important assumptions about the competitiveness of the housing market and consumer information about neighborhood crime rates. They also ignore the effect that location-specific amenities—including crime—have on local wage rates. A few researchers have estimated both a housing and a wage equation to capture both effects (see, e.g., Hoehn, Berger, and Blomquist 1987). Although these models use two equations, they have yet to estimate simultaneous models that account for the interaction between housing prices and wages.

One of the positive features of the property value studies of crime is that they rely on actual market transactions. Although economists tend to favor market-based approaches in which actual market transactions (housing prices) are used, any market-based approach necessarily takes into account the wealth and income of the buyer. Thus, the fact that less wealthy individuals necessarily buy less expensive homes leads to an estimate of the value of crime that is based on "ability to pay." This issue will reappear several times in this chapter because many of the methodologies discussed depend on the income of the victim or potential victim.

The housing market is not the only indicator affected by crime rates. People buy handguns and security alarms, take cabs instead of walk, and use other precautions to avoid crime. Although all of these expenditures can be considered part of the cost of society's response to crime, they might also be used in estimating the cost of crime itself. For example, a study of the purchase of security alarms might allow us to infer the value that consumers place on a particular reduction in the probability of being victimized. For example, if the purchase of a double-bolt lock at the cost of $25 reduces the risk of being burglarized from 1 in 500 to 1 in 1,000, we could infer that the individual who purchases the lock values the reduced risk by at least that amount.

Another method of estimating the nonmonetary costs of crime is to infer society's willingness to pay for reductions in crime from noncrime studies of society's willingness to pay for safety. Although there are several approaches, this growing literature primarily estimates wage rate differentials for risky jobs (Viscusi 1993). Thus, for example, if there is an additional $50 wage rate premium for accepting an increased risk of death of 1 in 500,000, that is interpreted to mean that the collective "value of life" is $25 million ($50 x 500,000). There is now an extensive literature on the value of life, which should *not* be interpreted as the value of any one particular life but, instead, is society's value of saving a "statistical" life. The first attempt to incorporate these value-of-life estimates with crime appears to be by Phillips and Votey (1981), who combined value-of-life estimates and out-of-pocket costs of crime with society's perception of the seriousness of crime to arrive at crime-specific monetary estimates. However, their methodology was unable to account for the risk of injury and death for many crimes.

Cohen (1988a) attempted to overcome these data limitations by combining estimates of the value of life with monetary estimates of the pain, suffering, and lost quality of life for nonfatal injuries. The approach used in Cohen is a hybrid of direct and indirect cost estimation. Direct costs are taken from NCVS data and several additional sources to augment some of the weaknesses of the government survey. Nonmonetary costs include the value of life for fatal crimes and pain, suffering, and lost quality of life for nonfatal injuries. These nonmonetary costs are estimated using indirect techniques. Risk of death is calculated directly from FBI data identifying the underlying crime in homicide cases. Risk of death probabilities are multiplied by the value of life to arrive at an estimate of the value of the risk of death component of each crime type.

The innovative—and most controversial—methodology introduced by Cohen (1988a) was the use of jury award data to estimate the monetary value of pain, suffering, and lost quality of life for *nonfatal* injuries. Cohen used jury awards in traditional tort cases and matched the type and severity of injury (e.g., broken

bones) with crime victim data in NCVS. This approach implicitly assumes that identical injuries are valued the same whether caused by an auto accident or an assault. However, crime victims might endure more pain and suffering due to the psychological trauma and fear of repeat victimization. More recently, Miller, Cohen, and Wiersema (1996) obtained data on jury awards to victims of physical and sexual assault and estimated crime costs using these cases.[11] These data were previously unavailable because civil lawsuits by crime victims are a relatively new phenomenon that has only recently grown to the point where adequate data exist. These lawsuits are generally against third parties for inadequate security, such as a parking lot owner not providing adequate lighting or an apartment complex owner not adequately securing a building.

The reason the jury award approach is controversial is primarily the popular notion that jury awards in the United States are unpredictable and/or unreasonably high. Theoretically, juries are asked to make the victim "whole" by compensating the victim for all out-of-pocket losses plus pain, suffering, and lost quality of life. Punitive damages are meant to punish the tortfeaser (defendant), not to compensate the victim; hence, they are excluded from the pain, suffering, and lost quality of life estimates. Despite popular beliefs to the contrary, considerable evidence exists that jury awards are predictable in a large sample. Popular press articles and calls for tort reform often focus on the outliers and punitive damage awards. The more common cases, however, are quite predictable, and jury awards are being used as a measure of pain and suffering in other contexts, including government regulatory agencies (e.g., Consumer Product Safety Commission). Perhaps most compelling, however, is the fact that our society has placed its tort system in the hands of juries and has decided that these awards are "just compensation."

Despite my defense of the use of jury awards to measure victim compensation for nonmonetary harms, this approach is theoretically *not* the most appropriate one for purposes of estimating the willingness to pay to reduce the risk of crime. Jury awards are ex post compensation designed to make a person whole. For policy purposes, the more relevant question is the "willingness to pay" (WTP) to reduce crime, which is an ex ante concept. The property value studies described previously are ex ante WTP approaches because they are based on actual market transactions, taking into account the prospective risk of criminal victimization. As noted, to date, researchers have been able to value an Index crime using only this method. For various reasons, the WTP for reduced crime is likely to be lower than the amount juries would likely award as compensation for an injury after the fact (see Cohen, Miller, and Rossman 1994, 73–74).[12]

An alternative approach to estimating the ex ante WTP for reduced crime is to directly survey the public (i.e., potential victims). This approach, often called

"contingent valuation," is a methodology developed in the environmental economics literature and has been used extensively to place dollar values on nonmarket goods such as improvements in air quality or endangered species. There have been literally hundreds of contingent valuation studies, meta-analyses and textbooks written on the subject.[13] Although there is some disagreement on the reliability of these surveys, they are continually used in benefit-cost analysis and natural resource damages litigation and for other purposes. A distinguished panel of social scientists, chaired by two Nobel laureates in economics (Arrow et al. 1993) was commissioned by the National Oceanic and Atmospheric Administration (NOAA) to assess the contingent valuation methodology. This panel was brought together because NOAA had drafted regulations calling for the use of this methodology when estimating natural resource damages in legal proceedings involving compensation for damaged public property. The panel concluded that this is a valid approach and provided a set of guidelines for conducting a reliable contingent valuation survey. Thus, if done properly, contingent valuation surveys can be useful policy tools. Although being used in many different policy contexts, contingent valuation is only beginning to be employed in criminal justice research.[14]

Finally, economists often rely on indirect measurement techniques by appealing to the notions of *opportunity cost* and *revealed preference.* In some instances, this is as straightforward as identifying foregone productive opportunities, such as the time an offender spends in prison or the time a victim spends out of work while dealing with the criminal justice process. In other instances, the costs are subtler. If consumers are rational and maximize their own utility, we can learn many useful things from their behavior—i.e., their revealed preference for one choice over another. Thus, the fact that individuals choose a leisure activity over working another hour provides us with a lower bound estimate of the value of that leisure activity—it must be at least as much as the opportunity cost of the time involved. This notion can be used to value the cost of many preventive or avoidance activities that people take to reduce their likelihood of victimization. Examples of these time costs include the time people take to lock and unlock cars and homes and the time needed to take a longer route home to avoid a bad neighborhood.

