

# The Role of the Cost-of-Crime Literature in Bridging the Gap Between Social Science Research and Policy Making

## Potentials and Limitations

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### **Research Summary**

*In this article, we review the theoretical paradigm underlying cost–benefit analysis and address some of the critiques of this framework that have arisen within criminal justice circles and other policy areas. We also review existing studies devoted to estimating the costs of specific crimes. We offer a brief discussion categorizing the alternative costs of crime and the various methodological approaches taken (hedonic analysis, contingent valuation, and accounting methods), with an explicit discussion of the relative strengths and weaknesses of each approach and debates within the economics profession pertaining to these methodologies. We argue that cost considerations broadly defined should be of central importance in criminal justice policy debates. However, we also highlight the potential for cost-consideration and important equity criteria to come into conflict.*

### **Policy Implications**

*Policy makers should consider careful cost–benefit analysis as an important criterion in criminal justice policy. Given some features of criminal justice policy choices such as the unequal distribution of the costs of criminal victimization, anti-crime enforcement,*

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*and the potential for perceived illegitimacy of the criminal justice system to undermine various public institutions, we argue that equity considerations also deserve careful attention. In practice, we place greater confidence in the use of cost-of-crime estimates to judge the relative effectiveness of alternative interventions, and we are cautious regarding policy prescriptions emanating from benefit–cost ratios that are marginally greater than one.*

During the past three decades, considerable research effort has been devoted to articulating and measuring the various pathways through which crime and our public and private responses to crime impact overall the well-being of society. An important substrata of this research has focused on placing a monetary value on the social cost of criminal victimization. These efforts often have aimed to generate separate figures for different crime types with the goal of generating a common metric against which the relative severity of alternative criminal incidents can be judged.

Estimates of the costs of criminal victimization play an important role in bridging the gap between basic social science research on criminal justice interventions and policy analysis. By monetizing and rendering commensurable crimes of varying severity, these estimates facilitate an analysis of the degree to which the benefits of a given proposal exceed the costs broadly defined. Equally as important, these estimates facilitate a comparative analysis of alternative policy tools, permitting estimates of the “bang-per-buck” across policy interventions and assessments of the efficiency of a given pattern of deployment of public resources.

Of course, there are limitations to this conceptual framework for public choice and, by extension, to the utility of the costs-of-crime literature in informing and guiding criminal justice policy. To start, cost–benefit analysis and cost–effectiveness analysis provide a specific weighting (or social accounting) of the relative welfare of alternative groups in society that often conflicts with widely held beliefs regarding fairness and equity. This is a direct result of the use of money as the common metric used to place various benefits and costs on a common footing. Responsible analysis requires cognizance of this fact and a careful parallel analysis of the equity implications of policy alternatives.

There are also important qualifications regarding the measurement of the costs of crime and suspicion that current methods overestimate these costs. For example, pain-and-suffering estimates based on observed jury awards reflect judgments made by jurors that have no consequences for the jurors themselves. Damage assessments are imposed on a third party; the jury effectively spends someone else’s money. Similar concerns are often raised regarding estimates of willingness to pay to avoid victimization via surveys querying about hypothetical referenda. By design, nothing is at stake for the respondent in answering a hypothetical question, although careful contingent valuation studies have made great efforts to articulate and make salient the tax consequences of the scenario under consideration.

Both examples illustrate how cost-of-crime estimates are often based on assessments that are divorced from personal budget considerations.

In what follows, we argue that the cost–benefit framework and economic approach to public choice should play an increasingly important role in criminal justice policy and that the body of research estimating specific costs of crime should figure prominently in policy analysis and public choice in the criminal justice domain. Such analysis is already quite important and influential in other policy domains, in which risk of injury and lives lost are influenced by policy choices, such as occupational safety and health, environmental regulation, and transportation safety. The increasing emphasis on cost–benefit analyses and the search for policy tools with an “evidence base” brings criminal justice policy into this fold.

However, we do not support the proposition that policy choices should strictly adhere to and be determined solely by the results of cost–benefit calculations. Cost–benefit analysis alone often fails to consider adequately the equity implications of policy alternatives. Equity is an especially important criterion in criminal justice policy, and perhaps it is a more important criterion relative to other policy domains. The burdens of criminal justice enforcement are disproportionately borne by the poor and the marginalized, and often they can exacerbate existing societal divides, such as inter-racial economic disparities or the relative deprivation of individuals with severe mental illness. Moreover, an unequally distributed burden of the impact of criminal justice enforcement may delegitimize law enforcement, the criminal justice system more broadly, and government in general in specific communities. Inadequate consideration of equity, fairness, proportionality, procedural justice, and disparate impact may ultimately serve to undermine and offset the value of crime-control benefits achieved through specific policy strategies.

Moreover, we have more confidence in the ability of cost-of-crime estimates to gauge the relative severity of alternative crime types than we do in the absolute magnitudes of the individual cost point estimates. Having a gauge of relative severity that renders alternative crime types commensurable greatly facilitates “cost-effectiveness” analysis of the relative efficacy of alternative uses of public funds. Irrespective of whether cost estimates for specific crimes are too high or low, a solid and reliable relative ordering permits the ranking of policy alternatives that have differential effects on different crime types. Conclusions regarding whether a specific policy has a cost–benefit ratio in excess of one, however, requires confidence in the precision and unbiasedness of the costs-of-crime estimates.<sup>1</sup>

We begin by discussing the theoretical paradigm underlying cost–benefit analysis and address some of the critiques of this framework that have arisen within criminal justice circles and other policy areas. We argue that cost considerations broadly defined are, in the language of Adler and Posner (1999), “morally relevant” and certainly an important criteria

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1. Similarly, this also requires confidence in the precision and unbiasedness of the underlying estimates of the intervention on crime.

to be considered along with equity consequences and perhaps more intangible deontological ethical concerns. We present the commonly offered defense of cost–benefit analysis that all policy choices with net positive benefits are potentially win–win for all involved and then discuss the practical impediments to redistribution in the criminal justice context that render the equity criteria particularly important.

Next, we review existing studies devoted to estimating the cost of specific crimes. We begin with a brief discussion categorizing the alternative costs of crime and the various methodological approaches taken (hedonic analysis, contingent valuation, and accounting methods), with an explicit discussion of the relative strengths and weaknesses of each approach and debates within the economics profession pertaining to these methodologies. We close with a discussion of the use of these figures in policy analysis and their potential to render social science research results more useful and perhaps actionable to policy makers and public deliberation.

### **Cost–Benefit Analysis, Public Choice, and Criminal Justice Policy**

Anderson (1999, 2012) and Cohen (2005) presented comprehensive estimates of the dollar value of the social cost of crime. The most recent analysis by Anderson (2012) placed the total external cost of crime in 2012 at roughly \$3.2 trillion. By external cost, we are referring to the cost generated for crime victims, for potential victims, and for taxpayers. To arrive at social cost, one would have to subtract from this total any cost for which there is an offsetting gain (a pure transfer in the language of welfare economics). Losses from theft and fraud clearly represent such a transfer as the gain to the offender offsets the loss to the victim. Excluding the value of property loss to victims yields a social cost of \$1.6 trillion (Anderson, 2012). Regardless of one's position regarding whether criminal offenders have standing in these cost calculations, both aggregate figures are large, amounting to 19.5% and 9.7% (respectively) of the country's gross national product in 2012. Behind these aggregate totals are \$646 billion in crime-control expenditures including \$113 billion on police protection; \$81 billion in correctional expenditures; \$76 billion in expenditures by various federal agencies; \$84 billion to combat drug trafficking; and more than \$300 billion in private expenditures on security devices and services, repairs, insurance, and private advocacy (for example, Mothers Against Drunk Drivers). Victim costs in the form of lost life and injury exceed \$750 billion.

These figures illustrate the fact that much is at stake in criminal justice policy choices. Interventions, whether they are increases in incarceration, expanding police forces, dropout prevention efforts, or some other policy proposal that reduces crime rates stand to generate substantial benefits for society to the extent that on net they chip away at these colossal cost totals. However, is positive net benefits a sufficient or even necessary criterion for choosing a particular policy path?

Cost–benefit analysis provides at least partial guidance on this question. First, cost–benefit analysis articulates and places dollar values on the consequences of a policy choice.

Second, cost–benefit analysis provides a clear set of criteria by which society and policy makers can rank alternative policy choices and pass judgment on specific proposals. More generally, this set of criteria also provides guidance regarding the appropriate level of government intervention, or alternatively stated—the optimal level of provision of a public good.<sup>2</sup>

In this section, we begin by providing a theoretically precise definition of the costs and benefits of policy changes and the microeconomic concepts that link specific harms and benefits to dollar values. This discussion illustrates the theoretical concepts that the cost-of-crime literature has so far aimed to operationalize empirically. We devote particular attention to how interpersonal variation in income levels gives rise to interpersonal variations in the monetary valuation of victimization. Next, we discuss the ranking of policy alternatives by cost–benefit and cost-effectiveness analysis and the implicit social preferences associated with these rankings. Finally, we discuss some of the general ethical objections to cost–benefit analysis and issues that have been raised specifically within the criminal justice policy context.

### *Articulating Policy Outcomes and Monetizing Harms and Benefits*

A cost–benefit analysis of a specific policy proposal involves identifying all members of society that are harmed, that benefit, and the key outcomes impacted by a proposal that ultimately impact the welfare of individuals. For example, a proposal to enhance sentences for drunk driving would negatively impact the welfare of drunk drivers who would be incarcerated as a result, positively impact the welfare of sober drivers and their passengers via enhanced safety, and negatively impact taxpayers through higher correctional expenditures. To be sure, this enumeration of consequences is limited to some degree by the imagination and our ability to anticipate secondary impacts of and behavioral responses to the policy. The policy world is rife with examples of the unintended, unanticipated, and often socially costly consequences of policy initiatives. For example, if increased prison time for those convicted of driving under the influence has an unintended criminogenic impact on postrelease

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2. Criminal justice and safety services have the classic characteristics of goods that are underprovided by the private market or are provided at suboptimal levels. For example, to some degree, the benefits derived from police patrols are nonrival (our benefit from the general deterrent effect of more police on the street does not detract from the comparable benefit that you would derive) and nonexcludable (one cannot exclude a given city resident who refuses to pay his or her taxes from realizing the benefit from greater general deterrence). As a result, individual citizens have a strong incentive to “free ride” on the services provided by others, and only those with great demand for security services will purchase them. As another example, some privately purchased security services can generate negative externalities. One neighbor’s purchase of a home security system could increase the likelihood that the next-door neighbor is robbed. An economic analysis of welfare is motivated in large part by an attempt to identify policy choices that bring society closer to optimal allocations of public resources, taking into account the underprovision of public goods and the suboptimal overprovision of the private market of goods that generate negative externalities.

behavior, then the higher postrelease offending levels would detract from the net benefits of this policy option.<sup>3</sup>

Once the likely consequences of a policy change are articulated, cost–benefit analysis renders consequences commensurable by placing a dollar value on individual benefits and harms. Microeconomic theory offers two alternative yet related theoretical concepts for assessing the dollar value of harms and benefits experienced at the individual level. Compensating variation is defined as the income transfer needed to restore an individual's well-being to what it would be in the absence of a specific policy change. For policies that provide a benefit, the compensating variation measures how much one would be willing to pay for the benefit in question. For a policy that harms someone, compensating variation is the minimum amount that one would be willing to accept in compensation. Equivalent variation, in contrast, measures the amount of money that would have the equivalent impact on one's happiness level as the consequences of a policy change. For a policy change that has a negative effect, equivalent variation measures one's maximum willingness to pay to avoid the consequences (think ransom), whereas for a policy that generates a benefit, equivalent variation measures the minimum amount of cash one would be willing to accept to forgo the benefit.<sup>4</sup>

Table 1 conceptually illustrates these ideas in two criminal justice contexts:

1. The calculation of appropriate compensation for an identified crime victim
2. The measurement of the individual benefits from a crime-mitigating public investment

Regarding compensation for crime victims, compensating variation equals the minimum income payment needed to restore the person's original level of happiness (i.e., the victim's minimum willingness to accept). Equivalent variation equals the amount that the individual would have been willing to pay to avoid being victimized (i.e., the maximum willingness to pay). Clearly, compensating variation in this instance will exceed equivalent variation, as the latter calculation is limited by the individual's income whereas the former is not. In addition, both measures of victim cost are likely to be higher for high-income victims. This is most obvious for the equivalent variation measure, where victimization cost

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3. In addition, the quality of the analysis is contingent, to some degree, on our understanding of the likely behavioral responses to a policy change. For example, if people are deterred by tough punishments for drunk drivers, then cost calculations would have to account for such a behavioral response.

