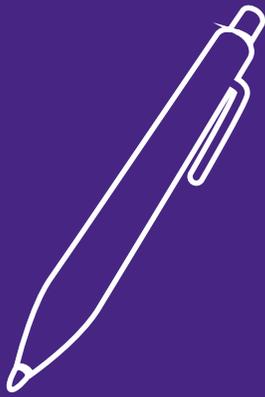


# Cost-Benefit Analysis and Justice Policy Toolkit

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COST-BENEFIT ANALYSIS UNIT



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cost-benefit knowledge bank  
for criminal justice

**CBKB**



**BJA**  
Bureau of Justice Assistance  
U.S. Department of Justice

## FROM THE UNIT DIRECTOR

In recent years, policymakers and the public have been asking whether justice policies pass the “cost-benefit test.” Two questions drive this discussion: First, what works to reduce crime? And second, are those programs and policies worth the cost? In 2009 the Vera Institute of Justice launched the Cost-Benefit Knowledge Bank for Criminal Justice (CBKB) to help researchers and practitioners address these questions.

When the project started, our efforts focused on training about cost-benefit analysis (CBA): how-to guides, webinars, and workshops. Although there was an emerging interest in CBA in the justice field, there wasn’t a lot of experience. Cost-benefit analysis is most widely used by economists and isn’t commonly taught in criminal justice and criminology programs; many public policy schools offer only an elective course.

We thought there might be reluctance to learn another methodology. Or we might find skepticism about one of CBA’s most controversial aspects—the measurement of intangibles, such as the victim costs of crime. But we soon discovered that people in the justice field were eager to acquire and apply these tools, and that many had already gotten started.

From our trainings we also learned that analysts in the justice field encounter a few common obstacles. Some face data or methods challenges when teasing out an investment’s impact or cost. Others are working to monetize intangible benefits that no one has calculated before. It became clear to us that the lessons we learned when providing CBA technical assistance (TA) in the real world would help our justice colleagues.

In 2012 and 2013 Vera worked with six municipal, county, and state government agencies committed to building their capacity to conduct CBA. Selected through a competitive application process, the agencies were the Allegheny County Criminal Justice Advisory Board, in Pennsylvania; the Denver Crime Prevention and Control Commission; the Kent Police Department, in Washington; the New Mexico Department of Public Safety; the Washington State Department of Corrections; and the York County Criminal Justice Advisory Board, in Pennsylvania.

Although the assistance Vera provided to each organization differed—depending on its analytic goals and capacity for program evaluation, budget analysis, and interagency collaboration—the work throughout also focused on topics that are fundamental to all justice CBAs, such as program evaluation, justice-system marginal costs, and the victim costs of crime.

The purpose of this toolkit is to guide justice analysts new to CBA through its foundational steps. It addresses the core issues we explored with our TA partner agencies, as well as topics covered on the project website [cbkb.org](http://cbkb.org) and in other CBKB publications. We hope it helps to advance the use of CBA as a way to assess justice policies and programs.



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# Introduction

*There is no one-size-fits-all template. Each cost-benefit analysis must be tailored to the investment being studied.*

Justice policymakers must make tough choices with limited resources. To help weigh their options, decision makers are increasingly turning to cost-benefit analysis (CBA), an economic tool that compares the costs of programs or policies with the benefits they deliver. This emerging demand for justice CBA means that many researchers are being called upon to conduct these studies for the first time and are looking for resources to help them get started.

A common misconception is that you can perform CBA by inputting data into a common set of formulas. In reality, there is no one-size-fits-all template. Each analysis must be tailored to the investment being studied. There is, however, a common CBA methodology, or series of steps, you must follow to produce cost-benefit results.

The purpose of this toolkit is to guide justice analysts through these steps. It is not intended to be a comprehensive treatment of CBA methods. Many textbooks and papers cover a broad range of related technical topics in greater depth.<sup>1</sup> If you are interested in additional information on CBA methods, consult the white paper *Advancing the Quality of Cost-Benefit Analysis for Justice Programs* at [vera.org/cbamethods](http://vera.org/cbamethods), or the resources listed on page 34.<sup>2</sup> If you do not plan to conduct a CBA but are looking for information on interpreting CBA results, see *Using Cost-Benefit Analysis for Justice Policymaking* at [vera.org/cbapolicy](http://vera.org/cbapolicy).

## ABOUT THE CENTER FOR EMPLOYMENT OPPORTUNITIES

This toolkit includes numerous examples from a cost-benefit analysis of the Center for Employment Opportunities (CEO), which was created as a demonstration project by the Vera Institute of Justice in the 1970s to provide paid work to individuals returning to New York City after their release from prison. CEO became an independent nonprofit organization in 1996 and serves about 2,000 participants every year.

Parole officers refer people to CEO who are placed in paid jobs immediately after completing a pre-employment class that teaches job-readiness skills. Participants perform maintenance and repair work for government agencies at sites throughout New York City. Most of them work four days a week and are paid the minimum wage. They spend the fifth day of every week with job coaches to discuss work performance and prepare for interviewing. Once participants have demonstrated good performance on the job, they work with a job developer to find permanent employment. CEO continues to provide support for up to one year after placement.

In 2003, the nonprofit policy and research organization MDRC began the evaluation of CEO through a grant from the U.S. Department of Health and

In addition to reviewing resources on cost-benefit methods, you should also look at CBAs similar to the one you are conducting. (You'll find a database of justice CBAs at [cbkb.org/basics/references](http://cbkb.org/basics/references).) It often helps to learn from similar studies. This toolkit features examples from a recent cost-benefit analysis of a prison reentry program, the Center for Employment Opportunities (CEO), to illustrate many of the concepts discussed.<sup>3</sup> This is a useful example because it is typical of justice CBAs in that it monetized effects for taxpayers and crime victims. But it also went a bit further than many others by examining the benefits to program participants. It is worth noting, however, that this study had more time and funding than most. For this reason, the toolkit includes examples and lessons from sites where Vera delivered on-site CBA technical assistance. If you see unfamiliar cost-benefit terms, go to [cbkb.org/glossary](http://cbkb.org/glossary).<sup>4</sup>

## Overview of cost-benefit analysis

Cost-benefit analysis is an economic tool that compares an investment's costs and benefits in the long run. The hallmark of CBA is that costs and benefits are expressed in monetary terms so that they can be directly compared. Because the investment's effects are expressed in dollars, CBA enables decision makers

Human Services. MDRC evaluated the program using a randomized controlled trial. During 2004 and 2005, 977 individuals were randomly assigned to either CEO or a control group, and researchers measured employment and criminal-justice outcomes over a three-year period, through surveys and administrative records. The evaluation found that CEO increased employment early in the follow-up period, but that these impacts faded as program members left subsidized employment. It also found that CEO reduced convictions for new crimes over three years.

MDRC computed the cost-benefit results, in collaboration with the Vera Institute of Justice, using the recidivism and employment effects measured in the impact evaluation. Costs and benefits were tallied from the perspectives of taxpayers, crime victims, and program participants over the three-year follow-up period.

For more information, see *More Than a Job: Final Results from the Evaluation of the Center for Employment Opportunities (CEO) Transitional Jobs Program*, by Cindy Redcross et al.<sup>a</sup>

<sup>a</sup> Cindy Redcross, Megan Millenky, Timothy Rudd, and Valerie Levshin, *More Than a Job: Final Results from the Evaluation of the Center for Employment Opportunities (CEO) Transitional Jobs Program* (Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services, 2012), OPRE Report 2011-18, [www.mdrc.org/publication/more-job](http://www.mdrc.org/publication/more-job).

*The hallmark of CBA is that costs and benefits are expressed in monetary terms so that they can be directly compared.*

to compare policies and programs that have different purposes and outcomes. To produce these results, an analyst must do the following:

- › **Assess the impacts of the investment.** Does the policy or program work? Does it accomplish the desired end, such as reducing recidivism? What other impacts does it have? If the initiative cannot be directly evaluated, has a similar initiative been shown to work?
- › **Measure the costs of the investment.** What does it cost to launch and operate the policy or program?
- › **Measure the costs and benefits of the investment's impacts.** What is the dollar value of the investment's impacts? Who benefits from the program? Who bears the costs? Criminal justice investments affect many groups, including taxpayers, victims, and program participants. What is the magnitude of the effect for each relevant group?
- › **Compare costs and benefits.** Over the long term, do the benefits outweigh the costs? Does the investment deliver higher or lower returns than other options?
- › **Test the reliability of the results.** Analysts must make assumptions to predict the expected costs and benefits. What are the implications if the assumptions are changed or the estimates are varied? Would different information change the bottom-line results drastically, slightly, or not at all?