Some crimes with very large intangible costs, like treason or crimes that betray the public trust, may never be monetized. However, that does not invalidate the theory that would identify the social cost of treason to be the risk of harm to our national security, or the social cost of a public betrayal of trust to be a diminution of public trust and moral behavior. Cohen (1989) examines the social costs associated with numerous types of corporate crime, including fraud, environmental, food and drug, safety, export violations, and other regulatory offenses. Although it is difficult to estimate social costs for some of these crimes, the

vast majority of corporate crimes are frauds that can be easily measured, and techniques exist for estimating the harm in many other instances.

Review of Literature on the Costs of Crime and the Criminal Justice System

This section reviews the empirical literature estimating the costs of crime and society's response to crime. The purpose of this review is to provide the most recent estimates available. However, because some older studies used different methodologies, they are included for comparison purposes. Most crime cost studies to date have focused on traditional Index crimes, with some recent attempts to estimate drunk driving and child abuse. Other studies have examined the cost of drug abuse, white-collar crimes, and maintaining the criminal justice system. Few studies have systematically examined all crime types and all costs.[15] The reader should be careful about comparing and/or adding up the costs in these various studies. Differences in methodologies, time periods, and potentially overlapping cost categories make such comparisons difficult. A more thorough study is required to undertake such an endeavor.

Traditional Index crimes

Exhibit 3 contains the most recent estimates of the cost of crime to victims, using the approach originally developed by Cohen (1988a)—combining out-of-pocket losses, the risk of death as measured by the value of life, and jury awards for nonfatal injuries. These estimates are taken from Miller, Cohen, and Wiersema (1996), an NIJ-sponsored research project. Exhibit 3 provides estimates of the cost *per criminal victimization*, which range from $370 for larceny to more than $2.9 million for murder (1993 dollars). These figures include attempted crimes that are unsuccessful and are averaged over all crimes—whether or not injury occurs. They include the cost of victim services provided by government and nonprofit agencies and the initial emergency police response (but not followup expenses to catch the offender). They exclude the risk of death because crimes resulting in death are included as a separate crime category. The Miller, Cohen, and Wiersema (1996) estimates are more comprehensive than previous efforts because they include domestic assault, child abuse, and drunk driving.

The estimates of tangible victim costs in Miller, Cohen, and Wiersema (1996) are considerably greater than in comparable government estimates derived from victim surveys. For example, Klaus (1994) estimates the average cost per rape in NCVS is $234. In contrast, Miller, Cohen, and Wiersema (1996) estimate tangible rape victim costs to be $5,100, including $2,200 in lost productivity and $2,200 in mental health care. As noted earlier, NCVS respondents are

Exhibit 3. Losses per criminal victimization (including attempts)

	Productivity	Medical care/ ambulance	Mental health care	Police/ fire services	Social/ victim services	Property loss/ damage	Subtotal: Tangible losses	Quality of life	Total
Fatal crime									
Rape, assault, etc.	$1,000,000	$16,300	$4,800	$1,300	$0	$120	$1,030,000	$1,910,000	$2,940,000
Arson death	724,000	17,600	4,800	1,900	0	21,600	770,000	1,970,000	2,740,000
DWI	1,150,000	18,300	4,800	740	0	9,700	1,180,000	1,995,000	3,180,000
Child abuse	**2,200**	**430**	**2,500**	**29**	**1,800**	**10**	**7,000**	**52,400**	**60,000**
Sexual abuse (including rape)	2,100	490	5,800	56	1,100	0	9,500	89,800	99,000
Physical abuse	3,400	790	2,700	20	2,100	26	9,000	57,500	67,000
Emotional abuse	900	0	2,700	20	2,100	0	5,700	21,100	27,000
Rape and sexual assault (excluding child abuse)	**2,200**	**500**	**2,200**	**37**	**27**	**100**	**5,100**	**81,400**	**87,000**
Other assault or attempt	**950**	**425**	**76**	**60**	**16**	**26**	**1,550**	**7,800**	**9,400**
NCVS with injury	3,100	1,470	97	84	46	39	4,800	19,300	24,000
Age 0–11 with injury	2,800	1,470	100	84	46	39	4,600	28,100	33,000
Non-NCVS domestic	760	310	81	0	0	39	1,200	10,000	11,000
No injury	70	0	65	69	9	15	200	1,700	2,000
Robbery or attempt	**950**	**370**	**66**	**130**	**25**	**750**	**2,300**	**5,700**	**8,000**
With injury	2,500	1,000	65	160	44	1,400	5,200	13,800	19,000
No injury	75	0	66	110	15	400	700	1,300	2,000
Drunk driving	**2,800**	**1,400**	**82**	**40**	*	**1,600**	**6,000**	**11,900**	**18,000**
With injury	12,100	6,400	82	120	*	3,600	22,300	48,400	71,000
No injury	170	0	82	17	0	1,000	1,300	1,400	2,700
Arson	**1,750**	**1,100**	**18**	**1,000**	*	**15,500**	**19,500**	**18,000**	**37,500**
With injury	15,400	10,000	24	1,000	*	22,400	49,000	153,000	202,000
No injury	8	0	18	1,000	0	14,600	16,000	500	16,500
Larceny or attempt	**8**	**0**	**6**	**80**	**1**	**270**	**370**	**0**	**370**
Burglary or attempt	**12**	**0**	**5**	**130**	**5**	**970**	**1,100**	**300**	**1,400**
Motor vehicle theft or attempt	**45**	**0**	**5**	**140**	**0**	**3,300**	**3,500**	**300**	**3,800**

* Unknown.
Note: All amounts are estimates in 1993 dollars. Totals may not add due to rounding. Risk of death is excluded.
Source: Miller, Cohen, and Wiersema 1996, table 2.

asked only for short-term costs, and some categories (e.g., mental health) are excluded altogether. Measurement issues also arise in estimating NCVS results. For example, in some instances, NCVS survey respondents indicated they did incur costs but were unable to provide estimates. Klaus (1994) treats these responses as zero costs, whereas Miller, Cohen, and Wiersema (1996) assumed these individuals incurred costs that were comparable to victims with similar injuries.