4. The difference between compensating and equivalent variation is subtle and often is a source of confusion. Because compensating variation measures the income adjustment needed to restore one's utility to what it was, the calculation relies on the individual's happiness level in the absence of the policy and the state of the world under the policy (i.e., the prices and incomes that result with the policy change) to calculate the necessary compensation. Equivalent variation, in contrast, measures the change in income that would have the equivalent effect on happiness of introducing the policy. In other words, the reference happiness level is that which would result if the policy were enacted while combined with prices and incomes in the absence of the policy to calculate the comparable income change.

TABLE 1

### Conceptual Examples of the Calculation and Definition of Compensating and Equivalent Variation in Criminal Justice Contexts

Harm or Benefit Being Quantified	Calculation Based on Compensating Variation	Calculation Based on Equivalent Variation
Calculating appropriate compensation for an identified crime victim.	The minimum amount of money that the crime victim would be willing to accept after the fact as compensation for the damages, pain, and suffering caused by the victimization.	The maximum amount of money that an individual crime victim would have been willing to pay before the fact not to have experienced the damages, pain, and suffering caused by the victimization.
Calculating individual benefits from a public investment in crime prevention.	The maximum amount that an individual would be willing to pay for the policy in question.	The minimum amount of money that an individual would be willing to accept in lieu of the benefits generated by the crime-prevention policy.

is limited from above by the income of the person in question. However, even the compensating variation definition, which is conceptually not limited by an individual's income level, is likely to generate a higher assessment of victim damages for high-income victims for reasons we will discuss shortly.

Both measures are theoretically correct gauges of the damages done. However, one might argue that for the purposes of calculating damages and attempting to make the victim whole (likely an impossible goal for victims of serious crimes), compensating variation is the more appropriate of the two. The compensating variation effectively endows victims with the right to their level of well-being in the status quo ante. Such an allocation of property rights is defensible on ethical grounds (and perhaps in terms of the deterrence value of damage assessment) as crime victims by definition are unjustifiably harmed by a third party.

In the second example in Table 1, compensating and equivalent variation swap places in terms of willingness to accept and willingness to pay. Specifically, compensating variation measures the benefits to an individual of a crime-mitigating public investment in terms of the maximum amount that the individual is willing to pay for these benefits. Equivalent variation, in contrast, equals the minimum amount the individual would be willing to accept to forego the benefits of the policy change. Again, the willingness-to-pay valuation of the policy change will be less than the minimum willingness to accept, as the former is constrained by income levels and the latter is not.

For the purposes of deciding whether to spend public funds on a particular policy, one might argue that willingness to pay provides the most appropriate of the two measures for several reasons. First, willingness to pay is the more conservative of the two, and some might argue for a generally high level of judiciousness and parsimony when it comes to the

stewarding of taxpayer dollars. Second, the aggregate valuation of a policy option derived from cumulating compensating variation over all individuals in society is perhaps better aligned with the calculation that would ideally be made by a policy maker with a fiduciary responsibility to constituents; namely, whether willingness to pay for the benefits created by a specific policy (essentially the summary measure regarding how society values the policy) exceeds policy costs.

These cost concepts measured at the individual level are key inputs to cost–benefit analysis, with the aggregation of costs and benefits providing the key statistics for ranking policy options. In essence, these individual valuations of costs and benefits provide the weights placed on the welfare of various individuals in assessing the merits of specific policy choices. With this in mind, it is important to explore how these standard measures of costs and benefits vary with individual income levels, and by extension how cost–benefit analysis weighs the relative welfare of the poor and the wealthy. We have already noted that willingness-to-pay valuations are limited by individual incomes. The fact that maximum *ability* to pay is higher for higher income individuals is likely to generate higher monetary valuations for similar benefits among those with high incomes. However, it is also likely that personal safety is what economists refer to as a normal good, that is, a good for which demand increases with income. Hence, in addition to a greater ability to pay for safety, high incomes should theoretically be associated with a higher *willingness* to pay for safety. This positive relationship between income and benefit and/or cost valuation ultimately results in greater weight being placed on the welfare of the well-to-do in cost–benefit calculations.

An alternative pathway through which these monetary gauges of welfare may favor the wealthy operates through the relationship between individual well-being and income levels. Specifically, if the marginal increment to well-being associated with an additional dollar of income decreases as income increases, then the wealthy will place higher dollar valuations on victimization than the poor, holding constant the characteristics of the criminal incident. This point is best illustrated with an example. Suppose two people, one poor and one wealthy, both of whom own the same model cell phone, are independently robbed of their phones while leaving their respective workplaces. Suppose that both individuals suffer similar levels of psychological distress as a result of the robbery.<sup>5</sup> Suppose further that the marginal effect on well-being of an additional dollar of income is higher for the poor person relative to the wealthy person.

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5. In this example, we are implicitly making what is referred to in microeconomic theory as an interpersonal utility comparison. By stating that both victims suffer comparable psychological harm, we are implicitly assuming that our underlying gauge of well-being can be used to distinguish different happiness levels cardinally and compare changes in well-being across individuals. This idea is somewhat controversial in economics, and many are reluctant to draw such comparisons. In fact, most of the results of basic microeconomic theory can be derived with a nonunique utility function so long as the ordinal ranking of alternative states is preserved.

The value of damages done in this example consists of two components: the cost of replacing the phone and the minimum compensation for pain and suffering needed to restore the victim's preincident level of well-being. By construction, the monetary value of the first component is equal, and hence we can focus on putting a dollar value on pain and suffering. Compensation for pain and suffering theoretically equals the amount of income that would be sufficient to offset the welfare loss associated with being traumatized. Although both individuals suffer similar traumas, the minimum necessary payment to the poor victim is smaller because his or her "marginal utility of money" is higher and each dollar goes further in improving the poor victim's welfare relative to that of the wealthy victim.<sup>6</sup> In other words, given his or her relative income deprivation, it takes fewer dollars to offset the utility loss from psychological distress. Hence, the dollar value of the victimization under these assumptions is lower for the poor victim.

As these welfare measures are essentially the building blocks of cost–benefit analysis, the systematic tendency to place greater weight on the welfare of the wealthy is certainly of concern. Of course, we still must discuss how these valuations map into the absolute and relative ranking of policy options and carefully ponder whether such rankings may conflict with social preferences for equity and fairness.

#### *Cost–Benefit Analysis and the Absolute and Relative Assessment of Policy Options*

Individual valuations of the net benefits of a policy ultimately provide key inputs into cost–benefit and cost-effectiveness analyses, and by extension, they provide one manner of prioritizing the uses of the powers of the state. Cost–benefit analysis essentially sums the monetary values of benefits and costs across all individuals and normatively recommends pursuing policies that generate net positive benefits (or, equivalently, that have cost–benefit ratios greater than one). Cost-effectiveness analysis, in contrast, ranks policies according to their cost–benefit ratios. Although these two analytical tools are similar and interdependent, one might conceptualize cost–benefit analysis as providing an incremental test for whether more or less public resources should be devoted to a specific policy effort. Cost-effectiveness analysis, however, provides a manner of assessing whether the resources spent within a given policy domain are being used wisely (i.e., whether we could achieve the same outcomes with fewer dollars or better outcomes with similar resources by simply reallocating resources across alternative policy interventions).

To illustrate these concepts, Figure 1 reproduces cost–benefit ratio estimates produced by the Washington State Institute for Public Policy pertaining to interventions intended to reduce juvenile offending.<sup>7</sup> The cost–benefit ratios vary greatly across interventions with high ratios for Functional Family Therapy and various cognitive behavioral therapy

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6. See Friedman (2002) for a more formal discussion of this point.

7. See the explanation on cost–benefit results from the Washington State Institute for Public Policy (2015).



interventions to ratios below one and even negative for programs such as Scared Straight. Cost–benefit analysis would prescribe investing in all of the programs in Figure 1 with a cost–benefit ratio in excess of one. Cost-effectiveness analysis, however, would prescribe that for a given level of expenditures, we allocate resources to the interventions with the highest cost–benefit ratios, perhaps involving reallocating expenditures from interventions with relatively low cost–benefit ratios to interventions with high ratios.<sup>8</sup>

In the context of the programmatic interventions illustrated in Figure 1, the recommendations of cost–benefit and cost-effectiveness analysis seem perfectly reasonable and frankly uncontroversial. Why would society not discard programs that generate negative net benefits and seek to spend public dollars in a manner that maximizes the impact per dollar spent? In many instances, we would argue that such analysis indeed should provide the principal criterion for public choice. However, the peculiar relationship between individual valuations of policy benefits and costs and individual income levels, in conjunction with strict adherence to the normative prescriptions of cost–benefit analysis, may yield policy recommendations that conflict with commonly held preferences for equity and fairness.

This issue is best illustrated with examples. Suppose a police department receives funding for one additional police officer and is trying to decide how to deploy this new resource. For simplicity, suppose the city is socioeconomically segregated into a wealthy area and a poor area and that the additional officer, through general deterrence, would prevent 10 residential burglaries per month in whichever area he or she is deployed. With higher incomes, lower average marginal utility of money, and more expensive possessions, high-income households will place greater monetary value on preventing 10 residential burglaries than will low-income households even if we assume that the psychological trauma associated with being burglarized is the same for a poor and a wealthy household. Here, an analysis of the cost-effectiveness of alternative deployment choices would yield the recommendation that the additional officer be deployed to the wealthy neighborhoods.

Alternatively, suppose that the material possessions of poor households are sufficiently modest that the benefits as measured by compensating variation associated with the 10 prevented burglaries per month falls short of the cost of an additional officer. Suppose also that the material possessions of the wealthy households are sufficiently opulent such that the benefits from preventing one burglary per month would exceed the cost of an additional officer. Now suppose that allocating the officer to the wealthy neighborhood would prevent only one burglary (because crime rates are already low in the wealthy neighborhoods) but 10 burglaries in the poor neighborhood. A cost–benefit test would not recommend additional police for the poor neighborhood but would for the wealthy neighborhood.

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8. Presumably, each of these interventions is likely to exhibit diminishing returns to scale, implying that reallocating dollars from intervention A toward intervention B would increase the cost–benefit ratio of A and diminish that of B. The optimal allocation of resources across interventions would occur where the cost–benefit ratios are equalized across interventions.

A cost-effectiveness analysis would recommend reallocating police officers from the poor neighborhood to the wealthy neighborhood.

As one final example, consider the analysis of the finances of a drug-selling gang from the south side of Chicago presented by Levitt and Venkatesh (2000). By analyzing variation in compensation for the gang's foot soldiers associated with periods of high and low mortality risk, the authors estimated the compensation required among these individuals to accept an elevated risk of death on the job, and by extension, the value that these (for the most part) young African American men were implicitly placing on lives lost. The authors estimated that the additional annual compensation for one additional death ranged from \$8,000 to \$120,000. We will discuss in detail the concept of the value of statistical life in the next section. For the moment, however, we will note that observed risk-wage trade-offs among the general working public yields an average estimate of \$9 million. If we use this estimate in conjunction with the upper bound estimate for foot soldiers in the drug-selling gang, then cost-benefit analysis would rank as equally attractive a policy that prevents one death among the general public to a policy that prevents 75 deaths among young men who participate in the drug trade. Cost-effectiveness analysis would rank a policy that prevents one death among the general public as preferred to any policy that prevents 74 or fewer deaths among young men involved in the drug trade.

