Budgeting for Results

Technical Appendix

Adult Crime and Juvenile Justice Policy Domains

August 2019

Introduction

This is a technical overview of the Budgeting for Results (BFR) benefit-cost analysis (BCA) within the adult crime and juvenile justice policy domains. In 2011, BFR created the Illinois Performance Reporting System (IPRS) for collecting program performance data. In 2017, BFR began using the Pew MacArthur Results First benefit-cost model to determine the return on investment for state programs[1]. The Results First model is based on the benefit-cost model developed by the Washington State Institute of Public Policy (WSIPP), which was designed to produce benefit-cost analyses on programs for Washington State. The Results First model is generalized to allow BFR to adapt WSIPP program analyses to Illinois by customizing the benefit-cost model with Illinois-specific information on state demographics, government spending and other inputs.

BFR divides Illinois-funded programs by policy domain and desired outcome. The Results First model includes several policy domains. The BFR pilot analysis was on programs in the Adult Crime domain with the desired outcome of reducing recidivism, and subsequent analyses were done in the Juvenile Justice domain. Using the existing IPRS database and information gathered from the Illinois Department of Corrections (DOC) and Department of Juvenile Justice (DJJ), BFR created inventories of such programs. For each program selected for analysis, BFR conducted a literature review of current research on the program in order to match the Illinois program with a program profile in the Results First model. Each profile is based on a meta-analysis of national research on program best practices conducted by WSIPP.

BFR worked with relevant agencies to gather all state costs related to running each program and to determine the marginal program costs per participant. The program costs and effect size, along with monetizable benefits to Illinois, are used to calculate the optimal return on investment (OROI), which is the return on investment that is anticipated when the program is run with fidelity to design and best practices.

Meta-Analysis and Effect Size

For each program identified in a policy domain, BFR collects information on the program and conducts research on similar programs that exist nationally, to determine if the Illinois program can be matched with an existing program profile in the Results First model. A program must have a matching program profile in order to produce a BCA. The program profiles are the result of comprehensive literature reviews performed by WSIPP. WSIPP performs a meta-analysis of studies that have evaluated a program's effect on one or more outcomes. This meta-analysis results in an effect size for each program outcome. The effect size is a single number that quantifies the expected impact of a program on a particular outcome for program participants, as compared to a control group. For example, a program in the adult crime or juvenile justice domains might have an effect size that represents the change in recidivism rate that can be expected for participants in the program as compared to the baseline Illinois recidivism rate.

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[1] The Pew-MacArthur Results First Initiative works with states to implement evidence-based approaches to policy. For more information, visit https://www.pewtrusts.org/en/projects/pew-macarthur-results-first-initiative

More information about WSIPP's meta-analysis and effect size methodologies can be found in the document "Benefit-Cost Technical Documentation" available at
https://www.wsipp.wa.gov/TechnicalDocumentation/WsippBenefitCostTechnicalDocumentation.pdf.
(Washington State Institute for Public Policy 2018).

Outcomes of Interest

Each program has one or more goals or outcomes, which may or may not be currently monetizable in Illinois' Results First model. Analyses in the Adult Crime and Juvenile Justice policy domains all include the outcome of reducing crime, the administering agency's stated goal for their programming. Currently, this is the only monetized outcome in Illinois program assessments in these domains.

The Results First model has the capacity to assess additional outcomes such as illicit drug use disorder or adult literacy that are secondary outcomes in the Adult Crime and Juvenile Justice policy domains. However, BFR has not yet populated the model with the Illinois-specific data necessary to conduct analysis on these additional outcomes. As BFR work progresses into new policy domains, BFR will populate more areas of the Results First model with Illinois-specific data and be able to update existing program assessments with new outcomes.

Future development of the Results First model will also allow for the expansion of program assessments to consider additional outcomes. For example, in the near future it may be possible to evaluate the effect of crime reduction programs on future labor market earnings for program participants.

Linked Outcomes

In addition to outcomes that are directly impacted by the program, some programs have linked outcomes which are influenced by the program's primary outcomes. In the case of reducing recidivism, national research has linked reduced juvenile crime to increased rates of high school graduation. Program profiles that show a positive impact on juvenile crime include an effect size that describes the expected improvement on the high school graduation rate for program participants as compared to the baseline Illinois high school graduation rate.