Generally, the largest component of crime costs is quality-of-life or intangible costs. Because intangible costs also are subject to the most uncertainty (and controversy), they are reported separately. Intangible costs are estimated from the pain and suffering component of jury awards for physical and sexual assault as well as the intangible value of the risk of death. Thus, they are calculated for all crimes except larceny. Even burglary is estimated to have an intangible cost of $300 per offense, based on the fact that a small fraction of burglaries eventually result in a homicide.[16] The ratio of intangible to tangible costs varies considerably by crime, with burglary being on the low end—intangibles being about one-third of tangibles—and rape being at the high end, with intangibles being 15 times greater than tangible losses.

Exhibit 4 compares the cost per *victimization* with the cost per *victim*, highlighting another important measurement issue. Some crimes, particularly physical and sexual assaults, are often repeated against the same victim. Thus, measuring the cost of *victimizations* might understate the impact on *victims.* Although there are a significant number of series victimizations in NCVS, there are few studies of series victimization. The methodology distinguishing between victims and victimizations needs further development. For example, we do not know if a victim who is assaulted 10 times incurs higher or lower costs than 10 individuals who were victimized once. We also do not know much about the validity of these series victimization responses. Thus, Miller, Cohen, and Wiersema (1996) truncated the number of victimizations against 1 person in a 6-month period to 10. However, they conducted a sensitivity analysis varying the maximum number of victimizations per individual and found about an 18-percentage point spread in total crime costs, depending on which estimate is used.

The crime costs estimated in exhibit 4 can be compared with the estimates derived using the property value studies discussed earlier. In Cohen (1990), I compared several property value studies with my earlier cost-of-crime estimates (Cohen 1988a) and found both methods yielded relatively close estimates. After adjusting for the number of crimes reported, I estimated the value of an average property crime in Rochester, New York, to be $665 based on Thaler (1978), compared with $869 based on Cohen (1988a). The average Index crime was

Exhibit 4. Crime severity measured by monetized losses per crime victimization/victim

Crime	Per victimization		Per victim	
	w/o risk of death	w/risk of death	w/o risk of death	w/risk of death
Child abuse: Sexual	$99,000	*	$125,000	*
Rape and sexual assault (excluding child abuse)	$87,000	$87,000	$109,000	$110,000
Child abuse: Physical	67,000	*	77,000	*
Child abuse: All types	60,000	63,000	70,000	74,000
Arson	38,000	54,000	38,000	54,000
Child abuse: Emotional	27,000	*	30,000	*
Drunk driving	18,000	26,000	18,000	26,000
Assault or attempt (NCVS)	9,000	19,000	12,000	31,000
Assault (any)	9,000	15,000	14,000	23,000
Robbery or attempt	8,000	13,000	10,000	16,000
Motor vehicle theft	4,000	4,000	4,000	4,000
Burglary	1,400	1,500	1,600	1,700
Larceny	370	370	400	400

* Deaths due to child abuse are not categorized by type of child abuse (e.g., sexual, physical, or emotional). Thus, the estimates do not include the risk of death. However, a combined child abuse category is included in this table, which includes the risk-of-death estimate.

Note: All amounts are estimates in 1993 dollars. Assault, robbery, motor vehicle theft, burglary, and larceny include attempted crimes that were not successfully carried out. If the other crime categories excluded attempts, the arson and drunk driving categories might drop in the rankings. See text.

Source: Miller, Cohen, and Wiersema 1996.

estimated to range from $1,177 based on a study in Boston (Hellman and Naroff 1979) to $2,285 in Chicago (Rizzo 1979), compared with the national estimate of $2,210 in Cohen. Because the estimates in exhibit 4 do not differ dramatically from those in Cohen (1988a), an updated comparison would likely find similar results.

Exhibit 5 aggregates victim crime costs based on the number of victimizations in the United States between 1987 and 1990, resulting in aggregate costs of $450 billion in 1993 dollars. This estimate includes only the cost of crime to victims and the cost of services provided to victims of crime. It excludes the

Exhibit 5. Aggregate annual costs of criminal victimization

Crime	Tangible	Quality of life	Total
Fatal crime (1990)	**$33,000**	**$60,000**	**$93,000**
Rape/robbery/abuse/neglect/assault	25,000	46,000	71,000
Arson death	600	1,700	2,000
Drunk driving death (DWI)	7,200	12,300	20,000
Child abuse	**7,300**	**48,000**	**56,000**
Rape	900	8,000	9,000
Sexual abuse	1,400	12,800	14,000
Physical abuse	3,200	20,400	24,000
Emotional abuse	1,900	7,100	9,000
Rape and sexual abuse	**7,500**	**119,000**	**127,000**
Other assault or attempt	**15,000**	**77,000**	**93,000**
NCVS with injury	11,000	44,900	56,000
Age 0–11 with injury	600	3,900	5,000
Non-NCVS domestic	2,200	19,100	21,000
No injury	1,300	9,500	11,000
Robbery or attempt	**3,100**	**8,000**	**11,000**
With injury	2,500	6,600	9,000
No injury	600	1,100	2,000
Drunk driving	**13,400**	**27,000**	**41,000**
With nonfatal injury	11,300	24,600	36,000
No injury	2,400	2,500	5,000
Arson	**2,700**	**2,400**	**5,000**
With nonfatal injury	750	2,400	3,000
No injury	1,900	65	2,000
Larceny or attempt	**9,000**	**0**	**9,000**
Burglary or attempt	**7,000**	**1,800**	**9,000**
Motor vehicle theft or attempt	**6,300**	**500**	**7,000**
Total	**$105,000**	**$345,000**	**$450,000**

Note: All amounts are estimates in millions of 1993 dollars. Totals were computed before rounding. No-injury cases involve no physical injury, but may involve psychological injury. NCVS fatal crimes are all crime deaths except drunk driving and arson. Personal fraud/attempt is excluded to prevent possible double counting with larceny.

Source: Miller, Cohen, and Wiersema 1996, table 4.

cost of prevention and the cost of the criminal justice system. Of this amount, tangible costs are estimated to be $105 billion, or about 25 percent of the total. The crime-specific estimates in exhibit 5 *exclude* the risk of death because a category already exists for fatal crimes. To include the risk of death in aggregate crime cost data would be double counting. Although it would be tempting to update this figure to 1999 dollars, this is not a straightforward exercise. Because crime has been steadily declining in the United States since 1990, updating national crime costs requires recent data on victimization rates. It also requires recent data on the distribution and severity of injuries to determine if this has changed significantly since the 1987–90 timeframe.

Drunk driving is a special category of crime that has some unique measurement issues. It is a crime (and a risk to society) every time someone drives drunk. Yet, many drunk driving incidents occur without any collisions and, thus, there is no harm to victims. In other crime categories, attempted offenses are included, as they might involve some property loss, fear, anxiety, and trauma. No comparable data exist on drunk driving incidents that do not result in collisions. In addition, not all collisions where the driver was drunk are caused by drunk driving. Some of those accidents might have occurred in the absence of alcohol. Thus, some method of attributing collisions to their cause is necessary.