Examples of policy proposals that pass the cost-benefit test but have questionable equity implications abound in many policy domains. For example, redistributive programs that provide aid to the poor often fail to generate net positive benefits because the value of the transfer to the poor falls short of the tax revenue needed to finance the benefits and the administrative costs of the program. A strict adherence to the normative recommendations of cost-benefit analysis would preclude such redistributive efforts. As an alternative example, consider the issue of generating tax revenue. The net social costs of raising tax revenue via an excise tax are lower when levied on goods for which the price sensitivity of demand tends to be low.<sup>9</sup> Hence, cost-effectiveness analysis would imply that we should always levy taxes on goods for which demand exhibits very low price sensitivity, such as cigarettes or insulin.

The potential for cost-benefit analysis to yield normative prescriptions that conflict with a common sense of fairness is well known. In fact, we believe that most advocates of cost-benefit analysis would argue for parallel assessments of the equity and distributional consequences of policy options and the consideration of equity as well as efficiency in policy

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9. In a simple static market analysis, imposing an excise tax always generates negative net benefits because of the reaction of the supply-and-demand sides of the market to the change in price. Generally speaking, the more elastic the demand for a good, the greater the distortion to individual behavior caused by an excise tax. An excise tax (a) increases the prices paid by consumers and reduces the prices received by producers; (b) reduces production and consumption, relative to what it would be in the absence of the tax; and (c) generates a "deadweight loss," which is defined as a loss of value for which there is no offsetting gain. Deadweight loss will be greater in markets with more elastic demand holding all else constant.

deliberation and public choice. Nonetheless, there is a strong case to make for cost–benefit analysis as a principal input for policy making, equity concerns notwithstanding, for the following reasons.

First, any policy choice with net positive monetary benefits provides what economists call a potential Pareto improvement. A Pareto improvement is a situation in which a change that makes someone better off does so without harming anyone else, inclusive of changes where everyone benefits. Pareto improvements represent movements toward efficiency in that one generates more happiness within the resource constraints of the society without generating a loss. A policy proposal that would generate net positive benefits is one that has the potential to be a Pareto improvement if a mechanism exists to redistribute some of the net benefits to those who would otherwise be the policy losers. Of course, this point is qualified by the empirical reality that, for whatever reason, there are few examples of cross-party compensation and many examples where policy changes create uncompensated losers. Our hypothetical examples regarding the allocation of additional police resources are instances in which redistributions converting potential Pareto improvements into actual Pareto improvement are unlikely to occur. Nonetheless, with positive net benefits, there is always room for a deal, so to speak, between those who benefit and those who are harmed by a policy change that in the end may make all better off.<sup>10</sup>

Second, the prescriptions of cost–benefit analysis need not conflict with equity objectives. For many interventions, the costs and benefits of policy alternatives will be borne by similar socioeconomic segments of society, and thus, the relationship between net-benefit valuation and income is less relevant (take for example, the earlier discussion of juvenile justice interventions). Moreover, it is certainly possible that the prescriptions of cost–benefit analysis are aligned, rather than are in conflict, with key equity objectives. One example is the Justice Reinvestment Initiative (JRI) of the Bureau of Justice Assistance within the U.S. Department of Justice. The aim of JRI is to evaluate the costs and benefits of various criminal justice interventions broadly defined, to include policing, prisons, jails, community corrections, and violence-prevention efforts, and to foster allocation of public resources toward more cost-effective policies. Suppose that it can be shown that the value of additional crime resulting from reverse deterrence and incapacitation associated with the elimination of a mandatory minimum prison sentence falls short of the value of crime that would be prevented should these resources be reallocated toward hiring more police officers. Making such a reallocation would reduce the cost of crime to society holding constant public expenditure levels, while mitigating the collateral consequences of incarceration that are borne disproportionately by poor communities.

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10. Schelling (1984) provided many interesting thought experiments in which policy proposals that on the surface appear to be unfair can be rendered mutually beneficial through appropriate compensatory mechanisms and transferable property rights assignments.

Third, cost–benefit analysis forces the policy process to struggle with the fact that we operate in a world of scarcity and that resources devoted to one intervention cannot be devoted to others. Spending on an expensive medical intervention may displace spending on preventive activities. It may be the case that the life years saved per dollar spent may be greater from the latter relative to the former. Criminal justice expenditures may displace public expenditures on early childhood education and other investments in health and well-being targeted toward at-risk families. A mature policy process must confront these trade-offs responsibly, even if it requires unseemly tabulations such as the placing a dollar value on a murder prevented.

### *Ethical Objections to Cost–Benefit Analysis*

Cost–benefit and cost-effectiveness analyses are influential and widely employed in other policy domains involving the regulation of risk. For example, in their review of research on the “value of a statistical life,” a concept that we will discuss in detail in the next section, Viscusi and Aldy (2003) cited several federal agencies employing cost–benefit analysis between 1985 and 2000, including the Federal Aviation Administration, the U.S. Environmental Protection Agency, the Food and Nutrition Service division as well as the Food Safety and Inspection Service division of the U.S. Department of Agriculture, the U.S. Food and Drug Administration, and the Consumer Product Safety Commission. These agencies employed the workhorse tools of welfare economics in deliberating over a variety of topics ranging from the regulation of the sale and distribution of cigarettes, the use of lead paint, and the regulation of fuel additives, to ozone air quality standards and portable bed rails.

To be sure, the use of cost–benefit analysis and the tools of welfare economics in these alternative policy domains are controversial to some and have certainly been criticized on moral and ethical grounds. In a widely cited paper, Kelman (1981) provided a general critique of the use of cost–benefit analysis in policy making. Although many of the examples cited pertain to regulatory activity in the domains of health and safety and the environment, the relevance to criminal justice policy is apparent. Kelman’s (1981) critique can be summarized as follows. First, in some situations, even though the benefits may outweigh the costs, the violation of a moral duty (i.e., the duty not to kill, lie, maim, or defame) may simply preclude consideration of the policy in question. Second, even when duties and rights are not absolute, they do have “prima facie moral validity,” and when they come into conflict with a favorable cost–benefit calculation, they should be given due consideration in the deliberation process. Kelman further contended that some issues of such great importance should not be governed by cost–benefit analysis. To quote Kelman (1981: 36) directly, “many environmentalists fear that subjecting decisions about clear air or water to the cost benefit tests that determine the general run of decisions removes those matters from the realm of specially valued things.”

It is important that we take these critiques seriously as these arguments do point to limitations of welfare economic analysis as a guiding light for policy makers. In fact, we would argue that most defenders of cost–benefit analysis are fully cognizant of these limitations, as is evident in the testy written responses to Kelman’s (1981) essay. For example, DeLong (1981: 39) argued that the “decision to use cost-benefit analysis by no means implies the adoption of the reductionist utilitarianism described by Kelman.” Solow (1981: 41) wrote that “Kelman hints broadly that ‘economists’ are so morally numb as to believe that a routine cost-benefit analysis could justify killing widows and orphans, or abridging freedom of speech, or outlawing simple evidences of piety and friendship.” Both quotes reveal a healthy appreciation of the fact that cost–benefit calculations provide one of many criteria that must be considered in public deliberations.

A recent salient example whereby net social cost is considered in tandem with, and perhaps is constrained by, larger ethical concerns is provided by the recent National Academy of Sciences (Travis and Western, 2014) report on the increase of mass incarceration in the United States. The committee authors of the report laid out a set of principles that should guide sentencing with an eye on minimizing the net social costs of our criminal justice policy while emphasizing some of the rights and duties that Kelman argued have *prima facie* moral value. Although Travis and Western recognized the value of sentencing in preventing crime through incapacitation and deterrence, they explicitly called for consideration of social justice (that the nation’s correctional apparatus should not exacerbate existing salient inequalities and perhaps aim to narrow them), respect for citizenship (guaranteeing minimum human rights, preserving dignity, and not damaging the long-term prospects of prison inmates, most of whom will eventually be released), proportionality (that sentencing disparities reflect heterogeneity in the severity of crime and culpability of the offender), and parsimony (that sentences be no harsher than needed to achieve retributive, crime-control, and rehabilitative goals) in sentencing reforms. The authors argued that these principles of restraint provide “complements, not alternatives, to recent emphases on offender accountability and crime control” (Travis and Western, 2014: 323).

Clearly, deliberations over criminal justice policy must strike a balance between the net benefits of our policy options and many of the fundamental ethical concerns that pervade all aspects of the criminal justice system. Thus, careful deliberations of the nature prescribed by welfare economics should certainly play a prominent role. It is interesting to consider the closing remarks of Kelman’s 1981 essay. Although not written specifically about criminal justice policy, the sentiments eerily foreshadowed some of the excesses to come in criminal sentencing:

My own judgment is that modest efforts to assess benefits and costs are justified, although I do not believe that government agencies ought to sponsor efforts to put dollar prices on non-market things. I also do not believe that the cry for more cost benefit analysis in regulation is, on the whole, justified. If regulatory

officials were so insensitive about regulatory costs that they did not provide acceptable raw materials for deliberative judgment, my conclusions might be different. (Kelman, 1981: 40)

Although in the counterfactual world more cost–benefit analyses may not have prevented the subsequent quadrupling of the nation’s incarceration rate, one might reasonably argue that more deliberative and less emotional response to crime would have likely yielded a different national path.

### **Placing a Dollar Value on Criminal Victimization**

Cost–benefit and cost–effectiveness analyses of criminal justice interventions require two key sets of inputs. First, one needs estimates of the effects of a given policy intervention on key consequences including such outcomes as crime rates, incarceration levels, and collateral consequences of the policy for offenders, potential offenders, family of offenders, and so on. Second, one needs monetary metrics that facilitate placing these consequences on a common footing. In this section, we discuss the small but growing literature that has so far attempted to place a monetary value on criminal victimization.

Several key cost concepts merit discussion before we review specific methodological approaches and studies. First, research on the costs of crime usually draws a distinction between *ex ante* estimates of crime costs (society’s willingness to pay to reduce criminal victimization before the identity of the victim is known) and the *ex post* costs of crime (the monetary value of the damage imposed on an identified victim). *Ex post* costs provide the key concept for formulating and arriving at a remedy. However, to the extent that cost–benefit analysis is motivated by the quest to identify the optimal provision of public goods, *ex ante* cost should guide public deliberations regarding preventative expenditures.

Second, most analysts draw a distinction between the direct costs of crime and the indirect costs of crime. Direct costs of crime are those that are generated by specific criminal victimizations, inclusive of the costs to victims and the costs to society of responding to criminal victimization. Indirect costs include all of the resources devoted to, and the various ways that our lives are altered by, crime-prevention efforts and efforts to avoid becoming a victim. Expenditures on locks and security systems; residential choices that increase commute times; and costly changes in behavior such as avoiding certain areas, not leaving one’s home after dark, or not allowing one’s children to play outside would all be subsumed under the indirect costs heading.

Finally, many researchers draw a distinction between the tangible and intangible costs of crime. Tangible costs are those that can be measured through economic transactions, for example, medical costs of victimization, processing costs for a criminal defendant, costs associated with punishment, the value of lost property, and the value of earnings losses associated with diminished capacity. Although tangible costs are conceptually straightforward, measurement challenges abound especially when one considers loss of life or diminished

earnings capacity. Perhaps the most controversy surrounds the articulation and measurement of intangible costs. Such costs include pain and suffering to victims, lost companionships to family members, and general diminished quality of life resulting from criminal victimization. We will discuss key examples of cost–benefit analyses next, where consideration of intangible costs is the difference between net-positive and net-negative social benefits.

Several alternative methodological approaches are available for measuring the cost of crime, each with its own relative strengths and weaknesses. Many of the studies in this literature have been juxtaposed and compared in the high-quality reviews by Chalfin (2013), Heaton (2010), and in an earlier review by Nagin (2001). In the proceeding discussion, we focus principally on the relative strengths of the alternative approaches and the degree to which the cost estimates align with the willingness-to-pay metric that undergirds welfare economics, and we selectively review key studies within each category.