CBA is a valuable tool because it is comprehensive. Consequently, conducting a CBA can be data-intensive and time-consuming. Many research questions can be answered using a less exhaustive type of analysis. Before starting a CBA, it's important to consider whether one of the following tools would better suit your needs:

- › **Cost analysis** provides a complete accounting of the expenses related to a given policy or program. Although a cost analysis is a necessary component of a CBA, it is an analysis you can also perform independently. See *The Price of Prisons: What Incarceration Costs Taxpayers* for an example of cost analysis.<sup>5</sup>
- › **Cost-savings analysis**, sometimes called fiscal impact analysis, is a comprehensive study of all governmental revenues, expenditures, and savings that result from a policy or program. Unlike CBA, this type of study does not measure the societal effects of the investment beyond the budget. State and local fiscal offices routinely produce these analyses—often called fiscal notes—to determine whether a proposed initiative is affordable. See the Illinois Sentencing Policy Advisory Council's analysis of [SB1342](#) for an example of fiscal impact analysis.<sup>6</sup>

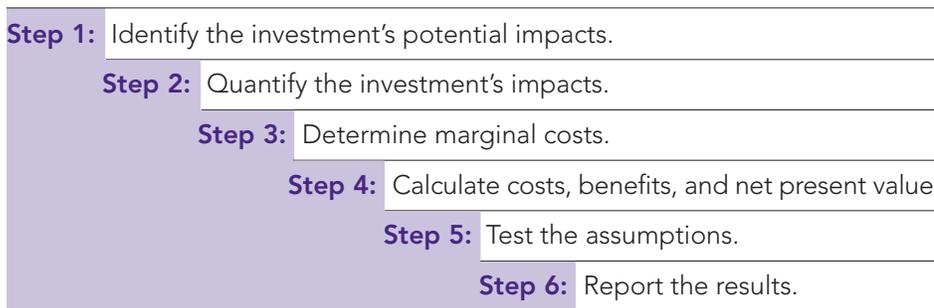
› **Cost-effectiveness analysis** is a method that compares policy or program costs relative to their outcomes, and indicates which option produces a desired outcome for the lowest cost. Unlike CBA, this type of study can compare only those programs that have the same types of outcomes (for example, recidivism or employment). It should not be used to compare policies with different outcomes, such as one that reduces crime rates and another that decreases the rate of homelessness. See *Mandatory Minimum Drug Sentences* by Jonathan Caulkins et al. for an example of cost-effectiveness analysis.<sup>7</sup>

Whereas these analyses typically adopt the narrow perspective of the government budget, CBA aims to capture the costs and benefits to all parties affected by an investment. This means including not only the perspectives of government stakeholders, but all relevant members of society. (The word “perspective” ordinarily suggests a particular viewpoint; in CBA it has a more specific meaning, and reflects a party that may experience costs, benefits, or both as a result of an investment.)

In practice, CBAs may not account for all perspectives, given the challenges of obtaining data. But justice CBAs should include at least the perspectives of taxpayers (that is, the impact on government agencies) and crime victims. If an analysis omits certain perspectives, the study should be explicit about which were excluded and the reason for the exclusions.

The remainder of this document outlines the six steps of conducting a CBA (see Figure 1). The first step is to identify the investment’s expected impacts. A CBA cannot monetize impacts—that is, express them as dollars—unless the impacts themselves have been quantified.

**Figure 1. The six steps of conducting a CBA**



Once the investment’s impacts have been measured (Step 2), determine the marginal costs of each impact (Step 3), then calculate the net present value by subtracting the investment cost from the benefits resulting from the investment (Step 4). Because there is often uncertainty about a policy’s effects or other factors associated with the investment, the CBA results should be tested by investigating a range of assumptions (Step 5). The analysis concludes by writing about the data, methods, and findings (Step 6).

# Before you get started

CBA has six basic steps. But before you start the analysis, you will improve the odds of success by establishing working relationships with people who can supply data and review your analysis. Cost-benefit analysis is a collaborative exercise. Although a single analyst can run the numbers, the calculations are entirely dependent on data and assumptions from a wide array of partners. You should:

- › Work closely with the policy’s evaluators; and
- › Convene an advisory panel to ensure that you have access to the best available data and can benefit from reviewers who have a range of knowledge and expertise.

*Cost-benefit analysis is a collaborative exercise.*

## EVALUATORS

In cases when the cost-benefit analyst is not involved in the program or policy evaluation, it is essential to collaborate closely with the evaluators. Ideally, this collaboration should begin when designing the outcome evaluation. Evaluators play a critical role in the CBA process because they can help ensure that the evaluation measures all of the impacts necessary for the CBA. The analyst should also ask the evaluation team to review the cost-benefit work. Even if the evaluators have little experience with CBA, they know a great deal about the research being used to produce the CBA results and can provide valuable feedback.

## ADVISORY PANELS

Convene an advisory panel with diverse representation to guide and review your analysis. Do not hesitate to include individuals affected by the investment who are known to be either advocates or opponents. Instead, strive to include all viewpoints. The advisory panel should first vet the methods and data to be used in the CBA. This may help members develop buy-in about the process, as well as help ensure the accuracy of the results. By including all stakeholders, it may be possible to generate a sense of group accountability for the quality of the analysis, and this in turn might encourage parties to devote the time and resources necessary to supply data. For example, when the Allegheny County Department of Human Services (DHS) conducted a [cost-benefit analysis of the county’s Day Reporting Program](#), they convened a working group that included participants from the county probation and parole office of the Fifth Judicial District of Pennsylvania, which operates the program; DHS, which was evaluating the program’s effectiveness; and the

County Office of Budget and Finance, which had the necessary data on justice-system costs.<sup>8</sup> Although DHS staff were responsible for conducting the CBA, the analysis was very much a collective effort.

This type of preliminary work can also help manage expectations. A broad range of advisers can ensure that the CBA is as comprehensive and accurate as possible, but if unavoidable obstacles arise concerning data or methods, it will be clear to the advisers that every effort was made to address them. This, in turn, may improve the credibility of the analysis once it's published.

## Step 1: Identify the investment's potential impacts

A cost-benefit analysis cannot be performed without measuring the investment's effects. So the first step is to determine all of the investment's potential impacts. This step will identify the impacts you should aim to quantify and monetize. To get started, ask the following two questions:

- › Which parties might benefit from the investment and which might bear costs?
- › What are the potential benefits and costs for each of those perspectives?

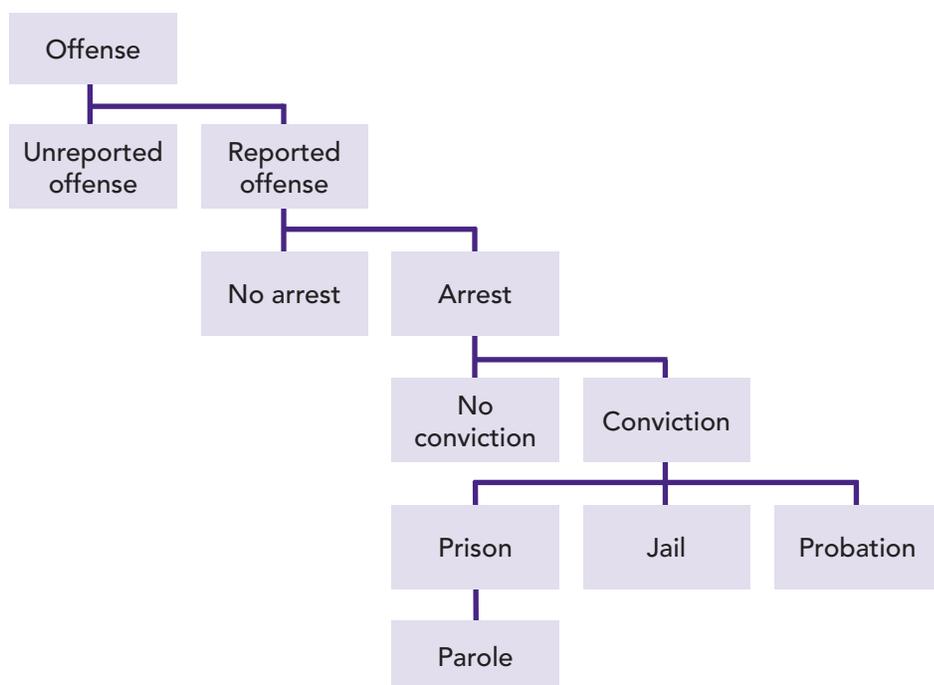
Think about the short-term and long-term effects of the investment, as well as potential unintended consequences of the investment's effects. All of the potential impacts may not be readily apparent. Review the following resources to comprehensively identify an investment's potential impacts:

- › stated goals and objectives of the investment;
- › evaluations and CBAs of similar investments;
- › position statements by proponents and opponents of the investment;
- › legislative testimony, if applicable; and
- › the program's logic model, if available.

Policies and programs of one agency may have a cascade of impacts through the justice system. As Figure 2 illustrates, a policy that reduces the number of criminal offenses will also affect a variety of justice system stakeholders. Fewer crimes will lead to fewer calls to the police department, fewer arrests, fewer convictions, and reduced use of corrections resources.

*A broad range of advisers can ensure that the CBA is as comprehensive and accurate as possible.*

Figure 2. Criminal-justice case processing

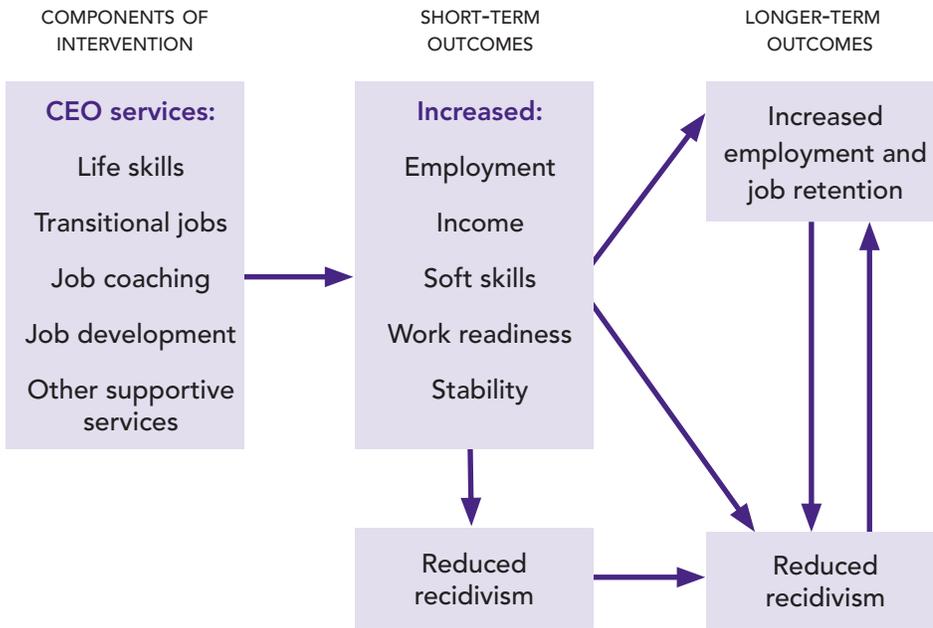


Source: Adapted from Wilson, Michael, *Cost-Benefit Analysis for Justice Policy: A Step-by-Step Guide*, Cost-Benefit Knowledge Bank for Criminal Justice.