Drug abuse

A series of reports has been commissioned by U.S. Government agencies to determine the economic costs of alcohol and drug abuse in the United States. The most recent study, by Harwood, Fountain, and Livermore (1998), estimated the total cost of drug abuse to be $98 billion in 1992. The bulk of these costs ($69 billion) were productivity losses to drug abusers, including premature death, reduced productivity while at work, career criminals who did not enter the legitimate labor market, and crime-related costs such as victim losses and time spent by incarcerated offenders. An estimated $10 billion was spent on drug abuse services and health care for drug-related illnesses. The remaining $18 billion was the estimated cost of crime committed by drug abusers. Harwood, Fountain, and Livermore (1998) only included tangible costs and ignored intangible costs to victims, families of drug abusers, and so forth. Because a significant portion of these costs was associated with victims of crime, there is some overlap between these estimates and those reported by Miller, Cohen, and Wiersema (1996).

The Harwood, Fountain, and Livermore (1998) report illustrates the difficulty of preparing credible estimates of the cost of drug abuse. First, the empirical evidence on the causal connection between drug abuse and crime is limited and largely unresolved (Miczek et al. 1994). Thus, the authors necessarily rely on

Unlike street crime, which is systematically measured through victim surveys and by the FBI, no comprehensive surveys of the incidence or cost of white-collar crimes exist.

assumptions that are based on a few limited studies. In addition, they assume that average productivity losses for incarcerated drug offenders is the same as the population average, about $39,000 per year (see Cohen 1999). Yet, it is known that the typical incarcerated offender is not as productive as the average person (Cohen, Miller, and Rossman 1994), and those engaged in street-level drug dealing have been found to have relatively low legitimate wage earnings potential (Reuter, MacCoun, and Murphy 1990).

The actual cost of purchasing illegal drugs is not included in the Harwood, Fountain, and Livermore (1998) study. According to a study by Abt Associates (1995), approximately $53 billion was spent on illegal drugs in 1992.[17] Heavy cocaine users are estimated to spend approximately $9,000 to $10,000 per year on cocaine, and heroin addicts spend approximately $17,000 per year (Executive Office of the President, Office of National Drug Control Policy 1991). However, adding these costs would largely result in double counting. Drug users who buy drugs transfer wealth from themselves to the seller, a voluntary transaction not resulting in direct external costs. However, external and social costs do result from the *activities* surrounding the purchase and consumption of drugs (e.g., theft to support a drug habit, medical costs associated with drug-induced illness). Cohen (1998, 19) argues that one could use the cost of drugs as a proxy for the opportunity cost of resources devoted to drug distribution. However, there is a significant risk premium associated with selling drugs, which presumably is reflected in the price of drugs. Noting that the Reuter, MacCoun, and Murphy (1990) study of street-level drug dealers finds legitimate hourly earnings to be about 25 percent of hourly earnings from drug sales, I assumed as a first approximation that only 25 percent of the price of drugs represents a social cost—the lost productivity of a drug dealer not working in legitimate activities. The remainder represents a risk premium paid to dealers who must face a higher risk of being killed on the job.

If the estimates are to be believed, white-collar crime causes tangible losses far in excess of tangible losses associated with street crimes.

Economic/white-collar crimes

Unlike street crime, which is systematically measured through victim surveys and by the FBI, no comprehensive surveys of the incidence or cost of white-collar crimes exist. Although various estimates exist, the sampling methodology and crime definitions are

seldom transparent, making comparability across crime particularly difficult. If the estimates are to be believed, white-collar crime causes tangible losses far in excess of tangible losses associated with street crimes. For example, a 1995 study by the Association of Certified Fraud Examiners (1995) reports that the average business loses about six percent of its total annual revenue to fraud and abuse committed by its own employees. This translated into about $435 billion in 1995—about four times the tangible losses from street crime shown in exhibit 5.

Exhibit 6 lists various estimates of the cost of economic/white-collar crimes. For example, Titus, Heinzelmann, and Boyle (1995) conducted a national survey of the U.S. population to identify victims of personal fraud. They estimated the annual tangible costs to be $45 billion. However, some of the fraud definitions include incidents that may not be considered criminal. Noticeably missing from exhibit 6 are many regulatory offenses such as antitrust, environmental,

Exhibit 6. The cost of criminal fraud

Industry	Fraud type	Cost ($ billions)	Year
All firms	Employee theft and fraud	$435	1996[a]
Telecommunications	Theft of services	$3.7–$5.0	1995[b]
Health care	Overcharge, services not rendered, kickbacks, etc.	$70	1992[c]
Insurance	False claims	$120	1995[d]
Entertainment	Bootlegging	$2.3	1995[e]
Telemarketing	Con artists, sweepstakes, phone scams	up to $40	1995[f]
All consumers	Fraud in general	$45	1991[g]

[a] Association of Certified Fraud Examiners 1995.
[b] Communications Fraud Association. Private communication.
[c] U.S. General Accounting Office. 1992. *Health insurance: Vulnerable payers lose billions to fraud and abuse.* Washington, D.C.
[d] Insurance Information Institute. 1996. *Insurance issues update.* New York.
[e] Recording Industry Association of America. 1996. Cited in Music and performer groups act to curb piracy. *Reuter European Business Report.* London, 26 September.
[f] Federal Trade Commission. *1995–1996 report: Staff summary of Federal Trade Commission activities affecting older Americans.* Retrieved 30 April 2000 from the World Wide Web: http://www.ftc.gov/os/1998/9803/aging98.rpt.htm.
[g] Titus, Heinzelmann, and Boyle 1995.

and food and drug. I am unaware of any studies that attempt to measure aggregate costs of these regulatory crimes. Based on the relatively large fines, cleanup costs, and so forth that can accrue in these cases, these regulatory crimes have the potential for enormous costs. However, some regulatory crimes are primarily reporting requirements that involve little harm (Cohen 1989).

To date, I am unaware of any study that attempts to quantify the intangible costs of fraud. In addition, the studies to date have assumed that the tangible losses are limited to the dollar value of the fraud. Nevertheless, there is anecdotal evidence that losses can be significantly greater in certain cases. For example, some frauds prey on the elderly and uneducated poor. To the extent these victims lose their homes, are unable to afford health care, and so forth, the costs may far exceed the dollar value of the fraud. Whether these losses are common or significant in the aggregate is unknown.