### *Measuring the Cost of Crime Through Hedonic Analysis*

The principal challenge faced by researchers striving to place a dollar value on criminal victimization is that individuals do not directly buy and sell victimization. However, consumers and producers buy and sell goods that bundle together the services of the good with other attributes, some of which may involve risk of injury or risk of personal victimization. For example, working the night shift at a convenience store may entail an elevated risk of victimization relative to working during the day. Living in a high-crime neighborhood may elevate the risk of being robbed or suffering a residential burglary relative to living in a low-crime neighborhood. To the extent that the markets for the underlying goods being traded are competitive (i.e., perfect information regarding good attributes, many buyers and sellers, and low transaction costs), negative or positive attributes of the good will be “capitalized” into the price. That is to say, a variation in price will reflect both the value of the principal service of the good in question as well as monetary compensation (that can be either positive or negative) for the hedonic, implicitly traded attribute. In our two examples, the night shift, all else held equal, should pay more than the day shift to account for the higher victimization rate. Similarly, a housing unit in the high-crime neighborhood, all else held equal, should sell or rent at a discount. Dividing the price differential associated with working the night shift by the increment in risk of a specific form of victimization yields an estimate of the cost of that form of victimization in terms of the compensation demanded by workers in the labor market.

The reader has likely already anticipated many of the critiques of hedonic analysis. First, there may be confounding factors not observed by the researcher that are correlated with risk and that explain observed price differentials for reasons that are independent of the risk of victimization. For example, working at night while most people are asleep is certainly a negative job attribute that likely requires additional compensation to induce someone to fill this position. Absent an estimate of the independent effect on compensation

of an irregular schedule, one might falsely overattribute a pay differential between the day shift and the night shift to the higher risk of victimization.

Second, the assumption of perfect information regarding secondary attributes of goods bought and sold is unlikely to hold. Information regarding victimization risk in either the night shift or housing example is likely to be imperfect and subjective perceptions inaccurate. People are notoriously bad at conceptualizing the true risk posed by low-probability events and may either systematically overestimate or underestimate the risks they face on a specific job or from purchasing a given product type.

Third, choices may be constrained by noncompetitive forces that also distort the price signal from which the researcher is trying to uncover the cost of a higher victimization risk. For example, racial housing discrimination may drive up housing costs in poor Black neighborhoods, reinforcing racial segregation in cities by constraining the residential choices of Black households, and may increase prices in predominantly Black neighborhoods relative to what they would be in the absence of such discrimination (see Massey and Denton, 1998; Yinger, 1997). If Black neighborhoods have higher crime rates on average than White neighborhoods, then the effect of discrimination on housing price differentials will confound the effect of higher victimization risk. As an alternative example, high unemployment rates among certain groups may force them to accept whatever employment is available and prevent the payment of compensating differentials for negative job attributes. Indeed, several studies found negative associations between workplace risk and compensation, which is an empirical finding consistent with noncompetitive forces driving the most vulnerable workers into low-paying jobs with negative nonpecuniary job amenities (Black and Kniesner, 2003; Hersch, 1998).

Fourth, hedonic analysis is often based on the trade-offs made by individuals whose risk preferences are not representative of the general population. For example, the least risk-averse workers are those who will select into risky jobs because those workers will accept risky employment for the lowest risk compensation. Should we be using the value placed on victimization risk from such individuals for policy analysis in which loss of life is a key outcome?

Finally, most of the research on the cost of crime has not generated crime-specific estimates of willingness to pay to avoid victimization usually because of insufficient independent variation in the underlying crime rates associated with traded goods.

Thaler (1978) provided one of the earliest estimates that employed hedonic analysis to explore the economic cost of crime. This study estimated the relationship between property crime rates and property values in Rochester, New York. Thaler ran regressions of property values on neighborhood crime rates, holding constant housing unit characteristics, and he found a significant negative effect of crime on property values. Of course, this early study was subject to critiques regarding potentially omitted variables (e.g., other unfavorable neighborhood characteristics that are correlated with crime such as local pollution or poor

school quality). In addition, the study did not generate separate estimates of resident willingness to pay to avoid distinct crimes such as burglary or robbery.

A more recent analysis by Linden and Rockoff (2008) employed a methodological design that more adequately addressed the omitted variables bias problem; yet it is still subject to many of the other concerns pertaining to risk perception and pricing. Linden and Rockoff used sex offender registries to estimate the effect of the arrival of a new sex offender in one's neighborhood on values of nearby properties. They focused on a single county in North Carolina and combined data on parcel sales, parcel characteristics, and the presence and arrival date of sex offenders from the state's sex offender registry program. By using longitudinal and latitudinal coordinates, Linden and Rockoff identified homes within 0.3 miles of a sex offender's residence and estimated (a) the distance price gradient once a sex offender is present, (b) the distance-price gradient prior to the sex offender's arrival, (c) the change in home prices within 0.1 miles pre-post the arrival of someone on the registry, (d) the comparable change between 0.1 and 0.3 miles of the residence, and (e) the relative change in prices for homes closer to the residence of the sex offender. Linden and Rockoff found sizable declines in home values within 0.1 mile of a registered sex offender's residence, on the order of 4.5%. For those living next door, the changes are larger, on the order of 12%. The price effect, however, declines rapidly with distance with little evidence of an effect on homes values just beyond 0.1 miles.

Linden and Rockoff (2008) used these results to back out an estimate of willingness to pay to prevent a sexual assault base on the decline in home values and a calculation based on the national victimization survey of the likelihood of being assaulted by a sex offender in one's vicinity. Assuming that individuals understand the true risks of having such a neighbor, the authors estimated a cost per sexual assault on the order of \$1.2 million. They explored the sensitivity of this result to various assumptions, with perhaps the most important being a systematic tendency to overestimate the likelihood of rare events. Under one set of extreme assumptions (namely, that the assault in the neighborhood would definitely happen to the person in question), the cost estimate drops to \$90,000. To be sure, if the price decline associated with a sex offender's moving in next door is driven in part by induced moral repugnance, then these estimates of ex ante victimization cost would be upwardly biased.

The body of hedonic analysis studies that has had the largest impact on cost-of-crime research involves studies devoted to estimating the value of a statistical life (VSL). Most of this research has involved testing via the use of multivariate econometric models for risk-wage trade-offs in labor market data for the United States and for other countries. This risk-wage premium is then used to estimate society's willingness to pay to reduce statistical deaths by one by essentially tabulating the amount of additional wage compensation needed to accept an increase in fatality risk that would generate one additional death. An alternative, though smaller, body of studies has generated VSL estimates from consumer product price differentials, where given products such as car seats or air bags are used to estimate individual

willingness to pay to reduce the risk of injury or death. This research was reviewed in detail by Viscusi (1993, 2008) and Viscusi and Aldy (2003).

The findings from the VSL literature often provide key inputs to cost-of-crime analyses and serve as benchmarks against which many of the results using alternative methods are compared (especially results for homicide). Hence, it is worthwhile to summarize the general magnitudes of the values from VSL studies, as well as some of the conceptual and measurement problems in this literature. Chalfin (2013) provided an exhaustive summary of VSL estimates from various markets as well as the use of VSL estimates by federal agencies, converting all values to 2010 dollars. The results from 31 separate labor market studies yielded a range of \$0.7 million to \$26.4 million with a mean value of \$9 million. The 13 studies based on consumer products yielded a range of estimates of \$1 million to \$11.1 million, with a much lower average relative to the labor market studies of \$3.4 million. Finally, Chalfin enumerated 18 separate cost–benefits analyses conducted by federal agencies, employing VSLs ranging from \$1.3 million to \$8.6 million (average of \$5.3 million). Notably, the cost–benefit analyses using relatively low values are all fairly old, occurring during the 1980s and early 1990s.

Most VSL estimates are subject to the same critiques that we raised in our more general discussion of hedonic analysis. Namely, jobs with relatively high workplace risk are also likely to be characterized by other negative job amenities that would require compensation to attract workers (for example, the risk of nonfatal serious injury). In addition, individuals who fill employment opportunities with relatively high fatality risks are unlikely to have preferences that are representative of the average person, or the median voter (take, for example, the low VSL inferred from the behavior and compensation of foot soldiers in the drug-selling gang analyzed in the 2000 study by Levitt and Venkatesh). Finally, how individuals perceive fatality risk and cross-occupational variation in this risk is uncertain, and there is no reason to believe that subjective assessments of cross-job differences in fatality risk are accurate.

Two relatively recent VSL estimates addressed many of these concerns and yielded estimates on the low side of the cost range reviewed in Chalfin (2013). The first exploited the 1987 change in federal policy permitting states to increase their speed limits on rural interstate freeways from the federal mandatory maximum of 55 miles per hour to 65 miles per hour. Ashenfelter and Greenstone (2004) assessed the effect of this change in states that opted for the increase on (a) total travel time savings and (b) auto-related fatalities. They found robust evidence of a 35% increase in auto fatality rates associated with the change in speed limits and travel time savings of approximately 125,000 hours per additional fatality.

Ashenfelter and Greenstone (2004) argued that state policy makers were well aware of the mortality consequences of increasing the speed limit as the imposition of the federal speed limit in 1974 led to a notable and widely discussed decline in traffic fatalities. In addition, research on the average speed/fatality trade-off was well developed by 1987 and actively discussed by state legislators across the country in deliberating about whether to

increase speed limits. The change in average travel time was clearly exogenous and the result of deliberate decision making by policy makers. Moreover, the beneficiaries of the change in policy in terms of reduced travel time (the general driving public) and those who bore the costs of this change in terms of higher fatality risk (the general driving public) were essentially the same. Hence, the VSL revealed by this particular policy change comes as close as possible to a deliberate public choice trading off higher fatality levels for an economic benefit in terms of lower travel costs. Pricing the time savings at the average wage for workers in each state, the authors estimated a VSL of \$1.54 million in 1997 dollars (\$2.25 million in 2015 dollars).

The second study, by Greenstone, Ryan, and Yankovich (2015), modeled the likelihood of reenlisting in the U.S. Army as a function of retention bonuses that vary over time and by army occupation and the variation over time and by occupation in fatality risk for the period 2002 to 2010. Greenstone, Ryan, and Yankovich estimated the effects of changes in fatality risk as well as of changes in the retention bonus on the likelihood of reenlisting and used these estimates to derive the VSL revealed by the choices of young men and women deciding whether to continue with their military careers. This exercise yields VSL estimates ranging from \$165,000 to \$769,000.

These two studies raised several issues that are pertinent to cost–benefit analysis in criminal justice policy. First, the one explicit example in which we observe policy makers deliberately choosing higher fatality levels in exchange for an economic benefit yields a VSL much lower than what is commonly assumed in crime-related cost–benefit analyses that price the loss of life. Although we also noted cost–benefit studies conducted by federal agencies that assume higher VSLs, the deliberations of states and their ultimate choices reveal the actual implicit valuations of lives from these state choices. Notably, none of these states subsequently reversed the decision to increase speed limits, and the federal limit on speed limits was subsequently abolished in 1995. Hence, to the extent that we are willing to interpret the policy process as reflecting deliberate informed choice, these subsequent actions (or inactions to be precise) suggest an implicit judgment that the value of the travel time savings was not outweighed by the extra fatalities.

To be sure, it may be the case that the manner in which a life is lost bears substantively on society's willingness to pay to avoid such an outcome and that a homicide is more costly in terms of willingness to pay than an auto-related fatality. Nonetheless, Ashenfelter and Greenstone's (2004) results, in conjunction with the general sensitivity of crime-related cost–benefit analysis to the assumed VSL (see Chalfin and McCrary, 2013), should inspire caution in interpreting the cost–benefit ratio calculations for criminal justice interventions in which the homicide effect of a policy intervention is the principal contributor to net benefits.

The second issue concerns the question of what is the appropriate value to place on the lives of individuals who often willingly and for meager reward place themselves at great risk. Consider the relatively low VSL revealed by the reenlistment behavior of soldiers. A strict adherence to cost–benefit analysis would value the lives of these individuals *ex ante* at

the VSL that is revealed by their choices. Hence, if the cost per life saved of providing body armor or reinforcing the floors of transport vehicles exceeds \$769,000, then *ex ante* net benefits from such an investment would be negative. Our best guess is that most Americans would oppose a policy tabulation and subsequent policy decision that placed a lower value on the lives of soldiers than the value we place on members of the general public in other risk-related deliberations. Interestingly, Greenstone et al. (2015) found lower VSLs among veterans that have seen combat, which is suggestive of a complex relationship between past experience and the willingness and motivation to take on lethal risk. For example, perhaps having experienced combat engenders a greater sense of duty and a consequent increase in the likelihood of reenlisting.