Justice policies also affect parties beyond the criminal justice system. For instance, justice-involved populations often use public health and social service resources, and therefore certain justice investments may have an impact on these systems as well. Furthermore, because a central objective of many justice policies is to reduce crime, a justice CBA should evaluate the perspective of crime victims. If a policy reduces the number of crimes, it reduces the victim costs of those crimes. It is also necessary to evaluate the perspective of program participants when studying investments designed to improve participant outcomes, such as improvements in education, earnings, or health.

Consider a long-term time horizon when thinking about an investment's potential impact. In some cases, the investment's impact may be immediate but may not result in future impacts. In others cases, short-run impacts will lead to others in the long term. Figure 3—the conceptual model of program outcomes for the Center for Employment Opportunities—illustrates how short-term outcomes can lead to other short-term and longer-term outcomes. In the short run, program participants benefit from employment and job-readiness skills learned in the program; and, if recidivism declines, taxpayers

Figure 3. Conceptual model of CEO program outcomes



Source: Cindy Redcross, Megan Millenky, Timothy Rudd, and Valerie Levshin, *More Than a Job: Final Results from the Evaluation of the Center for Employment Opportunities (CEO) Transitional Jobs Program* (Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services, 2012), OPRE Report 2011-18, 5.

and crime victims also benefit. In the long run, program participants, crime victims, and taxpayers will continue to benefit if positive impacts on recidivism persist in the future. Thus, a CBA should include these perspectives.

Your assessment of the investment’s potential effects produces a list of the impacts to measure in the outcome evaluation. It is likely, however, that some of the identified impacts cannot be quantified. This may occur because of data limitations, because the effect is intangible and cannot be credibly measured, or because the impacts take place after the evaluation period ends.

Your CBA report should fully catalog all of the potential effects and discuss the investment’s impacts you could not measure. Consider the use of a different methodology, such as a qualitative analysis, to study the effects that could not be monetized in the CBA. Because a CBA should be as comprehensive as possible, readers often interpret the results to be a complete accounting of the investment’s costs and benefits. It is therefore important to state which factors were excluded from the analysis and how these exclusions may affect the results.

## CBA IN THE REAL WORLD: IDENTIFYING POTENTIAL IMPACTS

Most justice CBAs monetize the impacts only on government budgets (reflecting the taxpayer perspective) and public safety (the victim perspective). These are certainly key impacts, but such a narrow focus often excludes other important benefits. About 10 years ago, Dan Pacholke, then superintendent of the Cedar Creek Correctional Facility in Little Rock, Washington, installed a compost shed and planted a small garden in the prison yard. The idea was to reduce waste and provide jobs for inmates. These modest projects evolved into the Washington State Department of Corrections' (DOC) Sustainability in Prisons Program (SPP), an extensive portfolio of inmate activities that includes recycling, fish-farming, beekeeping, and raising threatened species of native flora and fauna.

When the DOC began working on a cost-benefit analysis for SPP, one of the first steps was to brainstorm the program's potential benefits. From the outset, two of SPP's objectives were to lower prison operating costs through waste reduction and to reduce recidivism by training inmates to perform green-sector jobs. But with its growth in scope, the DOC identified other far-reaching positive impacts: species conservation, critical habitat restoration, an increase in inmates' generativity (concern for future generations), improved conduct, creating research and collaboration opportunities with regional colleges and other community partners, and redefining what a prison could be. Guided by the research literature, Vera worked with the DOC to rate these impacts and determine how reliably they could be measured and translated to monetary values.

Ultimately, the working group decided to prioritize impacts that could be credibly estimated and expressed in dollar terms. The SPP arguably spawned an international movement in sustainable prison operations, and this may be one of its most significant effects. Still, assigning a dollar value to this benefit would likely furrow brows and invite skepticism among the legislators who set the DOC's budget. On the other hand, some policymakers would likely be encouraged by SPP's impact on inmate infractions. To start these analyses, Vera helped DOC devise a method to estimate the cost of various infractions (rule violations in prison) and also advised DOC to enlist its academic partner, the Evergreen State College, to conduct rigorous contingent-valuation studies to estimate the value of SPP's conservation efforts. (For more information about contingent valuation, see page 19.)

## Step 2: Quantify the investment's impacts

The second step of a CBA is to determine which of the potential impacts you identified can be measured through an outcome evaluation, and then to measure those impacts through an evaluation of the program being considered or by evaluations of similar programs. CBA is sometimes referred to as a “second-generation” evaluation tool because it relies on an outcome evaluation to establish the causal link between an investment and its impacts. When an investment cannot be evaluated, meta-analysis is often used to estimate the program’s impacts.

### OUTCOME EVALUATIONS

The so-called “gold standard” of evaluation research is a randomized controlled trial (RCT), which is also referred to as experimental research. When RCTs are not feasible—because of time, funding, or data constraints—quasi-experimental research that statistically mimics a randomized trial can produce reliable results. Analysts are advised against relying on non-experimental research, which compares outcomes before and after a program’s implementation without a comparison group, because this type of research design cannot establish a strong causal link between the intervention and the change in outcomes. (For more information about the strengths and weaknesses of different research designs, see *Advancing the Quality of Cost-Benefit Analysis for Justice Programs* at [vera.org/cbamethods](http://vera.org/cbamethods).<sup>9</sup>)

An outcome evaluation quantifies an investment’s impacts. These measured impacts identify the changes that result from the policy. For example, the outcome evaluation might measure impacts on the number of avoided victimizations, arrests, or days of prison and/or jail use (typically measured in what are called bed-days). These impacts are multiplied by the marginal cost of each impact to monetize the effect in dollar terms. (See Step 3, page 15, for more on marginal costs.)

For example, the CBA of the Center for Employment Opportunities was based on a randomized controlled trial that measured the number of times participants were re-arrested, re-convicted, or re-incarcerated. The analysis found that program participants, on average, were re-arrested 0.119 fewer times than comparison-group members (1.058 versus 1.117).<sup>10</sup> The program impact, 0.119, was then multiplied by the marginal cost of an arrest, \$359, to calculate the taxpayer benefit of the reduction in arrests ( $0.119 \times \$359 = \$42$  per CEO participant). Because the outcome evaluation of CEO quantified the

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## CBA IN THE REAL WORLD: QUANTIFYING IMPACTS

A high-quality outcome evaluation gives a CBA greater credibility. Without an evaluation to isolate and estimate the magnitude of the impacts, a CBA is largely speculative. This often means that an evaluation needs to be designed and implemented to measure an investment's impact before analysts can perform a CBA. In Pennsylvania, when the York County Criminal Justice Advisory Board (CJAB) started work on a CBA of its court for adults arrested for driving under the influence (DUI), the existing performance data did not provide a baseline—or a counterfactual—against which to measure the recidivism impact. The existing data also failed to capture the main public safety benefit of reduced recidivism: fewer traffic accidents involving alcohol and other drugs. The CJAB resolved to estimate the recidivism impact, with Vera's assistance, by comparing DUI court participants to convicted drunk drivers who were eligible for the court but excluded due to capacity constraints. Vera also worked with the CJAB to develop a methodology to measure the impact this court has had on the number of alcohol- and other drug-related traffic deaths and injuries, using county-level data from the National Highway Transportation Safety Administration for Pennsylvania.

Pennsylvania DUI sentencing guidelines exemplify how real-world governance can undermine program implementation and evaluation. The intermediate punishment protocol for second- and third-time DUI offenders, the target population for York County's DUI court, is a relatively short jail term of 45 days. For many defendants, intermediate punishment is preferable to the DUI court program, which usually takes a year or more to complete, involves strict supervision and graduated sanctions, and above all, demands a firm commitment to get sober. In fact, defense attorneys frequently advise their clients to opt for intermediate punishment. This introduces a bias toward highly motivated offenders in DUI court. Furthermore, allowing some of the most persistent drunk drivers to avoid treatment makes it less likely that DUI court will have a significant effect on public safety at the county level.

impacts on re-arrest, re-conviction, and re-incarceration, the analysis monetized costs and benefits to law enforcement, courts, and corrections agencies. (See Step 4, page 22, for more on calculating costs and benefits.)

When possible, each impact should be measured on an annual basis. For example, if the evaluation measures re-arrests over a three-year period, identify the number of re-arrests in each year of follow-up. It is necessary to identify impacts annually so that you can discount the future impacts to account for the time value of money. (See Step 4, page 24, for more on discounting.)

Because of time, data, and resource limitations, an evaluation will not measure every impact. If an impact cannot be directly observed, you should investigate whether an expected impact can be credibly inferred using secondary data. For instance, if an evaluation finds that the program reduced re-arrests for violent crimes, it is likely that other crimes and thus arrests were avoided. You can estimate the policy's effect on crime using the proportion of crimes that result in an arrest. For instance, in New York State, about 57 percent of violent crimes result in an arrest.<sup>11</sup> So for every arrest, approximately 1.75 violent crimes have taken place. Similarly, you can infer the policy's effect on convictions and use of corrections if you obtain data about the proportion of arrests that result in conviction, jail, prison, and community supervision.