One conceptual difficulty in estimating the cost of crime against business is how to value the items taken. If money is taken, the value is straightforward—the face value of the bills. However, if the loss is merchandise, whether the loss should be valued at retail or wholesale depends on the opportunity cost to the victim. If the victim can easily replenish the product as needed and does not lose retail sales, the loss is the cost to the owner—not the price at which it would sell. However, if the item is scarce and cannot be readily replaced, the loss is now the full value the owner could have expected to receive for the item. Some white-collar crimes involve theft of services that involve essentially zero marginal costs to the victim and might not have been purchased at all in the absence of the theft. For example, the telecommunications industry estimates it is defrauded of $3.7 to $5 billion per year in schemes that allow users to obtain free services. This is a loss to only the phone company, however, if the user would have otherwise purchased the service. If these services would not have been purchased, it is hard to label this a cost. This is particularly true with bootlegged music and counterfeit luxury goods. Of course, in all cases, there may be other more subtle costs associated with the loss, such as diminishing the value of the legitimate product to all law-abiding purchasers.

Criminal justice system

The Bureau of Justice Statistics periodically estimates annual justice expenditures in the United States. These data are compiled from various surveys of local, State, and Federal government agencies. Lindgren (1997) reports that direct expenditures in 1992 by all governments was $94 billion. Nearly half ($41 billion) was for police, with the remaining for corrections ($31 billion) and judicial and legal services ($21 billion). These estimates include costs that are not related to crime, such as traffic safety and the civil court system. Some

of these expenditures are likely to be included in the estimates of the cost of drug abuse previously mentioned. In addition, they exclude crime prevention activities undertaken outside the traditional police, sheriff, or law enforcement office.

Even if accurate, aggregate criminal justice expenditures are of little value in conducting benefit-cost analysis. As noted, police officers do more than enforce criminal laws; they also deal with traffic safety and other community issues. Although I am unaware of any estimate that attempts to sort these costs, some authors have taken a different approach in estimating criminal justice costs using a "bottom-up" approach. Cohen, Miller, and Rossman (1994, 126–134) attempted to piece together the cost of the criminal justice system on a per-crime basis from a few studies done in single localities. They estimated the criminal justice processing cost per offense in 1987 dollars to be $5,925 for murder, $2,050 for rape, $1,125 for robbery, and $1,225 for aggravated assault. This includes the estimated cost of both police investigations and court-related costs such as pretrial booking and jail, hearings, and trials. I am unaware of any similar attempts to estimate per crime the criminal justice costs for other crimes. Note that the appropriate unit of analysis is an issue that becomes important in these types of studies. Criminal investigation costs occur only for crimes reported to police. However, because not all crimes result in arrests or convictions, few other criminal justice costs occur unless an actual offender is apprehended. Thus, for example, although the estimated cost of processing an aggravated assault case was estimated to be $1,225, the cost per *victimization* was only $580. However, because only 28.1 percent of aggravated assaults that were reported to police were cleared by arrest, the cost per *arrested* offender was considerably higher—about $4,400 in 1987.[18]

Note that police (and firefighter) emergency response to victimization is excluded from this section because it was included in the cost of victimization itself. As shown in exhibit 3, these costs are relatively small—generally less than $200 per incident. The emergency response to arson and murder are higher, about $1,000 to $2,000. All other criminal justice costs are considered part of society's response to victimization (and therefore excluded from the cost estimates in exhibit 3).

Private crime prevention

Not all crime prevention programs are paid for by government agencies. According to an industry estimate, revenues in the security industry were about $82.2 billion in 1996—nearly as much as governments spent on the criminal justice system itself.[19]

Zedlewski (1985) estimated the cost of firearms and guard dogs bought primarily for protective purposes. More recent estimates by Laband and Sophocleus (1992) and Anderson (1999) estimate the costs of protective firearms, guard dogs, locks, and other protections. Anderson's (1999) is one of the few studies to attempt to estimate the opportunity cost of time spent preventing crime. He estimated the average adult spends 4 minutes per day locking and unlocking doors and looking for keys. Based on the opportunity cost of their time, Anderson estimated this to be worth $437 per year per adult, or $89.6 billion annually in the United States. He also estimated the value of time spent by participants in neighborhood watch programs to be $655 million.

Although one could identify types of crimes that are more likely to be prevented by certain types of private protection expenditures, it is impossible to apportion most of these costs to individual crimes. For example, even though a private home alarm might be purchased to protect against burglary, it also protects a homeowner who happens to be home during a burglary from robbery, assault, rape, and murder. However, if one takes the view that the cost of burglary includes the *risk* of being home and further victimized, then expenditures on home security are indeed attributable to burglary.

Review of Literature on Costs and Benefits of Criminal Justice Policy

The existing literature on benefits and costs of criminal justice policies generally takes one of two forms: cost-effectiveness or benefit-cost studies. A cost-effectiveness study seeks to answer questions such as "What is the cost per crime averted?" or "What is the cost per successfully treated offender who does not recidivate?" These questions require a thorough understanding of costs and the probability of a successful outcome. They do not, however, require the analyst to monetize the successful outcome. To do so would be to conduct a benefit-cost analysis. To date, there have been few published studies of criminal justice or prevention programs that attempt to either conduct cost-effectiveness or benefit-cost analysis. Instead, researchers generally stop at the question of whether a certain punishment deters potential offenders or whether a treatment program reduces recidivism. If so, the program "works." But at what cost? Are there alternative programs that would give us more bang for the buck? The fact that few studies have been conducted is not surprising, given that criminal justice researchers are seldom economists and not necessarily trained to analyze costs and benefits. The few existing studies are described as follows.

Cost-effectiveness studies

Greenwood and colleagues (1994) compared various incarceration alternatives that were considered during the three-strikes debate in California. In comparing five alternatives, the cost per serious crime prevented ranged from $11,800 (third violent offense) to $16,300 (third felony offense). Although focusing on only violent offenders would appear to give us the most bang for the buck, because we do not know the value of the crimes averted by each option, we do not know which is better.

Similarly, Greenwood and colleagues (1996) compared four child and youth intervention programs: home visits to new mothers and daycare for their children, parent training, high school graduation incentives, and delinquent supervision. They found that per $1 million spent, graduation incentives prevented the largest number of serious crimes (258), followed by parent training (157), delinquent supervision (72), and home visit/daycare (11). Although one might begin to prioritize spending on the basis of such a study, it does not tell us if *all* or only some of these programs should be adopted.

Thus, although the studies by Greenwood and colleagues can help us determine which approach is most cost effective, they are not equipped to determine whether any one approach is socially desirable. A policy analyst must make a subjective determination that the option being considered is worthwhile. That does not mean, however, that cost-effectiveness studies are without merit. They may also provide important information about the relative benefits of two or more programs being compared. For example, Rydell and Everingham (1994) compared supply-control drug strategies (e.g., drug seizures) with demand-control strategies (e.g., drug treatment). Although comparing completely different programs, Rydell and Everingham were able to place these two approaches on equal footing by estimating the reduced cocaine consumption from each alternative. They found a 1-percent reduction in cocaine consumption could be obtained by spending either $34 million on treatment or $246 million on domestic drug enforcement (Rydell and Everingham 1994, 24, table 3.2). This study is often cited as providing evidence that treatment is seven times more cost-effective than drug control programs.