As a related example, consider a cost–benefit analysis of a policy choice designed to decrease auto fatalities among teenagers (for example, increasing the minimum age for a driver's license to 18). We know that teenagers, on average, are more likely to engage in risky behaviors than adults, often in exchange for relatively small rewards (for example, speeding and texting while driving). If one were to back out the revealed value that teenagers place on a statistical life from observed risk–reward trade-offs, one might reasonably propose that such calculations would yield low valuations relative to the valuations that the behaviors of the same individuals would reveal 10 years later. A cost–benefit analysis that values lives saved using the valuations revealed by the behavior of teenagers themselves may fail to yield a cost–benefit ratio greater than one. Of course, policy makers may paternally place higher values on the lives of teenagers in their deliberations (for example, by applying an average estimate for young adults) by taking into account neuroscientific research on brain development, age, and impulsive and risky behavior. However, this would depart (reasonably, we would add) from strict cost–benefit analysis.

This brings us back to the low VSLs revealed by the choices of members of drug-selling gangs. One can certainly argue that their choices reveal very low valuations of their own lives and that perhaps economic valuations of homicides involving criminally active individuals should reflect these low valuations. However, one may also argue that many of these participants are young, that their preferences for and attitudes toward risk are likely to evolve as they age, and that their willingness to accept risk may be influenced by past experiences and current circumstances in manners that are complex and not necessarily immutable. Interestingly, in assessing civilian mortality risk in an attempt to characterize the alternative risk profiles of soldiers who do not reenlist, Greenstone et al. (2015) estimated fatality risks for young African American men in many U.S. cities that are comparable with many of the high-risk, army occupations on an active tour of duty. “Revealed preferences for risk” as commonly conceptualized in relatively reductive models of human behavior may fail to account adequately for the endogenous determination of these preferences, and the role of such factors as prior traumatization, structural inequalities that impact aspirations, and general perceptions regarding one's future. To place a relatively low value on the lives of young crime victims who engage in high-risk behavior, in our view, places too much

stock in the underlying theoretical paradigm and, in particular, the implicit assumption of exogenous risk preferences.

### *Contingent Valuation Studies*

We noted in our general discussion of welfare economics that one main goal of cost-benefit analysis is to uncover the public's preferences or demand for goods and services that are generally suboptimally provided by private markets. We also noted that public safety services have many of the key characteristics of a public good. Namely, once provided, it is difficult to exclude someone who refuses to pay taxes from enjoying these benefits, and that one person enjoying the benefits of a safe environment does not detract from the benefits enjoyed by others. Although hedonic analysis provides an indirect path to uncovering these valuations, an alternative strategy would be simply to ask people how much they value a safe environment. This is essentially the methodological strategy underlying contingent valuation surveys.

Contingent valuation surveys aim to estimate the distribution of willingness to pay for a specific public good. For example, one might inquire via a contingent valuation survey whether a household is willing to pay \$0, \$50, \$100, \$150, or \$200 in the form of higher taxes for an intervention that would decrease homicide by 10%, for example. Usually the amount queried is randomly varied across respondents. With completed responses from a random sample of households, one can estimate the proportion of households unwilling to pay at least \$50, the proportion willing to pay \$50 but not \$100, the proportion willing to pay \$100 but not \$150, the proportion willing to pay \$150 but not \$200, and the proportion willing to pay \$200. Subject to specification choices regarding the value to assign to each category (for example, should those unwilling to pay \$50 be assigned values of zero), the researcher can then calculate the average willingness to pay among all households. Multiplied by the number of households in the United States, one arrives at the total willingness to pay for a 10% reduction in homicide. Dividing by the number of homicides that would constitute a 10% reduction yields willingness to pay to reduce statistical homicides by one.

Contingent valuation analyses have a fairly long and somewhat controversial history in environmental economics. A historical flashpoint arose in the litigation and damages assessment after the March 1989 Exxon Valdez oil spill along the Alaskan coastline. A damage assessment by Hausman, Leonard, and McFadden (1995) valued the direct economic losses from diminished recreation and fishing at approximately \$4 million. An alternative assessment by Carson et al. (1992), based on society's stated willingness to pay to avoid such environmental disasters, put the total losses at approximately \$3 billion.<sup>11</sup> The difference

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11. Exxon and the state of Alaska ultimately settled out of court for \$3 billion in damages. See Carson (2012) for a discussion of the Exxon Valdez event and the role of economic research in arriving at the settlement.

between these two figures is primarily a result of the inclusion in the latter estimate of what environmental economists refer to as “existence” or “passive use” value, namely, the value placed on the existence of something despite whether one derives direct use and enjoyment from the object of the valuation exercise. The wedge between these two cost estimates is analogous to the wedge that exists between realized out-of-pocket crime cost totals and crime cost totals that account for indirect and intangible costs of victimization, such as crime avoidance and victim pain and suffering.

This discrepancy in damage assessments sparked an intense debate within the economics profession regarding the validity of contingent valuation methods. Much of the arguments for and against the use of these methods are summarized in two symposia published in the *Journal of Economic Perspectives*. Peter A. Diamond and Jerry A. Hausman (1994) laid out the case against under the title “Contingent Valuation: Is Some Number Better than No Number?” First, they argued that hypothetical statements of willingness to pay are divorced from any true underlying economic transactions and often inquire about issues for which taxpayers and consumers have little direct experience in terms of actual purchases. In addition, respondents essentially have nothing at stake in answering a hypothetical interview. Responses may be strategic, aimed at pleasing the interviewer, or express protest, but they may not necessarily bear any resemblance to actual willingness to pay for a specific public good. This critique often fuels suspicion that contingent valuation estimates are in general biased upward because nothing is at stake for the respondent.

Diamond and Hausman (1994) raised additional concerns about the convenience samples used in some contingent valuation surveys (for example, stopping shoppers in malls), concerns that numerical answers may ultimately be anchored by the payment choices specified by researchers beforehand in designing the contingent valuation survey, and that the existence value figures are unrealistically large. Finally, several authors have raised concerns about what some refer to as the embedding effect, namely, that willingness to pay tends to be insensitive to variation in the ultimate impact of the intervention. For example, willingness to pay to clean up 10 lakes may seem to be the same as the willingness to pay to restore 100 or 1,000. In other words, respondents may simply be stating their willingness to contribute to some vague environmental effort, with the magnitude of the ultimate effect being poorly understood. There is reason to believe that this may be a particular problem in the cost-of-crime estimates, a point that we expand on shortly.

On the pro-side, W. Michael Hanemann (1994) contended that much of what society values is never traded in markets, and if we were to restrict public-sector interventions to those domains for which there exists a close market substitute, the public sector would fail to address and appropriately deliberate over many issues and problems that constitute the fundamental responsibilities of the state. Although Hanemann was principally referring to valuing environmental damage, the applicability of this argument to the criminal justice domain is self-evident. Hanemann noted that most serious contingent valuation efforts employ sophisticated sampling designs, pretest their survey instruments, and word survey questions

in a manner that reminds the respondent of the tax implications of the program. Hanemann also cited several studies that cross-validated the results from contingent valuation analysis with actual market transactions and noted that in many of these studies, willingness to pay from contingent valuation is within the ballpark of observed expenditures.<sup>12</sup>

The debates surrounding the valuation of the Exxon Valdez spill led to an unusually high-profile assessment of the merits of this relatively obscure research tool (Portnoy, 1994). The National Oceanic and Atmospheric Administration (NOAA) convened a panel of experts to assess whether contingent valuation methods can credibly provide estimates of environmental damage and, in particular, lost passive use value. The final report (Arrow et al., 1993), which included the Nobel laureates Kenneth Arrow and Robert Solow as co-authors and panel chairs, is often cited as a how-to guide and quality control document in many of the contingent valuation studies that have followed.

The panel ultimately concluded that contingent valuation surveys can indeed feasibly be employed to evaluate environmental damage. Most relevant to the topic of this essay, the NOAA panel laid out a set of best practices as they pertain to contingent valuation methods, and a set of guideposts against which to assess study quality (Portnoy, 1994). These include the recommendations that surveys be administered in person rather than by phone, and by phone rather than by mail, and that the surveys be based on probability samples rather than on convenience samples. The report also recommended that contingent valuation surveys measure costs based on willingness to pay rather than on willingness to accept as the key measure of valuation (an explicit acknowledgment of concern that estimates may be implausibly large). Additional guidelines include the recommendation that surveys pose questions in a referendum format that emphasizes the tax and income consequences of supporting a proposal, that respondents be reminded of the effect of the proposal on personal income, and that surveys include follow-up questions that permit assessment of whether the individual understood the question and whether willingness to pay varies with observable characteristics such as income in a manner predicted by simple economic theory.

The cost-of-crime literature that has taken this approach has benefitted greatly from this intellectual history. Notably, the earliest applications of contingent valuation methods (Cook and Ludwig, 2000; Ludwig and Cook, 2001; Zarkin, Cates, and Bala, 2000) post-date this debate and cite the NOAA recommendations in their methods sections, although not all are followed in at least one of these studies (Zarkin et al. [2000] relied on mall intercept samples in two communities on the East Coast). Although this body of literature is small, the existing studies to date have been high quality and generally have followed most of the NOAA guidelines. In addition, the costs of crime, even the intangible costs,

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12. The second *Journal of Economic Perspectives* symposium, published after the 2010 Deepwater Horizon oil rig disaster in the Gulf of Mexico, reiterated many of the same arguments, although as noted by Kling, Phaneuf, and Zhao (2012), this literature has advanced and matured considerably in the intervening 20 years (see Hausman, 2012, and Carson, 2012, for their updated assessment of the merits of contingent valuation methods).

have more conceptual clarity than the somewhat vague concept of passive-use value in environmental studies. Certainly, victim pain and suffering is a real phenomenon that we believe most individuals can understand and conceptualize. Even passive use value in the criminal justice realm (personal welfare associated with knowing that society is safer for all even if one is personally not at a high risk of becoming a crime victim) is a more concrete social objective over which respondents can express opinions relative to the valuation of a particular ecosystem that respondents are unlikely to visit or may not even be cognizant of. Another benefit that the crime contingent valuation studies have over the environmental studies is that one of the big-ticket crimes (in particular, homicide) has an external body of research based on market transactions against which values can be compared, that is, the extant VSL estimates. Here, we provide a selective review of key studies in contingent valuation analysis applied to the costs of crime.

Cook and Ludwig (2000; Ludwig and Cook, 2001) provided perhaps the first applications of contingent valuation methods to criminal justice research. The authors generated estimates of the cost associated with gun violence in the United States. In their book, Cook and Ludwig (2000) devoted great effort to drawing qualitative and quantitative contrasts between gun violence cost estimates based on the cost-of-illness (COI) approach, which effectively enumerates gun homicides and injuries and attempts to generate ex post estimates of each, and measures of society's willingness to pay to prevent gun violence. By design, contingent valuation methods are intended to generate ex ante estimates of willingness to pay for public goods that would decrease the risk of these particular outcomes. Given the many preventative measures that individuals take to avoid becoming a victim, including security service and device purchases and avoidance behavior, it is not clear a priori whether COI estimates or contingent valuation estimates would yield larger social cost figures.