Monetizing Program Benefits

In order to perform the BCA, it's necessary to monetize the desired outcome or outcomes of a policy domain. The benefits from running a program can then be directly compared to the program's cost. In the Adult Crime and Juvenile Justice policy domains, the monetizable benefits come from reducing recidivism.

The benefits of a government program can be apportioned to the stakeholders who benefit. In BFR reports, program benefits are divided into four categories: direct benefits to program participants, direct benefits to taxpayers through reduced government spending, direct benefits to other members of society and indirect benefits to society through the reduced deadweight cost of taxation. Benefits to

taxpayers are of particular interest to state policymakers who must make difficult decisions about how to allocate government resources.

The Benefits of Reducing Crime

Benefits to Taxpayers

As discussed above, the primary outcome of interest for the Adult Crime and Juvenile Justice policy domains is reducing recidivism. The benefits to taxpayers from reducing recidivism come in the form of reduced use of state, county and local criminal justice resources.

In estimating the benefits of reducing adult recidivism, BFR has been aided by work done by the Illinois Sentencing Policy Advisory Council (SPAC). Detailed information on this work can be found in the report "Illinois Results First: The High Cost of Recidivism 2018 Report", and in its accompanying technical supplement, both of which are available at http://www.icjia.state.il.us/spac/index.cfm?metasection=publications.

To estimate the decreased use of criminal justice resources that result from a reduction in recidivism, SPAC first analyzed how different types of crime contribute to Illinois' total recidivism rate. Different types of crime have different impacts on victims and on state resources. Table 1 below depicts the types of crimes committed by adults who were released from prison or sentenced to probation in 2007, and were convicted of another crime within nine years (55.9% of adults recidivate within nine years). Table 1 similarly depicts the types of crimes committed by juveniles who were released from DJJ custody or sentenced to community supervision in 2009 and adjudicated for another offense within nine years (80.6% of juveniles recidivate within nine years):

Table 1: Likelihood of most serious recidivism offense

Type of Crime	Murder	Felony Sex Crimes	Robbery	Aggravated Assault or Battery	Felony Property	Felony Drug and Other	Misdemeanors
Adult Crime	0.3%	0.4%	1.8%	5.4%	20.8%	32.5%	38.9%
Juvenile Offense	0.4%	0.7%	6.2%	6.9%	18%	29.2%	38.6%

Source: Adult Crime: Illinois Sentencing Policy Advisory Council (Steinfeld, Powers, and Saltmarsh 2018), Table 3.a.1. Juvenile Offense: GOMB/SPAC internal analysis.

The SPAC model also accounts for recidivism events (one readmission to the criminal justice system) resulting in multiple convictions for different crime types.

Tables 2 and 3 depict estimated criminal justice system marginal operating costs per recidivism event for the adult and juvenile justice systems. Costs were provided by SPAC in conjunction with the Illinois Criminal Justice Information Authority (ICJIA). Police, court and prosecutor costs are primarily derived from marginal cost estimates done by WSIPP, with adjustments for salary and budget differences between Washington State and Illinois. Most costs are similar across types of crime, and the overall average marginal cost is used. In the case of courts and legal costs, separate marginal cost estimates are provided for the different types of violent felony cases.

SPAC uses a dynamic marginal cost model to address the challenge that criminal justice spending does not always change in direct proportion to the number of prisoners or people on probation. Some costs such as food may be truly marginal, while others such as staff or facilities may change only with large changes in the population served. For more information, see the SPAC document "Dynamic Marginal Costs in Fiscal Impact Analyses" at http://www.icjia.state.il.us/spac/pdf/Dynamic_Marginal_Costs.pdf. The costs displayed in Tables 2 and 3 are the average dynamic marginal costs for incarceration changes of up to 10,000 people.

When benefits to taxpayers are calculated for a particular program, the dynamic marginal costs of changes in system use are calculated based on the expected annual program participation and the associated change in recidivism. For per-year costs such as prison, the benefit-cost model takes into account that different types of crime are associated with a longer duration of resource usage on average. For example, average prison terms range from 1.2 years for felony drug convictions to 36.5 years for murder.

All cost information is adjusted to current dollars using the Implicit Price Deflator for Personal Consumption Expenditures, calculated by the Bureau of Economic Analysis. When the Adult Crime and Juvenile Justice policy domains were populated, 2017 was the latest year available for this price index.