It is worth noting that some analysts ask questions such as, “What is the cost per offender?” Although important, this is purely a cost analysis and should not be construed as a cost-effectiveness study. To be a cost-effectiveness study, one must measure outcomes (e.g., crimes averted, recidivism rate), not just inputs (e.g., number of offenders admitted to the program). More importantly, to focus solely on costs can easily result in a conclusion to fund a program even if it has few benefits.

Outside of crime, a myriad of government programs reduce the risk of death from consumer and motor vehicle products, highway and workplace accidents, medical care, and so forth. Tengs and colleagues (1995) calculated the cost per life-year saved by more than 500 such programs. Although the median program cost $42,000 per life-year saved, they reported a wide range of interventions, from the best, which save more resources than they cost, to the worst, which cost as much as $10 billion per life-year. Thus, shifting resources between programs could save a greater number of life-years at a lower cost.

Given the growing interest in quantifying the effectiveness of criminal justice programs (e.g., Sherman et al. 1997), a similar project would be extremely valuable in the criminal justice arena. Such a project would compare criminal justice and prevention programs among themselves as well as across other interventions that save lives. This is a major endeavor, however, that will not be completed in the immediate future. Many issues have yet to be resolved, not the least of which is determining a common metric for comparison purposes. Although Tengs and colleagues (1995) used life-years saved, this assumes 1 year of life is valued equally, regardless of age, health status, or wealth. An alternative that has been developed in the health economics literature, quality adjusted life-year (QALY), weights life-years by the level of pain and/or impairment (see, e.g., Fabian 1994). Another alternative is to use the common metric of dollars, which puts us into the realm of benefit-cost analysis.

Benefit-cost studies

To date, only a few researchers have gone beyond cost-effectiveness analysis to explicitly compare the monetary costs with the monetary value of benefits. This is not surprising, given that, until recently, no credible monetary estimates existed for intangible costs of crime. Moreover, introducing a new metric such as intangible costs takes a considerable amount of time before it becomes mainstream in the literature. In addition, as noted earlier, this approach is not without controversy.

Among the authors who have used monetary estimates of the cost of crime (including intangible costs) in conducting cost-benefit analyses are: DiIulio and Piehl (1991), Gray (1994), Levitt (1996), and Donohue and Siegelman (1998). Among the programs studied by these authors are longer prison sentences, prison overcrowding, rehabilitation programs, and juvenile intervention programs. Welsh and Farrington (2000) summarized recent studies that measure costs and benefits and also discussed some of the methodological issues surrounding benefit-cost analysis.

In cases where a program passes a benefit-cost test using only tangible costs, the need for monetizing intangible losses is less obvious. For example, Prentky and Burgess (1990) show that the cost of incarcerated sex offender treatment is less than the tangible benefits from lower recidivism rates (e.g., lower reprocessing costs of recidivists and lower victim costs). No intangible benefits need to be estimated because the program already passes a benefit-cost test. However, a similar study by Austin (1986) of early release programs in Illinois concluded that the benefits (reduced prison costs) exceeded costs (tangible costs associated with increased crime due to recidivists). As I show in Cohen (1988a), if the cost of recidivism *includes* the intangible cost of crime to victims, the benefit-cost ratio goes the other way, and Illinois residents are better off building more prisons or finding another less costly but equally effective alternative.

Recently, Washington State has undertaken the most ambitious and policy relevant project to systematically compare the costs and benefits of crime prevention programs. The Washington State Institute for Public Policy was mandated by the State legislature to "evaluate the costs and benefits of certain criminal justice policies, violence prevention programs, and other efforts to decrease the criminal recidivism of juvenile and adult offenders, and certain at-risk behaviors of youth" (Aos et al. 1999). The project involves monetarily quantifying all tangible costs and benefits. It presents the benefit-cost analysis from two perspectives—taxpayers and crime victims. To the extent possible, it uses Washington State estimates (e.g., cost of criminal justice resources), although crime costs are taken from the national estimates in Miller, Cohen, and Wiersema (1996). Only tangible, crime-related benefits are considered.[20] The study focuses on prevention programs and does not include policing and sentencing policies.

Despite its limitations, the policy implications of the Aos and colleagues (1999) study are profound. First, a few programs (such as juvenile boot camps) simply do not reduce crime at any cost and instead actually increase crime. Second, although most programs result in modest crime reduction benefits, benefits generally exceeded costs. Third, the largest benefit-cost ratio was generally found in programs targeting juvenile offenders. For example, an aggression-replacement training program was estimated to pay back taxpayers $19.57 for every $1 spent. When victim benefits are included, these programs were estimated to pay back $31.40 per $1 spent. Inprison education and vocational training programs for adult offenders also generally had a positive benefit-cost ratio. Some early childhood education programs, such as nurse home visitation and early childhood preschool programs, were also found to be cost-beneficial. Others were found to have benefits that were less than the cost to taxpayers. Thus, shifting government resources between such programs could have major long-term social benefits.

An interesting study by Ayres and Levitt (1998) highlights the fact that the costs and benefits of crime prevention programs may accrue to different parties. They studied LoJack, a radio-transmitter device used for retrieving stolen vehicles that costs $600 to install (or about $97 per year on an annualized basis). Ayres and Levitt (1998, 45–46) estimated that "one auto theft is eliminated annually for every three LoJacks installed in high-crime central cities. There is little evidence that the reductions in central city auto thefts are simply being displaced either geographically or to other categories of crime." Interestingly, most of this benefit is a positive externality, because the probability that any one LoJack owner will reap the benefits of an avoided theft is relatively low. They estimate the private benefits to be about $150 per year in expected theft protection. Since much of this benefit goes directly to insurance companies, their study raises the issue of how to design proper incentives—either through insurance markets or government programs—to capture these positive externalities for the full benefit of society.

Measuring the effectiveness of crime prevention programs provides useful information that goes beyond the criminal justice community. For example, the often-cited Perry Preschool program has been shown to have long-term crime reduction benefits that exceed its costs, in addition to the intended consequences of higher graduation and employment rates (Barnett 1993). Similarly, a study of the costs and benefits of drug treatment programs by Rajkumar and French (1997) finds that a substantial benefit beyond reduced drug consumption is the monetary value of reduced crime committed by rehabilitated drug abusers. Based on the Treatment Outcome Prospective Study of 11,750 drug abusers, they estimated that the monetary value of reduced crime 1 year following treatment far outweighed the cost of the program.

Like any statistical tool, benefit-cost analysis is vulnerable to misapplication through carelessness, inexperience, or deception.