Cook and Ludwig (2000; Ludwig and Cook, 2001) developed a contingent valuation questionnaire that was administered to a nationally representative sample of households and inquired about willingness to pay for an intervention that would decrease gun violence by 30%. Survey respondents were randomly assigned to be queried about their willingness to pay \$50, \$100, and \$200 for a program. Those who responded affirmatively were asked whether they would pay double the queried amount. Those who answered negatively were asked a follow-up question regarding whether they would be willing to pay half the original amount. The questions were worded to ensure that the proposed policy reduced gun availability among convicted offender and juvenile delinquents but would not interfere with the gun rights of law-abiding citizens. Cook and Ludwig estimated a national willingness to pay of \$24.5 billion 1998 dollars, amounting to \$1.2 million per prevented gunshot injury. They also used their estimates to generate alternative estimates of the value of a statistical life assuming (a) all of the willingness to pay is to prevent gun-related deaths and (b) the cost of gun-related deaths is twice that of nonfatal gun injuries. These yield estimates of a VSL ranging from \$5.4 million to \$6.8 million in 1998 dollars (\$7.8 to \$9.8 million in 2015 dollars). These estimates lie well within the range of VSL estimates reviewed in an

earlier literature review by Viscusi (1993) and the estimate summarized by Chalfin (2013), but the numbers are higher than the implicit valuations of traffic fatalities estimated by Ashenfelter and Greenstone (2004).

Perhaps the most widely used set of cost-of-crime estimates from the contingent valuation literature was presented by Cohen, Rust, Steen, and Tidd (2004), who presented the results from a contingent valuation survey inquiring about household willingness to pay to prevent a host of serious violent offenses. Based on a random sample of U.S. households, the study inquired about willingness to pay for a program that would reduce specific crime rates by 10%. Each household was asked about three of five serious crimes, with the crimes inquired about and the order randomly determined. The willingness-to-pay amount is drawn from a payment schedule ranging from \$25 to \$200, with the amount randomly chosen and the same amount asked for each crime category. From these responses, the authors estimated the probability density function of the distribution of willingness to pay for each crime and estimated an average per household using this distribution.

Next, by using contemporaneous crime rates and estimates of the number of households in the United States, Cohen et al. (2004) generated an estimate of the value of a 10% crime reduction and the amount that the public would be willing to pay per crime averted. The per crime figures suggested \$25,000 for burglary, \$174,000 for armed robbery, \$57,000 for serious assault, \$185,000 for rape/sexual assault, and \$8.5 million for a murder. Again, it is interesting to note that the estimate for murder lies within the range of VSL estimates discussed earlier. Cohen et al. (2004) presented confidence intervals derived from the sampling variance of their estimates. These cost estimates exceeded the extant ex post cost of crime estimates that took a more “bottom-up” approach that we review in the next section. The authors speculated that the higher values from the willingness-to-pay studies are explained by the implicit inclusion of all indirect costs of crime that accrue to society beyond victimization cost. This inference is consistent with Anderson’s (1999, 2012) accounting of the total costs of crime as well as with Nagin’s (2001) critique of earlier efforts to arrive at bottom-up estimates.

One might raise several concerns about both the Cook and Ludwig (2000; Ludwig and Cook, 2001) studies as well as the work by Cohen et al. (2004). First, although Cook and Ludwig were careful to specify in their survey that gun rights for law-abiding citizens would not be impacted by the proposed intervention, Cohen et al.’s work left the actual nature of the intervention vague. It is difficult a priori to decide which approach is better; yet the juxtaposition of these two alternative designs raises the question of whether it is possible to value victimization in a manner that is divorced from the nature of the policy intervention that yields the crime abatement. Second, both studies specified that the program would have a given percentage effect on crime rates, and then they each backed out values per incident based on the implicit number of crimes prevented implied by the hypothetical percentage impact and contemporaneous crime rates. If we are to take these calculations as actual measures of society’s willingness to pay to prevent a specific crime, we must believe that

(a) survey respondents know what the actual crime rate is and (b) survey respondents can, during the interview, calculate, digest, and cognitively process a given percentage decline in crime and what it means to them. This raises concerns regarding the embedding effect discussed previously. For example, do we find lower willingness to pay for a 10% decrease in crime when crime rates are low?

These questions can be explored in part by reviewing the contingent valuation results presented by Nagin, Piquero, Scott, and Steinberg (2006) and Piquero and Steinberg (2010). Nagin et al. (2006) employed a contingent valuation survey to gauge the relative value that the public places on alternative crime-control strategies that have similar ends yet different means. Nagin et al. assessed the degree to which the public was differentially willing to pay for programs that focused on rehabilitation relative to programs that focused on incarceration and crime control through enhanced deterrence and incapacitation. Nagin et al. surveyed a random sample of Pennsylvania households, inquiring about their willingness to pay for a program that would reduce juvenile offending by 30%. Households were randomly assigned to be asked about a program that would be focused on rehabilitation as opposed to a program that would involve incarcerating a convicted youth for an additional year. The impact was arbitrarily held constant across the two interventions, and individuals were asked about their willingness to pay \$100 for the randomly assigned intervention. For those who answered yes, a follow-up question inquired whether they would pay \$200. For those who answered no to the first inquiry, a follow-up question inquired whether they would pay \$50. The authors tabulated average willingness to pay based on the responses to these questions and found a statistically significant and substantively higher (roughly 25%) willingness to pay for programs with a rehabilitation focus.

Piquero and Steinberg (2010) repeated this exercise by using the same survey instrument and research protocol but fielding the survey 2 years later (2007) in four states (Pennsylvania, Illinois, Louisiana, and Washington). The results were nearly identical in this much larger survey; yet the authors found some substantial cross-state differences. The overall difference in willingness to pay for rehabilitation over incarceration remained and was similar in magnitude to that found in the earlier survey by Nagin et al. (2006). In addition, a willingness to pay for the rehabilitation intervention was comparable across states. However, Piquero and Steinberg (2010) found greater disparities favoring rehabilitation in Washington and Illinois, no difference in willingness to pay in Louisiana, and a higher willingness to pay for additional incarceration in Louisiana relative to the other states in the study.

This four-state study permitted an exploration of whether contingent valuation studies of cost of crime exhibit the embedding effect problem highlighted in our discussion of the environmental literature. As we have already noted, contingent valuation critics raise concerns regarding whether respondents exhibit reasonable variation in willingness to pay that accords with basic economic theory. To be specific, do the results of these studies suggest that individuals are willing to pay more when the likely effect on crime is larger? The four

states surveyed in 2007 by Piquero and Steinberg (2010) differed greatly in terms of their violent and property crime rates. All interviewees were asked about their willingness to pay for a 30% reduction in juvenile offending. Assuming that juvenile offending is higher in states with relatively high crime rates, one would expect higher willingness to pay for a 30% decline in relatively high crime states because a 30% decline translates into relatively larger reduction in crime rates and individual victimization risks.

Figure 2 graphically depicts violent crime rates (incidents per 100,000) from the Federal Bureau of Investigation's Uniform Crime Reports and average willingness to pay from Piquero and Steinberg (2010) for the included states. The four states are ordered from lowest to highest in terms of the violent crime rate. Even though the violent crime rate in the highest crime state (Louisiana) is more than double the violent crime rate in the lowest (Washington), there is no detectable relationship between willingness to pay and the crime rate. Willingness to pay for a rehabilitative intervention is basically flat across states. Willingness to pay for an additional year of incarceration is roughly comparable across all states and then jumps by \$20 for Louisiana. Figure 3 presents a comparable graph for property crime rates. Here, we express property crimes as incidents per 10,000 to facilitate the visual comparison between crime rates and willingness to pay on the same scale. Although the ordering of states changes somewhat, we still find little evidence of higher willingness to pay in states with higher crime rates.

Does this imply that residents of Louisiana value victimization less than residents of Washington or Illinois? Not necessarily. An alternative interpretation would be that the average respondent simply does not comprehend in a meaningful way what constitutes a 30% reduction in offending among juvenile offenders. If this is true, however, the relative constancy across states suggests that the survey is picking up a general willingness to contribute to an effort, which is similar to the critique regarding embedding effects that has been raised in the environmental damages literature.

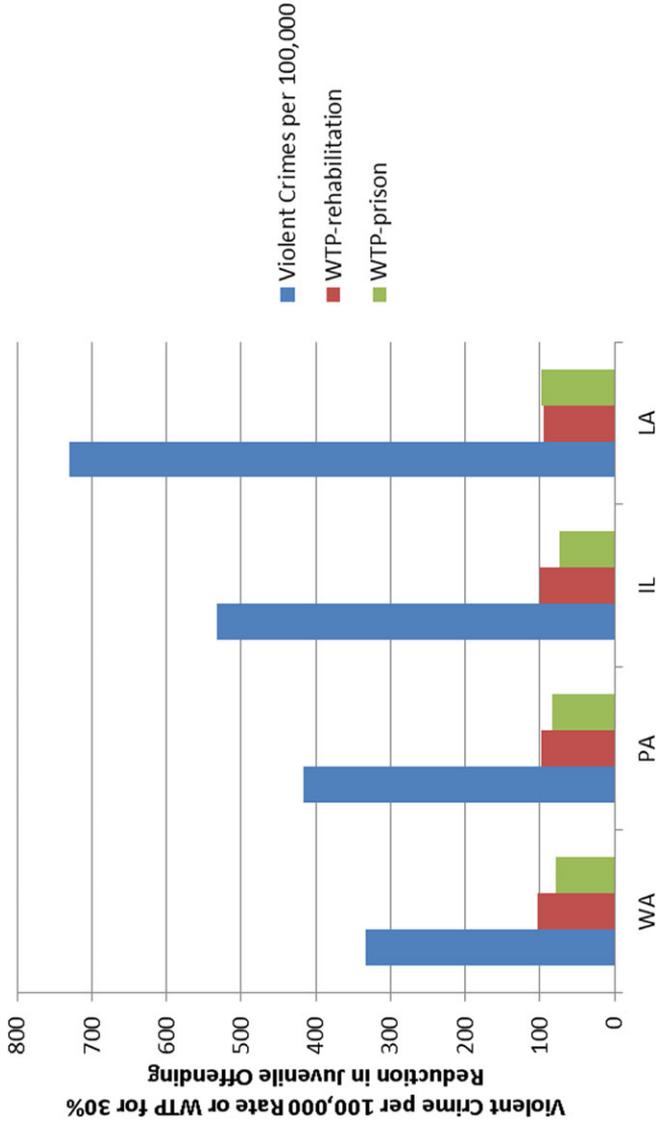
Interestingly, the finding of a preference for rehabilitation over incarceration foreshadows some of the more high-profile ballot referendums as well as other criminal justice reforms that have occurred in recent years. For example, voters in California passed voter-initiated propositions to divert drug offenders to treatment rather than to incarceration in 2000; to moderate sentences for less serious third-strike felonies in 2012; and to redefine many low-level drug offenses and larceny from felonies to misdemeanors, with a provision to redistribute savings toward schools and reentry efforts in 2014. As another example, the federal Justice Reinvestment Initiative is essentially consistent with the social ranking of policy tools derived from these contingent valuation studies.

### *Bottom-Up Estimates of the Cost of Crime*

An alternative strategy for estimating cost of crime was hinted at in our discussion of Cook and Ludwig (2000). Specifically, in theory one can enumerate the various costs that

FIGURE 2

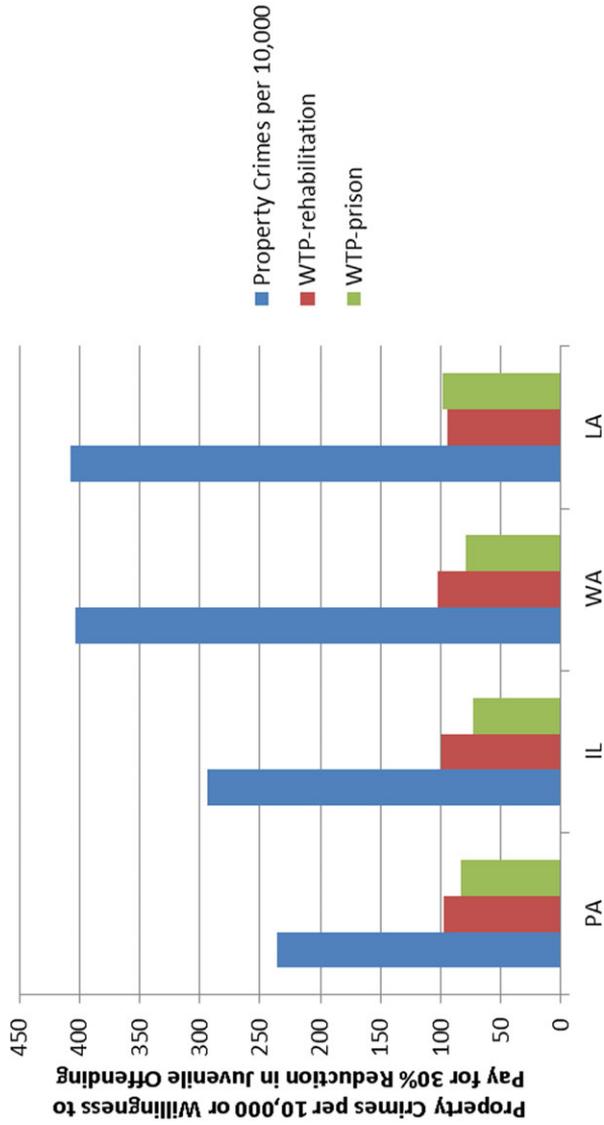
**Violent Crime Rates (per 100,000) and Willingness to Pay (WTP) for a 30% Reduction in Juvenile Offending from Piquero and Steinberg (2010)**



Sources: Piquero and Steinberg (2010) and the Uniform Crime Reports, 2007.