## META-ANALYSIS

When an investment cannot be evaluated—for instance, because it has not yet been implemented or there are data or resource constraints—meta-analysis can be used to estimate the program's impacts. Some justice CBAs are “ex ante” analyses, meaning that they are performed before the policy is implemented. Because a program that has not been implemented cannot be evaluated, analysts often rely on meta-analysis, a technique that uses past research to estimate the average impact a similar investment will have. The findings from a meta-analysis are often interpreted differently from those of an outcome evaluation, because the results of a meta-analysis may not be predictive for similar investments. But meta-analysis is a useful tool for cost-benefit analysts who wish to provide policymakers with estimates of the potential costs and benefits of investments that cannot yet be evaluated. (See *Research Syntheses and Meta-Analysis* by Harris Cooper for more information on meta-analysis.<sup>12</sup>)

## Step 3: Determine marginal costs

To monetize the impacts quantified in the outcome evaluation, multiply them by the applicable marginal cost. Because the number of crimes and impacts on government-agency workloads are often measured, analysts must determine marginal costs for justice agencies and the victim cost of crime. The marginal taxpayer cost is the amount of change in an agency's total operating costs when output (such as arrests or jail days) changes as a result of the program or policy investment.<sup>13</sup> The marginal victim cost is the monetized value of each incident of crime. You can estimate taxpayer costs by using budget and spending data. You can estimate victim costs by using one of several economic techniques. This section describes how to determine marginal costs for taxpayers and victims, and provides guidance on how to obtain more information on calculating the marginal costs for other impacts, such as participant earnings and public benefits.

*Because CBAs often measure the number of crimes and impacts on government-agency workloads, analysts must determine marginal costs for justice agencies and the victim cost of crime.*

*By working closely with government officials, you can address their concerns and improve the quality of your analysis.*

## TAXPAYER COSTS

Justice CBAs should measure the impact on all affected agencies, even those that are not implementing the policy or program. For example, the court system will bear the direct cost of a new drug court. But a number of other agencies will also bear costs and benefits. This is because the drug court's budgetary effects extend far beyond the courtroom, and its participants use other agencies' resources for treatment, case management, and supervision. These agencies and others will also benefit in the future if the drug court reduces recidivism, thereby reducing future justice system costs. Justice CBAs, therefore, require marginal costs for each segment of the justice system that is affected by the investment.

Fortunately, the number of resources on marginal taxpayer costs for justice CBAs is growing. Some marginal costs are readily available because other analysts have already calculated them. A few of these resources are as follows:

- › **Published cost-benefit analyses.** Because marginal taxpayer costs are part of a rigorous CBA, you can look to other reports that study the jurisdiction in your analysis. For example, Washington and Oregon have published their marginal costs in technical reports that accompany their CBA findings.<sup>14</sup> More than a dozen other states, including Iowa, Massachusetts, New Mexico, and New York, are developing cost-benefit analyses through the Pew-MacArthur Results First Initiative.<sup>15</sup> The Cost-Benefit Knowledge Bank (CBKB) reference database ([cbkb.org/basics/references](http://cbkb.org/basics/references)) includes more than 500 studies; many of these include the marginal costs used in analyses.
- › **Fiscal impact statements.** State fiscal offices develop these analyses, often called fiscal notes, to determine the budgetary effect of proposed legislation. When these analyses are prepared for justice policies, they require the use of the marginal costs for justice agencies. For example, someone preparing a CBA in Illinois could obtain the marginal cost of prison (\$21,600 per inmate per year) and jail (\$15,256 per inmate per year) from the Illinois Sentencing Policy Advisory Council's recent fiscal impact analysis of *Sentence Enhancements for Unlawful Use of a Weapon (UUW) Offenses*.<sup>16</sup>
- › **Government budget offices.** Some justice agencies maintain data on marginal costs. Even if these costs are not published, agencies may share them upon request. Fiscal information can be sensitive and government officials might be reluctant to share data because of concerns that it could be misused or misinterpreted. You can help ease these concerns by clearly explaining how the data will be used and when the analysis will be published. You should also consider sharing your analysis with justice agencies prior to publication, so they have an opportunity to comment. By working closely with government officials, you can often address their concerns and also improve the quality of your analysis.<sup>17</sup>

## CBA IN THE REAL WORLD: MARGINAL COSTS

The accuracy of justice-system marginal costs is critical because decision makers need to understand how policies and programs affect budgets. Although these costs may seem to be the most straightforward of all the inputs necessary for a CBA, the calculations are often complicated and the results are sometimes contentious because of concerns that they will be misused or misinterpreted in a way that adversely affects an agency's budget.

To address these challenges, you may want to calculate marginal costs through a work group that includes a wide array of stakeholders. For instance, cost-benefit analysts at the Allegheny County Department of Human Services (DHS) in Pennsylvania developed a justice system marginal-cost work group that included analysts and executives from their department, the Fifth Judicial District of Pennsylvania, and the County Executive's Office of Budget and Finance. The analysts in the work group collected the necessary data and determined the appropriate method to calculate costs. The executives, who are responsible for agency operations, weighed in on the calculations, both to ensure accuracy and learn how they would be used in the CBA. This allayed concerns about the use and interpretation of the marginal costs. In 2014, Allegheny County published its marginal costs so that internal and external stakeholders consistently use the same metrics for decision making and analyses.<sup>a</sup>

Similarly, the New Mexico Department of Public Safety developed a Law Enforcement Costs Subgroup to collect and vet law enforcement costs at the state, regional, and local level. This group comprised a wide range of stakeholders from the state Department of Public Safety and the Drug Enforcement Advisory Council and established a repository of costs for use in CBAs prepared by applicants for federal Byrne Justice Assistance Grants.

<sup>a</sup> Kathryn Collins, Emily Kulick, Chengyuan Zhou, and Erin Dalton, *Calculating Unit Costs in Allegheny County: A Resource for Justice System Decision-Making and Policy Analysis* (Allegheny County, PA: Allegheny County Department of Human Services, 2014), [www.alleghenycounty.us/dhs/research-crime-justice.aspx](http://www.alleghenycounty.us/dhs/research-crime-justice.aspx) (accessed October 30, 2014).

If the justice-system marginal costs required for your analysis have not been published, you can calculate them using either the “top-down” or “bottom-up” method.

- **Top-down method.** To use this approach for calculating marginal costs, divide the change in total cost of a given function by the change in total output. This is a top-down approach because it uses total (or top-level) costs and then divides them by the change in the unit of output. For example, budget documents in New York indicated that the state would

*Accurate marginal costs are critical because decision makers need to understand how policies and programs affect budgets.*

save \$3.7 million annually because of a reduction of 1,500 in the parole population.<sup>18</sup> The top-down method can be used to calculate the marginal cost of parole by dividing \$3.7 million by 1,500. Using this calculation, the marginal cost is \$2,467 per parolee, per year. The top-down method is convenient when an agency is delivering only one output (for example, jail bed-days) and the analyst can therefore easily identify which costs the policy will change. Analysts often prefer this method because the calculations are relatively simple when the necessary budget data is available.

- **The bottom-up method.** This approach investigates all the costs related to a single unit of output. This typically means identifying all the employees who are responsible for a unit of output, identifying how much time each person spends on that unit of output, and then multiplying that time by the cost of each employee's time spent on the activity. In the state of Washington, for example, the Tacoma Police Department used the bottom-up approach to estimate that the marginal cost of arresting a chronic minor offender was \$165.<sup>19</sup> This amount was calculated by multiplying the hourly cost of an officer (\$55) by the average number of hours to process these arrests (three). The bottom-up method is usually the best approach when measuring the cost of an activity funded by several agencies or when an activity is one of many being undertaken (for example, if probation services include individual offender management, group meetings, and employment programs).

For step-by-step instructions on how to calculate marginal costs for corrections, community corrections, courts, and law enforcement, see *A Guide to Calculating Justice-System Marginal Costs* at [vera.org/marginalcosts](http://vera.org/marginalcosts).<sup>20</sup>

## VICTIMIZATION COSTS

Victim costs, also referred to as victimization costs, are losses suffered by crime victims and include tangible and intangible costs. Crime victims may experience substantial financial, psychological, and physical harm. Tangible losses are those that easily translate into financial disadvantage, such as medical costs, lost income, and property loss incurred because a person was the victim of a crime. Intangible losses refer to the pain, suffering, and diminished quality of life that a crime victim may experience. In recent years, researchers have used a variety of methods to place a dollar value on the victim costs of crime.

Most cost-benefit analysts do not calculate the marginal cost of victimization; instead they rely on the cost-of-crime literature. The challenge analysts face is in deciding which set of estimates to use. Researchers use either the

bottom-up or top-down method to monetize the cost of crime. The bottom-up approach captures the costs incurred by the crime victim. The top-down approach captures these costs and the costs society bears when a crime is committed (such as fear of crime).

- › **Bottom-up method (costs to victim).** This approach adds up the individual component costs of the harms of victimization. Tangible costs, such as medical expenses and lost earnings, are measured through the “cost of illness” method, which tallies these costs by drawing on financial records. Intangible costs, such as pain and suffering, are measured through the “jury compensation” method, which uses the money awarded to victims by juries to estimate the intangible costs of crime. A strength of this approach is that details about the component costs may provide some readers with greater confidence in the results and how they were calculated. A weakness is that it omits many intangible costs of crime that affect society broadly, apart from the costs to victims—such as the fear of crime. For example, when a crime occurs, the whole community is affected because people will have a heightened fear of crime and may take additional precautions to avoid victimization.
- › **Top-down method (costs to society).** This approach attempts to capture the cost of crime to society as a whole. The “contingent valuation” method uses surveys that ask people to place a dollar value on changes in crime levels. For example, a survey might ask people how much they would be willing to pay for a reduction in crime or how much they would have to be compensated for an increase in crime. In theory, contingent-valuation estimates encompass the costs of crime to victims and non-victims. As a result, these estimates tend to be higher than bottom-up estimates.