A somewhat different approach was taken by Cohen (1998), in which the generic question was asked, "What is the monetary value of saving a high-risk youth" from a life of crime, drug abuse, or dropping out of high school? I estimated the value of saving one high-risk youth from a life of crime to be $1.3 to $1.5 million in 1997 dollars (discounted to present value). Comparable estimates are $370,000 to $970,000 for a heavy drug abuser, and $243,000 to $388,000 for a high school dropout. These estimates provide a basis for others who want to conduct a benefit-cost analysis of their programs.

Issues in Implementation and Policy Analysis

This section briefly addresses a few important issues that need to be considered by any researcher or policy analyst seriously thinking about using a cost-effectiveness or benefit-cost methodology. Briefly, I look at the potential for misuse of benefit-cost analysis, uncertainty, treatment of future benefits or costs, issues of fairness and equity, and public perception of the risk of crime.

Despite a policy analyst's best attempt to base the analysis on sound assumptions, there will always be considerable uncertainty about both the costs and benefits of a proposed program.

The use and misuse of benefit-cost analysis

Policymakers—the consumers of benefit-cost analyses—often have little understanding of the methodology and assumptions underlying the analysis. Like any statistical tool, benefit-cost analysis is vulnerable to misapplication through carelessness, inexperience, or deception. The technique is sometimes criticized because it presents an aura of precision and objectivity that might not be justified. The results can be no more precise than the assumptions and valuations that are employed. Thus, it is important that the analyst carefully spell out the assumptions, the basis for those assumptions, the projected benefits, how those benefits are valued, and how alternative assumptions might affect the results (see the following discussion of uncertainty).

The risk of using benefit-cost analysis is that regulatory agencies or proponents of a particular program might use the technique to justify a program they want funded and manipulate the numbers until a positive benefit-cost ratio is achieved. Opponents of a proposal can do the same. Yet, benefit-cost analysis forces analysts to explicitly characterize the assumptions so that the analysis is transparent. This lends itself to an open process where the issues can be debated on an informed basis.

Uncertainty

Despite a policy analyst's best attempt to base the analysis on sound assumptions, there will always be considerable uncertainty about both the costs and benefits of a proposed program. Oftentimes, the program being evaluated for potential implementation will be based on one already studied elsewhere. Yet, the two programs will rarely be identical to each other. Differing elements

might include the demographics of the offending or treatment populations, the punishment or treatment protocols (e.g., level of security for a prison; type, length of, and number of counseling sessions), the program personnel (e.g., educational background, experience, commitment), and the time periods. Any one of these factors might alter both the costs and effectiveness of the proposed program.

One method for dealing with uncertainty is to conduct a sensitivity analysis of the results. For example, suppose previous studies found that a drug treatment policy is 20 percent effective at reducing crime committed by those who complete the program and that the benefits of the program exceed its costs. Instead of assuming a 20-percent effectiveness rate, one might vary this assumption to see how sensitive the benefit-cost analysis is to that rate. We would be much more confident in the program if it also passes a benefit-cost test with only a 10-percent success rate. However, we would be much less sanguine if only a slight reduction in effectiveness reversed the benefit-cost equation. Depending on the number of studies and type of data available, a more sophisticated statistical analysis might be performed to estimate a confidence interval around the costs and benefits.

Discounting to present value

Another problem of comparability often arises when the benefits of a program will not be realized for many years into the future. For example, investing in a program that treats young offenders involves expenditures today, but might yield benefits over an extended future timespan. Because a dollar spent today is not the same as a dollar received 15 years from now, future benefits must be discounted to present value when compared with the costs borne today. Programs that require a multiyear funding commitment might also be evaluated by discounting future costs to present value.

Although there is no general consensus of the appropriate discount rate for purposes of policy analysis, most cost-of-crime studies have used a yearly rate of between 2 and 3 percent, which is consistent with both the real (i.e., net of inflation) discount rate for worker wages over time and the real consumer interest rate over time.[21] A similar consensus appears to have developed around a 3-percent net discount rate in health care economics (Gold et al. 1996). Some government agencies, however, have routinely used net discount rates of approximately 10 percent, and the Office of Management and Budget (1992) only recently reduced its required discount rate for regulatory policy analysis to 7 percent. The higher the discount rate, the lower the present value of future benefits. The choice of a proper discount rate is especially important in considering the benefits of youth prevention programs or other programs with benefits that

might not accrue for many years. Although this problem is nowhere near being settled, it is less of a problem in the criminal justice context than in the environmental arena, where it is common for latency periods to extend 20, 30, or 40 years or more (see Revesz 1999).

Fairness and equity

Benefit-cost analysis does not discriminate on the basis of socioeconomic status. A $1,000 medical cost is valued at $1,000, regardless of whether the injured person is rich or poor. Thus, the tool is politically neutral and can (and will) be overridden when other policy goals come into conflict. Thus, it is useful for the analyst to identify the demographic characteristics of the group that is likely to benefit most from a proposal.

A more subtle concern is the fact that the methodology itself may incorporate inequities in society. For example, if one is measuring lost wages to victims of crime—and those victims tend to be in the lower income quartiles—the benefits of a crime prevention program will be skewed downward based on the victim's income. If one were to compare a crime reduction program with another program that targets airline safety, for example, the typical wage rate might be higher for the airline accident victim than the crime victim. Further, if one were to conduct a contingent valuation survey of potential victims to determine their willingness to pay for crime reduction programs, the value is likely to be highly dependent on the wealth (i.e., ability to pay) of the respondent. Thus, from a public policy standpoint, benefit-cost analysis does indeed discriminate against society's less wealthy. If society deems this to be unfair, the analyst needs to make adjustments in the estimated costs and benefits to "neutralize" the effect of wealth on the estimated costs and benefits. This has been done to some extent in my earlier studies of the cost of crime. For example, the statistical value of life that is applied to the risk of death is based on the typical individual in the United States, not the typical crime victim. However, wage losses and reported short-term medical costs are necessarily taken from crime victim surveys.

Public perception versus objective measures of risk

Perhaps one of the most difficult issues that needs to be confronted as these methods are further developed and implemented is the fact that the public's perception of the risk of crime may not be the same as actual risk. Indeed, it has long been noted that as crime rates have declined over the past decade, the public's concern about crime has grown. There are many possible explanations for this disparity that are beyond the scope of this chapter (see Warr in this volume). Furthermore, any method that asks the public their willingness to pay for reduced crime inherently must confront the fact that the public might be

misinformed about the risk and severity of crime. Thus, public expenditures on crime prevention might be too high relative to what the public would demand if it was fully informed. The reverse is also true, of course, so that any objective measure of crime severity will ignore public perception and fear.

Concluding Remarks

Cost-effectiveness, benefit-cost analysis, and placing dollar values on the intangible costs of crime have all arrived at the criminal justice policy arena and will not go away. Increased scrutiny of government spending programs, coupled with new evidence that certain targeted prevention and rehabilitation programs work, provide the impetus for both new and innovative criminal justice policies *and* fierce public debate over their merits. This paper provides a framework for the future analysis of criminal justice policy from the perspective of solid empirical research.