**FIGURE 3**

**Property Crime Rates (per 10,000) and Willingness to Pay (WTP) for a 30% Reduction in Juvenile Offending from Piquero and Steinberg (2010)**



Sources: Piquero and Steinberg (2010) and the Uniform Crime Reports 2007.

are created by specific victimizations (medical expenses, lost work, cost of investigation, criminal case processing, punishment, etc.), place dollar values on each, and then sum. In practice, these bottom-up estimates have been based on a hybrid of ex post and ex ante cost estimates, with loss of life being valued with ex ante VSL estimates and all other costs being generated from information on typical injuries sustained, estimates of lost work time, and estimates of average costs associated with each.

Perhaps the most controversial cost category in bottom-up estimates pertains to pain, suffering, and diminished quality of life (i.e., the intangible costs to crime victims). Certainly, such costs are real and deserve to be included in any cost–benefit calculation. A particularly salient example of where the inclusion of such costs generates a widely different cost–benefit result is found in contrasting an analysis of an Illinois early release program by Austin (1986) with the reanalysis of this policy by Cohen (1988). By relying on cost estimates by the National Institute of Justice (NIJ) that were limited to out-of-pocket victim expenditures such as medical costs and property damage, Austin (1986) concluded that the budgetary savings from the early release program far exceeded the marginal increases in crime associated with recidivism among early releases.

Cohen (1988), however, argued that this conclusion was based on the very low valuation placed on serious offenses and on the failure of the NIJ figures to consider the intangible costs to victims. In several publications, he singled out the low assumed victim costs for rape (\$350 in 1986 dollars) as a key flawed input in the Austin analysis (Cohen, 1988, 2005). Cohen (1988) generated more inclusive estimates of victimization costs that accounted for pain and suffering via an imputation based on data from jury awards from civil trials. Cohen's (1988) principal strategy was to estimate the relationship in civil cases between medical costs of an injury and pain-and-suffering awards and then to use this relationship in conjunction with medical cost estimates for specific forms of victimization to impute a pain-and-suffering value. For example, pain and suffering for rape cases was estimated in the following manner. Cohen took a weighted average of the medical costs for traumatic neurosis, severe psychiatric distress, broken bones, and other injuries that occur in the commission of rape, where the weights were the incident rates of the particular condition associated with the victimization. Pain-and-suffering awards were then imputed from the estimated empirical relationship between medical costs and jury awards. In generating the total cost of specific victimizations, Cohen presented separate estimates that incorporated the likelihood that an incident would result in a fatality. Multiplying the fatality incident rate by a VSL estimate generated a contribution to cost associated with being exposed to the fatality risk. By incorporating intangible costs, Cohen estimated the victimization cost of rape at \$57,000 rather than at \$350, and he drew the opposite conclusion regarding the sign of the net benefits of the Illinois early release program. Cohen's conclusions strongly admonished against partial victimization cost estimates. To quote the author directly, "in

my mind, to conclude that this early-release program was worthwhile was tantamount to balancing the state budget on the backs of crime victims” (Cohen, 2005: xii-xiii).<sup>13</sup>

Cohen’s early work, and in particular the jury-award methodology, figured prominently in the work of Miller, Cohen, and Wiersema (1996). This study is perhaps the most widely cited in this literature and is the source of victimization cost figures frequently used in back-of-the-envelope calculations made by economists and others studying criminal justice topics. The project makes great effort to generate victimization counts that adjust for underreporting for a wide range of violent and property crimes. For each crime type, Miller et al. (1996) provided separate estimates of “tangible losses” (costs associated with property damage and loss, medical care, death, mental health care, police and fire services, victim services, and lost productivity) as well as “intangible losses” in the form of pain and suffering and diminished quality of life. Again, the victimization cost estimates were largely *ex post*, although for fatal victimizations, the authors employed an estimate from the VSL literature. In some tabulations, they estimated separate costs for each crime type that incorporated the costs associated with the fatality risk.

McCollister, French, and Fang (2010) presented an updated bottom-up analysis of victimization costs by using more recent jury-award data as well as more detailed information to generate cost-of-illness estimates of the tangible costs of victimization. McCollister et al. (2010) also presented victimization cost estimates for a larger range of offenses relative to previous studies and presented a detailed comparison of their estimates with previous estimates from this literature. Table 2 reproduces a subset of the results presented in Table 1 of McCollister et al.’s (2010) article. All estimates have been converted to 2015 dollars. The first column presents the *ex ante* costs from Cohen et al.’s (2004) contingent valuation analysis, whereas the second column presents the bottom-up estimates from Miller et al. (1996).

The broader set of cost estimates in McCollister et al. (2010) is presented in the final column of Table 2. Several interesting points can be made about these comparative estimates. First, the most recent bottom-up estimates are fairly close to the results from the contingent valuation study, with a generally consistent ranking of crime severity (despite drastic differences in methodology). Second, in the two bottom-up studies, the estimated

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13. Rajkumar and French (1997) provided another early contribution to the bottom-up cost estimates of criminal victimization that generate estimates of intangible costs based on pain and suffering jury awards. Although this publication generated the cost of criminal victimization, the principal aim was to provide a cost–benefit analysis of drug-treatment programs. The authors used hospital emergency room data to estimate the costs of treating various injuries. In conjunction with information on the incidence of various injuries associated with specific criminal victimizations, the authors generated estimates of the direct costs of a specific crime. To generate intangible costs, they followed the jury award methods proposed by Cohen (1988), estimating the relationship between medical expenses and pain and suffering awards. They did not include information on psychological injuries and estimated intangible costs for robbery and assault only. They then used this in conjunction with estimates of the crime-mitigating effects of drug treatment to perform a cost–benefit analysis of drug treatment taking into account crime victimization costs.

**T A B L E 2**

**Comparison of Unit Cost of Crime from Two Key Bottom-Up Studies and One Key Contingent Valuation Study (All Costs in 2015 Dollars)<sup>a</sup>**

Offense	Cohen et al. (2004)	Miller et al. (1996)	McCollister et al. (2010)
Murder	\$12,372,429	\$4,774,809	\$9,791,369
Rape or sexual assault	\$312,042	\$135,617	\$262,446
Assault	\$92,165	\$23,382	\$116,652
Robbery	\$305,458	\$20,264	\$46,118
Arson	—	\$58,546	\$23,002
Larceny theft	—	\$577	\$3,850
Motor vehicle theft	—	\$6,235	\$11,741
Household burglary	—	\$2,338	\$7,044
Embezzlement	—	—	\$5,973
Fraud	—	—	\$5,485
Stolen property	—	—	\$8,692
Forgery or counterfeiting	—	—	\$5,739
Vandalism	—	—	\$5,297

<sup>a</sup>See reference sections for study citations. All figures are converted to 2015 dollars based on the 2008 valuations reported in McCollister et al. (2010) and the percentage change in the CPI-all urban consumers between 2008 and early 2015.

property crime costs were low relative to the costs of violent crime, homicide in particular. Other scholars compared the sensitivity of cost–benefit studies of criminal justice interventions to whether one can demonstrate an impact of the intervention on homicide (see Chalfin, 2013; Chalfin and McCrary, 2013). The reason for this is perfectly clear when one notes that the estimated cost of a homicide is 37 times the next most costly crime (rape/sexual assault) and 833 times the most costly property offense (motor vehicle theft).

Clearly, the method for estimating intangible costs is the most controversial and debatable component of the bottom-up cost estimates. Few would argue that the true costs of victimization should be limited to out-of-pocket expenditures. That is to say, it is hard to debate against the proposition that crime victims’ suffering goes beyond the sum of lost wages, medical expenses, and property damages. However, one may legitimately question whether the decisions of juries reflect anything akin to the compensation and/or equivalent variation associated with the nontangible aspects of victimization. First, instructions given to jurors heading into deliberation over general/pain-and-suffering damage evaluation vary widely across states and tend to be vague (Abel, 2006). In addition, these awards tend to exhibit great variation for similar injuries (Abel, 2006; Cooter and DePianto, 2011). Jurors are being tasked with placing a value on unusual and often horrific scenarios for which their preferences are most likely incomplete and poorly defined, and where any amount of money is likely to be insufficient compensation (Cooter and DePianto, 2011). There is also experimental evidence of instability in pain-and-suffering awards in mock trials. Specifically, Saks, Hollinger, Wissler, Evans, and Hart (1997) as well as Hinsz and Indahl (1995)

provided evidence that caps on pain-and-suffering awards tended to present psychological anchors around which jurors set pain-and-suffering award amounts. If set high enough, the award caps have the counterintuitive effect of increasing both average general awards as well specific damage awards. Robbennolt and Studebaker (1999) found similar results in experimental manipulation of punitive damage awards in mock trials. Hence, in addition to being highly variable within injury class, the average awards exhibit sensitivity to the framing of deliberation instructions. Finally, some evidence (cited in MacCoun, 2006) of systemic bias was found in pain-and-suffering awards; minor injuries are overcompensated, and major injuries are undercompensated.

Many of these critiques of the jury-award methods were raised in the past (see the 2001 review by Nagin and the earlier 1995 discussion by Zimring and Hawkins). To the list of issues raised earlier one might add the fact that jurors are making decisions that are divorced from their own personal budget constraint as they are imposing a cost on a third party. Zimring and Hawkins (1995) also raised concerns pertaining to the fact that the total cost of crime once one takes into account pain-and-suffering estimates sums to an amount that would greatly exceed what most people would consider reasonable expenditures. For example, we noted that by some estimates, the costs of crime amounted to 9% to 19% of the country's gross national product. Does this then imply that society would be willing to pay 9% to 19% of gross national product to eliminate crime completely?

One might raise additional concerns regarding the general high level of jury awards in the United States and whether these awards are reflective of some structural bias in our system for mediating civil disputes (torts in particular). Media reports tend to focus on outsized awards for pain and suffering and punitive damages to an extent that they likely bias common perceptions regarding average tort compensation (MacCoun, 2006). In fact, most tort cases settle out of court for modest amounts, and there is little evidence of a trend toward larger awards (Robbennolt, 2000). Nonetheless, on average, pain-and-suffering awards are higher in the United States than in other Western developed countries (Sugarman, 2005). In addition, awards in the United States exhibit greater variation for similar injuries (in the language of public finance, they exhibit greater horizontal inequity) than in other nations, which suggests greater overall capriciousness in our system for valuing pain and suffering. Finally, awards in the United States do not accurately reflect the net receipts to plaintiffs, as attorney fees are often charged as a percentage (commonly one third) of awards (Sugarman, 2005). Of course, higher awards in the United States might reflect international variation in the value placed on intangibles.