Top-down cost estimates are more appropriate for CBA than bottom-up estimates because they are more comprehensive; they provide a measure of the full impact of criminal offenses on society. But the disadvantage of this method is that the estimates are harder to disaggregate into types of cost (resulting in less transparency than the bottom-up method), and some people are skeptical that contingent-valuation surveys can produce accurate estimates. Figure 4 illustrates the difference when using bottom-up and top-down victim-cost estimates for the crime of rape. Note that the top-down method produced a higher victimization cost (\$237,000) than the bottom-up method (\$113,000), because the top-down method incorporates fear of crime, avoidance costs, and prevention costs, which are captured through contingent-valuation surveys. Although analysts and policymakers may find the greater precision of bottom-up estimates appealing, they should be aware of the important costs these estimates fail to capture.

Figure 4. Victim costs of rape: Comparison of bottom-up vs. top-down approaches

	BOTTOM-UP APPROACH	TOP-DOWN APPROACH
Out-of-pocket costs	\$650	Included
Lost productivity	\$2,800	Included
Counseling	\$2,800	Included
Pain and suffering	\$103,500	Included
Justice system costs	\$3,250	Included
Avoidance costs; prevention costs; fear of crime	Not included	Included
<b>Total</b>	<b>\$113,000</b>	<b>\$237,000</b>

Source: Mark A. Cohen, “Economic Cost of Crime and Public Policy Decisions” (presentation at seminar on “The Costs of Crime and Violence in Latin America and the Caribbean: Methodological Innovations and New Dimensions,” Inter-American Development Bank, Washington, DC, Jan. 24, 2013).

See *Advancing the Quality of Cost-Benefit Analysis for Justice Programs* at [vera.org/cbamethods](http://vera.org/cbamethods) for more information about bottom-up and top-down estimates of the costs of crime.<sup>21</sup>

## OTHER COSTS

Justice investments often result in impacts beyond those to taxpayers and victims, such as improved health, education, or employment outcomes for program participants.<sup>22</sup> When impacts can be quantified, you should strive to monetize them.

An analyst’s ability to monetize outcomes is typically limited to the state of current research. There is consensus about how to measure some outcomes of social programs, such as public benefit payments and special education (see Figure 5). But there is no consensus about how to monetize other outcomes, including some that are rarely or never monetized.<sup>23</sup> (Keep in mind that some of these outcomes should be more easily monetized over time as research develops.) See *Valuing Benefits in Benefit-Cost Studies of Social Programs* by Lynn Karoly for more on the methods used to monetize outcomes that social programs affect.<sup>24</sup>

If a CBA omits certain perspectives, the study should be explicit about which were excluded—and the reason for the exclusions—and use qualitative data, such as interviews and focus groups, to describe the nature and magnitude of the costs and benefits to those perspectives.

*If a CBA omits certain perspectives, the study should be explicit about which were excluded and why.*

**Figure 5. Monetization of outcomes affected by social programs**

<p><b>Outcomes with more-established methodology for monetization:</b></p>	<ul style="list-style-type: none"> <li>&gt; Special education use</li> <li>&gt; Grade retention</li> <li>&gt; Transfer payments and other means-tested programs</li> </ul>
<p><b>Outcomes without clear consensus on monetization:</b></p>	<ul style="list-style-type: none"> <li>&gt; Achievement-test scores</li> <li>&gt; High school graduation</li> <li>&gt; College attendance</li> <li>&gt; Teen pregnancy</li> <li>&gt; Use of tobacco, alcohol, and/or other drugs</li> <li>&gt; Crime and delinquency</li> <li>&gt; Child abuse and neglect</li> <li>&gt; Earnings</li> </ul>
<p><b>Outcomes never or rarely monetized:</b></p>	<ul style="list-style-type: none"> <li>&gt; Child/youth behavioral/emotional outcomes (e.g., behavior problems, school suspensions/expulsions, and mental health outcomes)</li> <li>&gt; Child/youth cognitive outcomes (e.g., IQ scores)</li> <li>&gt; K-12 grades, school attendance, school engagement</li> <li>&gt; General health status of children/youth</li> <li>&gt; Contraceptive use</li> <li>&gt; Adult parenting measures</li> <li>&gt; Marriage and divorce</li> <li>&gt; Adult mental health</li> <li>&gt; Adult reproductive health</li> <li>&gt; Employment</li> <li>&gt; Income and poverty status</li> </ul>

Source: Adapted from Karoly, Lynn A. *Valuing Benefits in Benefit-Cost Studies of Social Programs*. (Santa Monica, CA: RAND Corporation, 2008), 78.

## Step 4: Calculate costs, benefits, and net present value

*The full cost of an investment often extends beyond a simple program budget.*

Once you have measured the investment’s impacts and collected the marginal costs associated with each one, you can compute the CBA results. (If fewer impacts were quantified in Step 2 than you identified in Step 1, you should discuss those expected but unquantified effects qualitatively in the report’s narrative.) This section provides guidance on calculating the investment costs, monetizing their impacts, and discounting future costs and benefits.

### CALCULATING INVESTMENT COSTS

Begin the cost-benefit calculation by measuring the costs of the investment. These are typically taxpayer costs, but some investments are supported by other resources, such as user fees or volunteer time. Because a CBA ideally measures costs and benefits for all perspectives, you must consider costs of the investment to parties other than taxpayers.

Determining the investment cost is sometimes a straightforward process. Many justice investments are programs with dedicated resources, such as staff and equipment. Perhaps the program is neatly compartmentalized as one or more line items in a budget or is funded entirely through a grant. But the full cost of an investment often extends beyond a simple program budget. To ensure that you capture all of the relevant costs, use a structured methodology. A commonly used approach is the “ingredients method.”

The general concept behind this method is that every investment uses resources, or “ingredients,” that have a cost. (This method is also called the resource cost model.) The approach involves gathering data for each resource necessary to support the program, such as staffing costs (including salaries, benefits, and overtime) and non-staffing costs (for instance, travel expenses and contracts for professional services). This process entails three steps:

1. Identify all of the resources that support the investment.
2. Determine the monetary value for each resource.
3. Estimate the total cost of the investment.<sup>25</sup>

Use a structured cost-collection tool—such as the CBCSE Cost Tool Kit, produced by the Center for Benefit-Cost Studies of Education (available at [cbcse.org/cost-resources](http://cbcse.org/cost-resources))—to identify all of the potential resources. You can accurately tally the total cost once you have collected the amount of each ingredient. This approach also determines how the cost burden is distributed among all stakeholders, which is necessary in a CBA.

For more on the ingredients method, see *Cost-Effectiveness Analysis: Methods and Applications*, by Levin and McEwan (2001).<sup>26</sup>

## MONETIZING IMPACTS

Once you calculate the cost of the initial investment, the next step is to tally the costs and the benefits that accrue as a result of the investment. The effects of the investment are quantified by the outcome evaluation (see Step 2) and then monetized by multiplying these effect sizes by the appropriate marginal cost (see Step 3). Therefore, the cost (or benefit) of each impact is calculated as follows:

$$\text{Impact} \times \text{marginal cost} = \text{cost (or benefit)}$$

For example, if an investment reduces the number of arrests by 100 and the marginal cost per arrest is \$500, the benefit of the avoided law enforcement costs is \$50,000, as follows:

$$\text{Reduction in 100 arrests} \times \$500 \text{ per arrest} = \$50,000 \text{ benefit}$$

When outcomes are measured over a multiyear period, identify impacts in each year of follow-up. This is necessary so that the monetary value of the impacts in future years can be appropriately discounted (see the section “Discounting” on page 24). For example, the evaluation of the Center for Employment Opportunities measured outcomes over a three-year follow-up period and found that CEO participants spent less time detained in jail. (The impact on detention is because CEO participants were less likely to be re-arrested during the follow-up period). The CBA measured the taxpayer benefit by multiplying the reduction in jail bed-days by the marginal cost of jail for each follow-up year, and then adding the amounts for each of those years (see Figure 6).

**Figure 6. Center for Employment Opportunities:  
Benefit of reduction in use of jail for pretrial detention  
(per participant)**

	REDUCTION IN JAIL BED-DAYS	DAILY MARGINAL COST OF JAIL	BENEFIT OF REDUCED USE OF JAIL
	A	B	C (A x B)
Year 1	0	\$71.51	\$0
Year 2	3.2	\$71.51	\$227
Year 3	3.8	\$71.51	\$273
<b>Total</b>	<b>7.0</b>	<b>\$71.51</b>	<b>\$500</b>

Source: Author’s calculations using data from Redcross, et al. (2012).<sup>27</sup>

## DISCOUNTING

When your CBA examines effects beyond one year, you will need to discount the values of future costs and benefits. Discounting adjusts future costs and benefits downward, by a percentage called the discount rate, in recognition of the time value of money. This is the concept that money is worth more now than later.

Justice CBAs commonly use a discount rate of about 3 percent. The Washington State Institute for Public Policy (WSIPP) uses low (2 percent), modal (3.5 percent), and high (5 percent) rates in its Monte Carlo simulations.<sup>28</sup> (See the sidebar “Monte Carlo analysis,” page 26, for more on this topic.) WSIPP uses a discount rate of 3.5 percent when a CBA does not involve a simulation. The U.S. Office of Management and Budget recommends producing estimates with both 3 and 7 percent discount rates when conducting regulatory analysis.<sup>29</sup>

The discount rate you select affects the results. The higher the discount rate, the more steeply future costs and benefits depreciate. A lower discount rate decreases the value of future costs and benefits less, keeping them closer to current dollar values.

See the CBKB discounting tool at [cbkb.org/toolkit/discounting](http://cbkb.org/toolkit/discounting) for the formula used to discount future costs and benefits. Once you discount future costs and benefits, the net benefit or net cost is referred to as the “net present value,” which means the results are reported in “present value” terms.