This chapter has demonstrated the importance of considering both the costs and benefits of criminal justice and prevention programs. Although the practitioner might think in terms of cost per treated offender, the more relevant cost is cost per unit of benefit in which the benefit might include reduced crimes, successful drug treatment, and so forth. Even if a treatment program has been shown to reduce recidivism, it is important to know at what cost and at what benefit it does so. It does little good to know that a program costs $10,000 per offender treated without knowing the corresponding benefit received for that $10,000. Although I argue that dollars is the best metric to compare benefits and costs, it is not always possible to adequately quantify all costs or benefits. In such cases, it is still worthwhile to quantify as much as possible and to identify and list those that cannot be quantified, along with a qualitative description of their relative severity and importance.

This chapter should make clear, however, that we are far from the point where benefit-cost methods can be applied to criminal justice programs on a wholesale basis. There is much more work to do on many of the components of estimating the cost of crime. In many cases, these same problems exist in other program areas that value lives and other intangibles. Among the issues that would benefit most from further work are: refinement and agreement on the statistical value of life, studies that directly elicit the public's willingness to pay for reduced crime (especially for property crimes, in which intangible losses are difficult to estimate), a better understanding of how to incorporate public perceptions into policy decisions, agreement on the proper discount rate for policy analysis involving long-term benefits, and measures of community wellness that go beyond individual crime victims. Perhaps most important,

however, is a continuing need for improved estimates of the crime control benefits of incarceration, alternative sanctions, and crime prevention programs.

My purpose in writing this chapter was twofold. First, because I am obviously in favor of encouraging the use of empirical tools in analyzing alternative criminal justice or crime prevention policies, I hope this chapter will encourage policy analysts to experiment with these tools and thereby improve their decisions. Although the techniques described in this chapter have been used for many years in other areas of public policy, they are just beginning to penetrate the criminal justice policy arena. The technique is not ideological but instead can be an important tool in the public policy debate. Both the hardline view of three strikes and you're out and the more compassionate view of focusing on prevention instead of punishment can be subjected to rigorous cost-benefit analyses in addition to political rhetoric.

My second goal is to encourage other researchers to devote serious time and energy to further improving the empirical evidence on the costs of crime and the benefits of crime prevention strategies. Criminal justice literature is far behind other areas of public policy, such as environmental protection and health care, that affect the health and well-being of our society. Literally hundreds of studies, peer-reviewed journal articles, conferences, and actual regulatory analyses have been conducted in these areas. It is time for the criminal justice research community to do the same.

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Notes

1. Gramlich (1981) contains a historical overview of benefit-cost analysis and a textbook treatment of the fundamentals of this technique. See also Mishan (1988) for a standard textbook on benefit-cost analysis.

2. President Ronald Reagan promulgated the first such requirement in 1981, Executive Order 12291 (46 *Federal Register* 13193). In 1993, President Bill Clinton issued Executive Order 12866 (58 *Federal Register* 51735). Although these Executive orders cannot supercede statutory provisions, they have had a dramatic effect on the manner in which regulatory agencies draft and analyze proposed rules.

3. For example, see Senate Bill S981, 105th Congress (1997), which would require all major rules to be accompanied by a benefit-cost analysis.

4. As discussed elsewhere in the chapter, there are methods that can be adopted to deal with the effect of wage inequality on estimating the cost of crime. In short, the analyst might adopt average wage rates in the United States in estimating the cost of lost wages. This puts all crime victims on an equal footing, regardless of their wealth.

5. As some critics have noted, all cost estimates are subject to considerable uncertainty, and categories of costs will be inevitably left unaccounted for (Zimring and Hawkins 1995). Thus, unless methods and assumptions are relatively consistent, or the unaccounted for costs are known to be relatively small, any such comparisons are likely to be of questionable value.

6. See Sherman et al. (1997) for a comprehensive examination of the effectiveness of alternative programs.

7. It would be double-counting to include both the value of stolen property and all collateral costs of the theft in an estimate of the social cost of theft.

8. French, Rachal, and Hubbard (1991) contain a useful discussion of the distinction between private, social, and external costs and provide a conceptual framework for estimating the costs of drug abuse.

9. See Zerbe and Dively (1994, 263–270) for a detailed discussion of the Kelman article and opposing views in support of the use of benefit-cost analysis.

10. Chapters 8 and 9 of Hellman (1980) provide a useful discussion of the economics of victimless crimes.

11. Details can be found in Cohen and Miller (1999a).

12. Regardless of the theoretical concerns, Cohen (1990) finds that the jury award method yields estimates of the cost of an Index crime that are consistent with the property value studies. Cohen and Miller (1999b) find that jury awards are consistent with the value of a life-year implied by the value-of-life studies based on worker wage rate differentials.

13. For an overview of the contingent valuation method, see Mitchell and Carson (1989). Smith (1996) compared the valuation from two different proposed environmental projects and found that citizens could make a clear distinction between the two projects.

14. The National Institute of Justice recently funded a more comprehensive public survey on attitudes toward sentencing and parole decisions that included a significant contingent valuation component to it, "Measuring Public Perception of Appropriate Prison Sentences," NIJ grant no. 99–CE–VX–0001. For further details, contact Mark Cohen, the author of this chapter, who is the project manager for the survey. The only study the

author is aware of that employs a similar technique in the context of violence is by Ludwig and Cook (1999), who examine the public's willingness to pay for reduced gun violence.

15. A recent paper by Anderson (1999) attempts to estimate aggregate costs of all crimes.

16. One limitation of the approach used in Miller, Cohen, and Wiersema (1996) as well as in my earlier estimates is that the intangible costs of property crimes such as burglary are based on the probability of being a homicide victim. This is likely to underestimate the fear and feeling of being violated that accompanies being a burglary victim. Future research might improve on the intangible cost estimates of property crimes.

17. See Caulkins (in this volume) for a discussion of the difficulty of measuring drug costs.

18. These figures are calculated from Cohen, Miller, and Rossman (1994), tables 19–20.

19. This estimate includes alarms, guards, electronic and physical security, bomb and metal detection, access control, and so forth. Source: Bill Cunningham, Hallcrest Systems, Inc., as reported on the Security Industry Association Web site: http://www.siaonline.org/wp_giant.html.

20. As previously noted, excluding such ancillary benefits as increased productivity from high school graduation might skew policy decisions away from programs that have higher overall social benefits. Excluding intangible benefits might bias decisions away from programs that prevent violent crimes relative to property crimes and might also result in certain programs failing a benefit-cost test when the intangible benefits exceed costs.

21. Note that these are net discount rates, as they already account for inflation. Thus, for example, a 2-percent discount rate would be consistent with long-term cost-of-living increases of 4 percent and long-term interest rates of 6 percent.

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