### *Relative Comparison of These Three Approaches to Estimating the Cost of Crime*

The three approaches to measuring victimization costs—hedonic analysis, contingent valuation, and the bottom-up accounting method—can be compared along several dimensions. First, both hedonic analysis and the results from contingent valuation surveys estimate ex ante willingness to pay to avoid or prevent criminal victimization. From the viewpoint of

a public choice theorist, this approach to deliberating prescriptively about possible criminal justice interventions is correct. The bottom-up studies presented, for the most part, are ex post cost estimates. A subset of these estimates presented victimization costs that were adjusted for fatality risk by adding the product of the likelihood of a fatality multiplied by a chosen VSL estimate. This particular adjustment seems logically inconsistent with the general premise of a bottom-up approach. As these studies carefully and comprehensively articulated the consequences of an actual offense, these estimates are best thought of as the compensating variation associated with being a crime victim (i.e., the minimum payment needed to restore utility to the previctimization level). Incorporating into these estimates an ex ante cost component based on a risk of an outcome that does not materialize is inconsistent with a damages-done approach.

A second dimension along which these methods can be compared is the degree of inclusiveness of the cost estimates. The hedonic and contingent valuation estimates in many ways provide a summary or omnibus assessment of the costs of crime that bypasses the need to articulate all possible consequences of a criminal victimization. To the extent that consumers or survey respondents are knowledgeable about the consequences of a specific crime as well as the likelihood of becoming a victim, then their actions (in hedonic analysis) or their stated preferences (in contingent valuation analysis) will reveal true valuations inclusive of direct and indirect costs of crime and perhaps passive-use value derived from the knowledge that others are victimized at a lower rate. Of course, one might question whether individuals know what the consequences of a victimization are and whether the average voter knows current crime rates and the objective likelihood of becoming a crime victim. If they do not, then the actual point estimates of the cost of crime will be inaccurate. Bottom-up estimates of course require careful articulation of all possible costs of victimization and likely underestimate indirect costs associated with crime avoidance and prevention.

A third dimension along which these three sets of estimates can be compared concerns the likely direction of bias (are they too high or too low?). There are few hedonic estimates of specific crime costs. The one exception is the body of VSL estimates that aims to price fatalities in general rather than fatalities resulting from homicides. Stipulating to the applicability of VSL estimates as a homicide cost measure, it is important to note that few of the VSL studies have identified plausibly exogenous variation in fatality risk, with the exception of Ashenfelter and Greenstone (2004) and Greenstone et al. (2015). There is reason to believe that confounding omitted variables will impart an upward bias on VSL estimates; this conjecture is consistent with the lower estimates found in these two studies relative to the average values from the wider VSL literature.

Bias in the contingent valuation studies likely depends on several factors, including the extent to which the average person overestimates crime rates and whether the hypothetical nature of the survey creates divergence between stated and actual willingness to pay. If perceived crime rates are higher than actual crime rates, then contingent valuation studies will overestimate willingness to pay to prevent specific crimes, whereas the reverse is true if

perceived crime rates are below actual crime rates. Interestingly, public perception of crime rates and change therein are notoriously inaccurate and tend to overestimate the likelihood of becoming a crime victim. For example, despite continuously decreasing crime rates in the United States since 1994, most Americans believe (and in some years the overwhelming majority) that crime has increased each year (McCarthy, 2014). Aside from inaccurate perceptions of risk, if people are more generous in terms of their willingness to pay in hypothetical situations relative to actual referenda, then contingent valuation studies will yield estimates of willingness to pay that are systematically higher than actual willingness to pay.

Whether the bottom-up studies are biased in one direction or the other depends crucially on the measure of intangible costs derived by pain-and-suffering awards, as this cost component accounts for the lion's share of cost estimates. Several factors suggest that average awards are likely to be higher than the willingness-to-pay concept central to cost-benefit analysis. First, jurors make decisions with someone else's money. Second, jury awards in the United States are inclusive of attorney fees; this factor can be taken into account by juries when deciding on a pain-and-suffering total. Third, jury awards are high in the United States relative to other developed nations, which likely reflects aspects of our civil-conflict resolution practices. Thus, pricing intangibles is a difficult and poorly defined task and may often involve putting a price on unimaginable harm. For the most serious injuries and harms, awards by construction are likely to be insufficient to "make one whole."

In the end, all three estimates tend to yield cost figures that are fairly consistent with one another in terms of general magnitude and the ordering of crime severity. For homicide, contingent valuation methods tend to align with VSL estimates from observed market behavior when loss of life is involved. Given the concerns about actual crime-cost point estimates raised in this article, we are cautious about analyses that take strong positions based on whether net benefits are positive. We are more comfortable, however, with policy analysis that employs cost-of-crime estimates to rank policy alternatives according to their cost effectiveness.

## **Conclusion**

Mark Cohen (2005), perhaps the largest contributor to the economic cost of crime literature, wrote about his experience during the 1980s as a young scholar tasked with helping the newly formed federal sentencing commission assess the relative severity of felony offenses with an eye on building proportionality and fairness into federal sentencing guidelines. He noted the lack of guidance from commission members, the dearth of research on the relative severity of crime, and the rudimentary and partial accounting for victimization costs that existed at the time. Over the following three decades, a relatively modest number of researchers have set about filling in this knowledge gap, employing clever yet controversial innovations (making

use of jury awards<sup>14</sup>) and drawing from other important policy domains where one must value what is very difficult to value (contingent valuation methods from environmental economics and VSL studies from analysis of labor market policy). This research effort has made considerable progress and often has provided key inputs to back-of-the-envelope calculations summarizing specific research projects and more systematic and serious efforts at cost–benefit and cost-effectiveness analysis of criminal justice policy interventions.<sup>15</sup>

Despite this progress, there is certainly room for further development and more research on this topic is needed. As we discussed, there are reasons to believe that the principal methods used to generate cost-of-crime estimates may be biased upward. To the extent that the average survey respondent tends to overestimate the likelihood of becoming a victim or erroneously believes that crime as a social problem is getting worse, a hypothetical percentage point decline in crime will be perceived as having an impact on crime that is exaggerated relative to the true effect. When willingness to pay is normalized using objectively measured crime rates, the per-incident cost estimates will be too high. In addition, evidence of embedding effects raises questions regarding the accuracy of these estimates and their dependence on context. More research is certainly needed on the application of contingent valuation methods in criminal justice policy, with an eye on assessing whether crime cost estimates are sensitive to alternative manners of framing the questions (and perhaps to educating respondents about actual crime rates and victimization risks).

Regarding bottom-up estimates, awards for pain and suffering in the United States (a) exhibit great variation holding injuries constant, (b) tend to be higher in the United States than other countries, (c) reflect decision making that is not subject to a personal budget constraint, and (d) may implicitly incorporate attorney fees to be drawn from the damages award. Whether these factors result in upwardly biased cost estimates (and the magnitude of this bias) is difficult to assess. However, one could imagine exploring sensitivity of cost–benefit calculations to, for example, discounting pain-and-suffering awards by one third to account for attorney fees.

One potential extension of this research might be to apply contingent valuation survey methods to nationally representative samples of individuals to gauge what the public believes is the appropriate value to place on criminal victimization in public deliberations. Such a survey could emphasize the dual purpose of these numbers for victim compensation and for deliberation over criminal justice policy options. For example, respondents may be queried about their maximum willingness-to-compensate crime victims out of a publicly financed victims' compensation fund. Respondents could be reminded that payments occur at taxpayer expense and that policy interventions that prevent crime would lower the tax burden accordingly. Consequently, respondents would be further prompted with examples

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14. Cohen attributed this methodological innovation to Phillip Cook.

15. See, for example, the exhaustive and careful cost–benefit analysis effort of the Washington State Institute for Public Policy ([wsipp.wa.gov/](http://wsipp.wa.gov/)).

illustrating how these numbers might figure into criminal justice policy deliberations. For example, if the established victim's compensation for auto theft is \$2,000 and a program promises to reduce auto thefts at a cost of \$40,000 per theft, then policy makers would take a pass. In contrast, if the standard victim's compensation for a sexual assault were \$50,000 and a program promised to reduce sexual assaults at a cost of \$4,000 per incident prevented, then policy makers would invest in this program. Setting aside issues of behavioral responses to a guaranteed compensation schedule, framing the question in this manner could effectively prompt respondents to think as policy makers. Not acting to prevent crime imposes a cost on society through victim compensation. Taking action may either increase or decrease these costs, depending on the costs of crime prevented relative to the set compensation amount. Framed in this manner, such a contingent valuation survey would prompt a respondent to consider how much is too much to pay to prevent a specific type of victimization.

Given our concerns regarding the potential upward bias to cost-of-crime estimates, we feel more comfortable with the use of these estimates to rank policy alternatives rather than to pass overall judgments regarding whether specific proposals have net-positive benefits. To be sure, in some cost-benefit calculations, the evidence of the net-positive benefits or the potential for net-positive benefits is overwhelming and modest upward bias is unlikely to alter conclusions regarding whether the program pays for itself. For example, many of the programs reviewed in Welsh and Farrington (2000) as well as many of the programs evaluated and ranked by the Washington State Institute for Public Policy yield cost-benefit ratios much greater than one. As another example, tabulations of victimization costs generated during the life course by criminally active youth are suggestive of enormous social savings from early and effective preventive measures (Cohen, 1998; Welsh et al., 2008). Moreover, we have confidence that cost-benefit calculations that use the more recent, more inclusive cost-of-crime figures reviewed here that yield net-negative benefits are actually identifying ineffective interventions (see, for example, Lofstrom and Raphael, 2013, and Raphael and Stoll, 2013, for cost-benefit calculations of this sort pertaining to marginal prison expansions). Nonetheless, cost-benefit tabulations with ratios near one or that are being determined primarily by an underlying effect of the intervention on homicide deserve careful scrutiny. For example, researchers could follow the lead of Chalfin and McCrary (2013) and chart the relationship between estimated cost-benefit ratios and the assumed VSL.

Another practical issue concerns the manner in which uncertainty in cost-benefit tabulations is conveyed when summarizing research and conveying findings to policy makers. Of course, there are two sources of variation in cost-benefit ratio estimates: the sampling variance of the intervention effect size estimates and the sampling variance of the cost-of-crime estimates. Typical cost-benefit calculations by economists writing about criminal justice tend to appear in conclusions and usually neglect to characterize the uncertainty of this estimate. However, a serious effort to incorporate effect size sampling variance into cost-benefit calculations was undertaken by the Washington State Institute for Public

Policy. Calculations in their rankings were based on the effect-size sampling distribution rather than on a unique point estimate. Thus, when evaluating a program, they reported both the cost–benefit ratio (using a point estimate effect of a policy) as well as an estimate of the chance benefits will exceed costs measure (Washington State Institute for Public Policy, 2014).<sup>16</sup>

Aside from measurement issues, we have argued that the results from cost–benefit analysis should be one of many criteria considered by policy makers and that there certainly are many public choice problems where net benefits may take a backseat to other legitimate social objectives. Given the unequal distribution of the cost of criminal victimization and anti-crime enforcement efforts, as well as the potential for perceived illegitimacy of the criminal justice system to undermine various public institutions, equity considerations deserve careful attention in all criminal justice policy choices.

These caveats aside, careful cost–benefit analysis akin to what occurs in other policy domains throughout the country should be one of the key drivers of criminal justice policy. The cost-of-crime literature has done a great deal to facilitate the incorporation of this normative paradigm and set of analytical tools into the criminal justice domain.

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16. This calculation of the “chance benefits will exceed costs” has two basic steps (Washington State Institute for Public Policy, 2014). First, they determine a program effect size through a meta-analysis that considers several reports and peer-reviewed evaluations of the policy intervention of interest. They weight studies according to their credibility, which basically depends on the research design of the study, among other attributes. They use the meta-analyses to calculate average effect sizes as well as effect size variance. The second step consists of calculating the “chance will exceed costs.” They implement Monte Carlo simulations in which each simulation calculates a cost–benefit ratio from drawing a normally distributed policy effect. The parameters of these distributions are those found in the previous meta-analysis: the effect size and its standard error. Finally, after running 10,000 simulations, they calculate the “chance will exceed costs” as the proportion of times the cost–benefit ratio was greater than one.

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