Figure 7 illustrates the effect of a 3 percent discount rate on the results presented in the table above; the figure tabulates the undiscounted and discounted benefits of reduced jail use shown in Figure 6 (see page 23). The total undiscounted benefit of the reduction in jail use is \$500; the discounted benefit is \$478, a difference of \$22. A lower discount rate would reduce the total benefit by less; a higher rate would reduce the benefit by more.

**Figure 7. Center for Employment Opportunities:  
Discounted benefit of reduction in use of jail for pretrial  
detention (per participant)**

	BENEFIT OF REDUCED USE OF JAIL (NO DISCOUNTING)	BENEFIT OF REDUCED USE OF JAIL (3% DISCOUNT RATE)
Year 1	\$0	\$0
Year 2	\$227	\$220
Year 3	\$273	\$258
<b>Total</b>	<b>\$500</b>	<b>\$478</b>

Source: Author’s calculations using data from Redcross, et al. (2012).<sup>30</sup>

## CBA IN THE REAL WORLD: CALCULATING COSTS AND BENEFITS

Once you have collected the data, the next step is to crunch the numbers. You can use spreadsheet or statistical programs to make these calculations; Microsoft Excel is a popular option because most workplaces support this program. Spreadsheets are useful because they are so flexible, but flexibility can be problematic because each analyst's CBA spreadsheet will look a little different. A few simple practices, exemplified by work done by the Denver Crime Prevention and Control Commission (CPCC), can help ensure that others can review a CBA.

In 2010 the Denver CPCC developed a Return on Investment Model using Microsoft Excel. The model measures the cost-effectiveness of CPCC investments, such as reentry programming and drug courts. Because these analyses are updated annually, the CPCC has taken several steps to ensure that historical analyses can be reviewed, updated, and replicated by other analysts. (Over time it is likely that new analysts will be tasked with cost-benefit work as staff move on to other jobs or assignments.) A few best practices are as follows:

- > **Maintain a common table of inputs and assumptions.** Store inputs used in several calculations throughout the analysis (such as marginal costs) in a common table within the workbook. When a cost-benefit calculation requires the use of one of these inputs, it should link to the input in the centralized table. This practice saves time because if you need to change the value of an input, you change it only once.
- > **Document the source of every input.** Record the source for each input—such as marginal cost, program impact, or assumption—in the spreadsheet. For instance, a cell adjacent to the data can be used to label the source of the input. This is invaluable for analysts who are reviewing the analysis.
- > **Keep formula operations simple.** Rather than embedding several computations in a single spreadsheet cell, break up the computation into several cells. A useful guideline is that someone should be able to check the work by reading a printed copy of the spreadsheet.

## MONTE CARLO ANALYSIS

You can use Monte Carlo analysis to examine multiple variables simultaneously and simulate thousands of scenarios, resulting in a range of possible outcomes and the probabilities that they will occur. Monte Carlo simulation repeatedly draws random values for each model input to create a probability distribution of CBA outcomes. You can then express the results as the estimated probability that the program will yield net benefits or as a range of forecasted net present values within some confidence interval.

Keep in mind that Monte Carlo analysis is data-intensive because it ideally uses the range and statistical distribution for each model input. The outcome probability distribution the simulation produces is only as reliable as the model and the variable distributions that serve as inputs; if the effect-size estimate is biased, the Monte Carlo results will be too.

For more information on Monte Carlo analysis, see the CBKB webinar about sensitivity analysis.<sup>a</sup>

<sup>a</sup> Ben Bryant and Carl Matthies, “Sensitivity Analysis for Cost-Benefit Studies of Justice Policies: A Primer,” webinar for the Vera Institute of Justice’s Cost-Benefit Knowledge Bank for Criminal Justice, 2012, [cbkb.org/2012/09/watch-cbkb-webinar-on-sensitivity-analysis-for-cost-benefit-studies-of-justice-policies](http://cbkb.org/2012/09/watch-cbkb-webinar-on-sensitivity-analysis-for-cost-benefit-studies-of-justice-policies) (accessed October 29, 2014).

## Step 5: Test the assumptions

Cost-benefit studies often incorporate assumptions when sufficient data is not available. Such assumptions introduce uncertainty into the analysis that you should test by using a technique called sensitivity analysis. Sensitivity analysis shows how responsive—or sensitive—a study’s results are to changes in assumptions. It is important to use sensitivity analysis because there is typically some uncertainty about CBA model inputs. These are the most common types of sensitivity analysis:

- › **Partial sensitivity analysis:** In this analysis, you select one variable and change its value while holding the values of other variables constant, to determine how much the CBA results change in response.
- › **Best-case and worst-case scenarios:** This type of analysis establishes the upper (best-case) and lower (worst-case) boundaries of the results. To perform a best-case analysis, use the most-favorable assumptions about the program or policy’s outcomes; for the worst-case scenario, use the least-favorable assumptions. Because this approach produces extreme predictions, it is most useful for determining whether a net benefit will become a net cost under alternative assumptions—or vice versa.
- › **Break-even analysis:** If you are unable to estimate a policy’s most likely effects or cannot find comparable studies to help determine its best-case and worst-case scenarios, you can use a break-even analysis. This helps identify how large a policy’s impact must be for its benefits to equal its costs, that is, to break even. By definition, breaking even results in a net present value of \$0.
- › **Monte Carlo analysis.** Use this type of analysis to examine multiple variables simultaneously and simulate thousands of scenarios, resulting in a range of possible outcomes and the probabilities that they will occur (see the sidebar “Monte Carlo Analysis”).

Sensitivity analysis was part of the CBA of the Center for Employment Opportunities. Because researchers had uncertainty about a few important assumptions, they used a “worst-case scenario” analysis to illustrate what the results would look like given the most conservative assumptions.

Figure 8 illustrates the results using both the “base case,” that is, the scenario the authors consider the most plausible, and an alternate scenario that uses “low-end” (or worst-case) assumptions for three inputs: the marginal costs of prison and jail, and the value of a program participant’s labor.

In the base case, the authors found that CEO returns a net benefit of \$4,907 per participant—or a benefit-cost ratio of 2.36. Using the low-end assumptions, the program also yields a positive return: a net benefit of \$927 per participant, and a benefit-cost ratio of 1.26. (For more information about summary metrics, see Figure 9 on page 28.) These results provide further support that the investment is cost-beneficial.

Figure 8. Sensitivity analysis in *More Than a Job: Final Results from the Evaluation of the Center for Employment Opportunities (CEO) Transitional Jobs Program*

	MARGINAL COST OF PRISON	MARGINAL COST OF JAIL	VALUE OF PROGRAM PARTICIPANT'S LABOR	NET PRESENT VALUE PER PARTICIPANT (BENEFIT-COST RATIO)
<b>Base case</b>	\$129/day	\$72/day	Market value	\$4,907 (2.36)
<b>Low-end assumptions</b>	\$28/day	\$14/day	Participant wages	\$927 (1.26)

Source: Redcross, et al. (2012), pages 67 (Table 4.4) and 122 (Table F.5).<sup>31</sup>

A cost-benefit study is stronger when its authors address uncertainty by performing sensitivity analysis. A study isn't meant to guarantee precise costs and benefits—and will be misleading if its results are calculated using only point estimates for the CBA model's inputs. A CBA that considers a range of possible scenarios and explains which outcomes are likely will not only be more credible than one that looks only at the base-case scenario, but more informative.

### CBA IN THE REAL WORLD: TESTING THE ASSUMPTIONS

When making investment decisions, people sometimes gravitate toward the most optimistic projections about the future. For example, if a mutual fund had a 15 percent rate of return last year, many investors may be inclined to pour money into it, based on the belief that it will do at least that well this year. Rather than reporting a single net present value, CBAs should report a range of net present values projected under different assumptions.

In Washington, the Kent Police Department's Intelligence-Led Policing Initiative (ILP) used crime analysis on volume crimes like burglary and auto theft to inform decisions about deploying officers. The evaluation compared the change in Part I offenses (also called "index crimes" in the context of reporting and analyzing common crime statistics) in Kent before and after implementation of ILP to the change in Part I offenses in three neighboring cities. One of those cities had no crime analyst over the period studied and two

did not use crime analysis to direct officer deployment. This evaluation method implicitly assumes that any difference in trends between Kent and the other cities after the initiative started are attributable to ILP, an assumption that is defensible because trends among the cities were fairly consistent before ILP was introduced.

The evaluation found that burglary and auto theft decreased significantly in Kent once intelligence-led policing was in use, even after accounting for declines in those crimes in neighboring cities. Analysts could not precisely determine the magnitude of the reductions in these crimes, however, so they calculated a net present value range from the lower and upper bounds of the effect-size estimates. The net present value was also calculated with and without including significant changes in crimes that ILP does not target. Like an investor with a "bullish" outlook, the Kent Police Department was understandably keen to include the decrease in aggravated assaults when calculating the net benefits, but less eager to count the uptick in sexual assaults after ILP was in use.

## Step 6: Report the results

*To paraphrase the Golden Rule, you should provide as much documentation for others as you would want them to provide to you.*

Once you have computed the CBA results (Step 4) and tested them (Step 5), the final step is to compose a report that communicates your findings. This section provides guidance on how to tabulate results, document the analysis, and interpret the findings.

### TABULATING RESULTS

The tables that report your CBA results should be clear and comprehensive so that people can understand them without reading the accompanying narrative. Consider the following guidelines when tabulating results:

- › Report both the net present value and benefit-cost ratio as summary metrics.
- › Include costs and benefits in a summary table.
- › Disaggregate costs and benefits by perspective.
- › Cite data sources and write clear, concise notes about any important factors related to the data and calculations.
- › Give each table a title that comprehensively describes its contents.

The summary metrics net present value (NPV) and benefit-cost ratio (BCR) are commonly used, although the consensus among CBA experts is that the NPV most accurately depicts the results.<sup>32</sup> An advantage of NPV is that it does not matter whether the analyst counts benefits as negative costs or counts costs as negative benefits, a decision that affects the total benefits and costs, and thus the benefit-cost ratio.<sup>33</sup> Figure 9 provides the formulas to calculate NPV, BCR, and another popular metric, return on investment, which compares net benefits to the investment cost.

Figure 9. Formulas for CBA summary metrics

$$\begin{aligned}\text{Net Present Value} &= \text{Benefits} - \text{Costs} \\ \text{Benefit Cost Ratio} &= \text{Benefits} \div \text{Costs} \\ \text{Return on Investment} &= (\text{Benefits} - \text{Costs}) \div \text{Costs}\end{aligned}$$

Figure 10, which summarizes the final results of the CBA of the Center for Employment Opportunities, incorporates many of these features. The title, sources, and notes are comprehensive, and costs and benefits are disaggregated for each of the three examined perspectives—taxpayers, victims, and participants. The table also reports two summary metrics: the net benefit and the benefit-cost ratio.

Figure 10. Sample table of CBA results

The Enhanced Services for the Hard-to-Employ Demonstration

Table 4.4

Net Benefits and Costs (in 2009 Dollars),  
Full Sample  
Center for Employment Opportunities

	Taxpayer (\$)	Victim (\$)	Participant (\$)	Total (\$)
<b>Benefits</b>				
Criminal justice	2,912	432	0	3,344
Employment				
Earnings	0	0	590	590
Tax payments and credits <sup>a</sup>	190	0	-190	0
Value of output from CEO transitional jobs <sup>b</sup>	4,576	0	0	4,576
<b>Costs</b>				
CEO program costs <sup>c</sup>	-3,603	0	0	-3,603
Net benefits (per person)	4,075	432	400	4,907
Benefit-cost ratio	2.13	NA	NA	2.36

SOURCES: Marginal costs were estimated using information provided by New York City and state criminal justice agencies, New York State executive budget agencies, and Taifa (1995). See Appendix Table F.1 for more detail. For additional employment data sources, see Table 3.1; for additional criminal justice data sources, see Table 3.2.

NOTES:

<sup>a</sup> Income taxes and federal and state Earned Income Tax Credit were based on tax rules for filing year 2009.

<sup>b</sup> The value of output from CEO transitional jobs was calculated using information from the Department of Citywide Administrative Services.

<sup>c</sup> CEO program costs were calculated using CEO's financial expenditure reports for Fiscal Year 2005 and CEO's management information system (MIS), adjusted for inflation.

Source: Cindy Redcross, Megan Millenky, Timothy Rudd, and Valerie Levshin, *More Than a Job: Final Results from the Evaluation of the Center for Employment Opportunities (CEO) Transitional Jobs Program* (Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services, 2012), OPRE Report 2011-18, 67.

## DOCUMENTING THE ANALYSIS

Because analytic decisions can heavily influence a CBA's results, it is important to include thorough sections on your methods, data, and any limitations. To paraphrase the Golden Rule, you should provide as much documentation for others as you would want them to provide to you. Document all perspectives, program impacts, marginal costs, assumptions, limitations, and data sources in your study. A CBA should explain which costs and benefits have been included and which have not. The most thorough studies report the perspectives, costs, and benefits that could not be monetized; the limitations of the analysis; and a range of likely results when a single result cannot be presented with confidence.

## INTERPRETING THE RESULTS

The CBA summary metrics (such as NPV and BCR) provide a valuable snapshot of the investment's bottom line. The CBA report can add further value by identifying the factors that drive the results.<sup>34</sup> Costs can exceed benefits if the program had no effect on outcomes—or had a negative effect—or if a positive effect was not substantial enough to offset the costs. Knowing which of these scenarios accounts for the result has important implications for decision makers, not only for selecting programs to invest in, but for improving underperforming programs and for sustaining and enhancing programs that are producing net benefits.

Address the following questions in the narrative of your report to provide greater depth to the analysis:

- 1. What's driving the costs?** Whether a program is found to have a net benefit or a net cost, it's important to carefully examine the areas with the greatest costs.
- 2. What's driving the benefits?** Knowing why the benefits outweigh the costs will help you assess the likelihood of attaining favorable results in the future. For example, if the net benefit is largely due to the program reducing recidivism among violent, rather than nonviolent, offenders, then benefits can be maximized by targeting enrollment to the violent offender population that generates the greatest return on investment.
- 3. At what point do the benefits break even with the costs?** When there is uncertainty about how effective the investment will be, you may report what effect the policy or program needs to have on outcomes for the benefits to at least equal the costs. This can then be used to gauge the likelihood of attaining a net benefit.
- 4. How does implementation affect the results?** If there is room for improvement in administering the policy or program, there may be an opportunity for better returns on the investment. Evidence-based programs that are not faithful to their program model may yield fewer benefits than anticipated. When a program scales up, CBA results may change.
- 5. Are the results transferable to other jurisdictions?** CBA results from one jurisdiction are often used to inform policy in another. The appropriateness of “importing” results depends on differences in the jurisdictions and the specific programs or policies being studied. When programs in different jurisdictions are similar, it is worth considering CBA results from another location because the effectiveness of the programs may also be similar. But it's also important to consider whether impacts on costs and benefits may differ because of regional cost-of-living differences.

## LOOKING BEYOND THE BOTTOM LINE

Because a CBA measures all benefits and costs in dollar terms, it allows decision makers to compare investments that have different objectives, such as improving literacy, reducing recidivism, or increasing employment. An obvious application of CBA, therefore, is that it can help people decide which programs should receive funding and which should be eliminated. It is important, however, that a CBA's recommendations go beyond simply assessing whether a program merits or does not merit funding. Decision makers consider a host of factors other than costs and benefits when making an investment, such as whether there is a demand for the program and whether there is capacity to implement it. For instance, juvenile probation officials in Allegheny County said that one of the obstacles they face when implementing evidence-based programming is that, given the rigors of implementing with fidelity, a program won't remain cost-effective if an insufficient number of participants complete it.

In addition to a recommendation on whether policymakers should “buy” the investment the CBA examines, make recommendations on how to maximize its cost-effectiveness. Consider the following questions when you develop recommendations:

- › **How can costs be reduced?** Whether the CBA finds there is a net benefit or a net cost, explore the areas where there is potential for cost-savings. For instance, maybe the program is underutilized and the cost per participant would decline if enrollment increases. Or maybe you can suggest options that reduce the investment's cost without sacrificing quality.
- › **How can the benefits be enhanced?** The net benefit or net cost measured by the CBA is a function of the investment's implementation. The recommendations should detail ways to increase the program's benefits. For example, benefits can sometimes be maximized by better targeting the investment. Some populations may have better outcomes from a given program—for instance, with certain interventions, high-risk populations have better outcomes than low-risk populations do. If there is room for improvement in administering the policy or program, there will potentially be better returns on the investment.

*A CBA's recommendations should go beyond simply assessing whether a program merits or does not merit funding.*

# Using CBA to inform policy and practice

Once the CBA results have been completed, a new phase of the work can help ensure that the work makes an impact on policy and practice. Practitioners and policymakers have a wide range of responsibilities and may not have time to keep up with the research. So once the CBA is completed, allot time to disseminate the work through a range of formats to capture the attention of practitioner audiences. Each document should summarize the results, explain concisely what the results mean, and make recommendations about how to improve policy, practice, or both.

## DISSEMINATION

A full-length technical report is typically the foundation of a dissemination strategy. Your document should be detailed enough that others can use it to assess the methods and data. But it is just as important to produce brief documents for a general audience that summarize the results and underscore the key findings and recommendations. These materials should include a 5- to 10-page executive summary, a brief fact sheet, or both.

The summary documents should describe the research in conversational language without omitting important information. When writing for a general audience, express yourself as simply as possible, focus on what readers need to know, and address possible misinterpretations. See *Going Public: Writing About Research in Everyday Language*, published by the U.S. Department of Education, for a guide to reporting research findings to a lay audience.<sup>35</sup>

In addition to using e-mail, websites, and possibly social media and traditional media, you should seek out venues to present the findings in person to practitioners. A good place to start is your CBA's advisory panel (see the section "Before you get started," page 8). This group can share the work with their own networks. Contact membership associations such as the National Association of Counties ([www.naco.org](http://www.naco.org)), the American Correctional Association ([www.aca.org](http://www.aca.org)), and the National Conference on State Legislatures ([www.ncsl.org](http://www.ncsl.org)) to share your work with wider audiences of policymakers and practitioners. These organizations often convene conferences and present webinars designed to connect policymakers and practitioners with the latest research.

*Create a dissemination plan to help ensure that your work makes an impact on policy and practice.*

# Conclusion

Justice analysts are increasingly called upon to produce CBAs to support the growing demand for them by researchers, practitioners, elected and appointed officials, and the public. We hope this guide provides a useful road map for each step of performing a justice CBA. The toolkit provides guidance on best practices, though a few points are worth repeating:

- › Include both the taxpayer and victim perspectives, at a minimum, in an analysis. Discuss any relevant perspectives that are excluded and the reasons for the exclusions.
- › Provide qualitative information about impacts and their monetary values when quantitative information is unavailable or unreliable.
- › Use marginal costs rather than average costs in calculations for analysis of policies that affect incremental government spending.
- › Conduct sensitivity analysis to present a range of possible scenarios.
- › Document thoroughly the assumptions, decisions, sources, data, methods, and calculations that went into conducting the study. Provide enough information to help others evaluate and replicate your work.

Many resources are available to new cost-benefit practitioners. *The Society for Benefit-Cost Analysis* (SBCA) is dedicated to the advancement, exchange of ideas, and research related to cost-benefit analysis and other economic tools. The SBCA hosts an annual conference and edits the *Journal of Benefit-Cost Analysis*, which aims to improve the practice of CBA and encourage its use to promote better public policy.

The number of CBA practitioners in the justice field is growing. For instance, more than a dozen states are developing cost-benefit analyses through the Pew-MacArthur Results First Initiative, which works with states to implement the Washington State Institute for Public Policy cost-benefit model. Also seek out other local cost-benefit analysts. Each site Vera worked with as part of its cost-benefit technical assistance project developed a CBA “users group.” Each one served as a local community of practice for an interdisciplinary group of evaluators, economists, budget officials, and practitioners. The field of justice CBA continues to grow, as do the resources available to provide information, support, and guidance.

# Resources

## GENERAL

Cost-Benefit Knowledge Bank for Criminal Justice (CBKB): [cbkb.org](http://cbkb.org)

District of Columbia Crime Policy Institute: [www.dccrimepolicy.org](http://www.dccrimepolicy.org)

*Journal of Benefit-Cost Analysis*: [www.degruyter.com/view/j/jbca](http://www.degruyter.com/view/j/jbca)

Pew-MacArthur Results First Initiative: [www.pewstates.org/resultsfirst](http://www.pewstates.org/resultsfirst)

Society for Benefit-Cost Analysis: [www.benefitcostanalysis.org](http://www.benefitcostanalysis.org)

Vera Institute of Justice: [www.vera.org/cba](http://www.vera.org/cba)

Washington State Institute for Public Policy: [wsipp.wa.gov](http://wsipp.wa.gov)

## BOOKS

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Circular A-4, "Regulatory Analysis." Washington, DC: U.S. Office of Management and Budget, 2003.

Circular A-4, "Regulatory Impact Analysis: A Primer." Washington, DC: U.S. Office of Management and Budget, 2011.

Circular A-4, "Regulatory Analysis: Frequently Asked Questions (FAQs)." Washington, DC: U.S. Office of Management and Budget, 2011.

Circular A-94, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs." Washington, DC: U.S. Office of Management and Budget, 1994.

# Appendix

## SUMMARY OF CBA CAPACITY-BUILDING TECHNICAL ASSISTANCE

In 2012, the Vera Institute’s Cost-Benefit Analysis Unit (CBAU), through funding from the Bureau of Justice Assistance, issued a competitive application for free technical assistance (TA) to build cost-benefit analysis capacity. (A copy of the application instructions is available at [cbkb.org](http://cbkb.org)<sup>a</sup>). The sites selected were the Allegheny County Criminal Justice Advisory Board, in Pennsylvania; the Denver Crime Prevention and Control Commission; the Kent Police Department, in Washington; the New Mexico Department of Public Safety; the Washington State Department of Corrections; and the York County Criminal Justice Advisory Board, in Pennsylvania.

Every site received training and technical assistance—both on-site and online—about the core components of CBA, such as justice-system marginal costs, program evaluation, and the costs of crime. But the assistance also varied across sites because each had different capacity needs and programs to study.

### ALLEGHENY COUNTY CRIMINAL JUSTICE ADVISORY BOARD, PENNSYLVANIA

Vera’s work with the Criminal Justice Advisory Board (CJAB) first centered on the development of a database of Allegheny County justice-system marginal costs. Analysts at the county Department of Human Services, in collaboration with other CJAB members, began developing this database following a Vera webinar, which was provided to all TA sites. Vera provided feedback on these costs, which the county used to produce cost-benefit analyses of day reporting centers and school-based probation.<sup>b</sup>

In addition, Vera worked with officials in Allegheny County to broaden interest in cost-benefit analysis as a decision-making tool, through on-site presentations to executives from the county manager’s office and several justice agencies. Vera also met with officials from the Department of Budget and Finance to discuss potential ways to integrate CBA into the county’s budget process.

### DENVER CRIME PREVENTION AND CONTROL COMMISSION

The Denver Crime Prevention and Control Commission (CPCC) was the only TA site that had conducted cost-benefit analyses prior to its engagement with Vera. These analyses are produced using an Excel-based tool called the Return on Investment Model, which has been used to calculate the net benefits (principally tangible taxpayer benefits) of several programs the CPCC funds. Vera was asked to help measure the intangible benefits of the city’s justice investments, and to assist with the study of new CPCC investments in the Juvenile Services Center and the city’s Frequent Front-End Users initiative.

As a means to study the intangible benefits of Denver’s justice investments, Vera convened three on-site focus groups to discuss the full array of benefits that result from the CPCC’s programs. There was a focus group of community business leaders, one of law enforcement officials, and one of service providers and advocates. To assist with the study of new CPCC investments, Vera prepared customized webinar trainings about program evaluation and monetizing benefits (such as employment and housing).

### NEW MEXICO DEPARTMENT OF PUBLIC SAFETY

Before working with Vera, the Grants Management Bureau (GMB) of the New Mexico Department of Public Safety (DPS) had mandated that applications for federal Byrne Justice Assistance Grant funding include a cost-benefit analysis to support each request. In 2012 the GMB had implemented statewide CBA trainings for grant applicants and asked Vera to help advance the bureau’s training efforts and provide feedback on the use of CBA results to inform funding decisions.

Vera supported the training efforts by developing customized training materials, such as a “benefits quiz” to help GMB trainers explain how grant recipients should

<sup>a</sup> See [cbkb.org/wp-content/uploads/2012/01/2012-01\\_CBKB\\_CBA\\_TA-application.pdf](http://cbkb.org/wp-content/uploads/2012/01/2012-01_CBKB_CBA_TA-application.pdf).

<sup>b</sup> See [www.alleghenycounty.us/dhs/research-crime-justice.aspx](http://www.alleghenycounty.us/dhs/research-crime-justice.aspx) (accessed November 6, 2014) for these reports.

identify and measure program benefits. To support the bureau's efforts to use CBA results in making funding decisions, Vera convened a meeting with GMB and Craig Prins, executive director of the Oregon Criminal Justice Commission, to facilitate peer-to-peer learning. The commission, like GMB, is a State Administering Agency for Byrne Justice Assistance Grants and has also been using CBA to inform the allocation of grant funding.

### **KENT POLICE DEPARTMENT, WASHINGTON**

The Kent Police Department (KPD) requested assistance from Vera in using cost-benefit analysis to examine intelligence-led policing (ILP) and Kent City Jail cost-control programs.

To analyze ILP, Vera developed a short survey instrument that was sent to crime analysts in neighboring cities to determine when the KPD's peer agencies had hired crime analysts and whether their work affected deployment decisions, as it did in Kent. Survey responses, in conjunction with Uniform Crime Report data, were then used to estimate the impact ILP had on crime reduction in Kent. The preliminary results suggested that ILP reduced burglary and motor vehicle theft.

Vera also provided assistance with the analysis of a life-skills course and work crew program at the Kent City Jail. Vera found that the bed-day savings the work program achieved were substantial enough to support its proposed expansion. For the life-skills course, Vera determined that the program is cost-neutral if it prevents about 17 participants per year from recidivating.

### **WASHINGTON STATE DEPARTMENT OF CORRECTIONS**

Vera worked with the Washington State Department of Corrections (DOC) to apply cost-benefit analysis methods to programs offered through the Sustainability in Prisons Project (SPP). SPP has the potential to generate large, widespread, and long-lasting benefits, but some of these benefits—such as increased inmate generativity (concern for future generations), native species conservation, and habitat

restoration—are difficult to quantify and monetize. DOC leadership is deeply committed to SPP programming and is looking to cost-benefit analysis to produce an evidence base to support funding requests in future budget cycles.

The DOC's work with Vera centered on defining a comprehensive list of SPP's tangible and intangible benefits, including the perspectives of the department and inmates, for two SPP programs: dog training and native prairie-plant restoration. Vera worked with the DOC to develop methods to quantify and monetize these benefits; share this information with and solicit feedback from other stakeholders in Washington State; and assess how this information could be used to help the DOC demonstrate the effectiveness of its new programs, in keeping with the state's evidence-based framework.

### **YORK COUNTY CRIMINAL JUSTICE ADVISORY BOARD, PENNSYLVANIA**

The York County Criminal Justice Advisory Board (CJAB) requested that Vera help apply cost-benefit analysis methods to examine the expansion of the Adult DUI Treatment Court. Vera created a flow chart that outlined the paths of DUI ("driving under the influence") case processing from arrest through adjudication. This aided efforts to catalog the costs, cost offsets, and potential cost-savings associated with DUI court when compared to "business as usual," which typically includes the cost of incarceration in jail, blood testing, treatment, fines, and fees.

Vera analysts also assembled a data set to evaluate the impact of York County's DUI courts. The data included Pennsylvania County demographics from the American Population Survey, DUI traffic fatality data from the National Highway Transportation Safety Administration, and data from the Administrative Office of Pennsylvania Courts on DUI court establishment dates and locations.

Following Vera's preliminary analysis, the CJAB's Evaluation Subcommittee worked to identify a suitable comparison group for a more robust impact evaluation of York County's DUI court; develop a consensus on the appropriate cost-benefit methods; and oversee the evaluation of future CJAB projects.

## ENDNOTES

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## About the Cost-Benefit Knowledge Bank for Criminal Justice

The Cost-Benefit Knowledge Bank for Criminal Justice helps to broaden the knowledge base of practitioners and policymakers about criminal justice cost-benefit analysis, deepen the knowledge and practice in this area, and support practitioners in building their capacity to promote, use, and interpret cost-benefit analysis in criminal justice settings.

## About the Cost-Benefit Analysis Unit

Vera's Cost-Benefit Analysis Unit provides policymakers with clear, accessible information on the economic pros and cons associated with criminal and juvenile justice investments so that they can identify effective, affordable interventions for their jurisdictions and allocate resources accordingly.

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