Table 2: Adult criminal justice system marginal operating costs (2017 dollars)

	Murder	Felony Sex Crimes	Robbery	Agg. Assault or Battery	Felony Property	Felony Drug and Other	Misdemeanors
Police Costs per Arrest	$1005						
Courts and Legal Costs per Arrest	$202,562	$24,952	$13,114	$6,484	$267		
Adult Jail per Person per Year	$15,523						
Adult Probation per Person per Year	n/a[2]	$1,861					
Adult Prison per Person per Year	$28,762						n/a[2]
Adult Post-Prison Supervision per Person per Year	$2,924						n/a[2]

Source: Illinois Sentencing Policy Advisory Council (Steinfeld, Powers, and Saltmarsh 2018), Table 4.a.1, with figures adjusted to 2017 dollars using the BEA's implicit price deflator for personal consumption expenditures.

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[2] Probation sentences for murder are very rare. Misdemeanors cannot result in prison sentences, although they can result in sentences to county jail of up to one year.

Table 3: Juvenile justice system marginal operating costs (2017 dollars)

Resource Type	Cost per Person per Year
Local Detention	$24,246
Local Supervision	$4,000
State Institution	$44,398
Post-Release Supervision	$5,000

Source: GOMB/SPAC internal analysis.

Benefits to Society

In addition to returning benefits to the taxpayer, government programs usually also aim to create some benefit for society at large. In the case of programs that aim to reduce recidivism, these benefits come in the form of reduced harm to victims of crime.

An important element of monetizing crime victimization is accounting for unreported crime. Crime that is not reported to law enforcement does not impose costs on the criminal justice system, but it can still have victimization costs. The SPAC cost of crime model uses the National Crime Victimization Survey to estimate the number of actual victimizations per reported crime. This accounts for crimes that are not reported and for crimes that can have multiple victims.

Victimization costs by type of crime are estimated based on national economic research. They are divided into tangible and intangible costs. Tangible victimization costs include the value of stolen or damaged property, medical expenses and lost earnings due to injury or other consequences. Intangible costs are the pain, suffering or death resulting from being a crime victim. Intangible cost estimates are not meant to place a literal dollar value on the cost of a specific life or of individual suffering, but are statistical values based on actual jury awards and settlements in wrongful death suits.

Not all crimes have identifiable victims. The model does not include victimization costs for misdemeanors (a very broad category of crimes) or for "crimes against society" such as drug crimes. Table 4 below displays tangible and intangible victimization cost estimates by type of crime.

Table 4: Victimization Costs (2017 dollars)

	Murder	Felony Sex Crimes	Robbery	Agg. Assault or Battery	Felony Property	Felony Drug and Other	Misdemeanors
Tangible	$639,090	$5,342	$6,699	$13,536	$2,282	$0	$0
Intangible	$7,315,354	$190,604	$1,010	$20,904	$0	$0	$0
Total	$7,954,444	$195,946	$7,709	$34,440	$2,282	$0	$0

Source: (Illinois Sentencing Policy Advisory Council 2018), Table C, with figures adjusted to 2017 dollars using the BEA's implicit price deflator for personal consumption expenditures.

The Benefits of Increased High School Graduation

As previously stated, the benefit-cost model links a reduction in juvenile crime among program participants to a higher high school graduation rate for participants, as compared to the baseline high school graduation rate in Illinois. These benefits accrue to program participants, taxpayers, and society at large.

Benefits to Program Participants

Increased educational attainment affects program participants in several ways. First, youth who graduate from high school are expected to have higher earnings over the course of their adult lives. Second, high school graduates have different healthcare costs and different distributions of who is paying for their healthcare compared to non-graduates. High school graduates tend to be healthier overall, while relying less on taxpayer-funded healthcare resources. High school graduates are also more likely to have insurance or pay out of pocket for medical expenses. For this reason, an increase in the probability of high school graduation for program participants results in a cost to participants from increased healthcare spending, which is subtracted from the benefits participants gain from higher earnings.

Benefits to Taxpayers

The increased earnings for program participants due to increased high school graduation also results in a benefit to taxpayers, through taxation of those earnings. Taxpayers also benefit from participants' decreased reliance on public healthcare systems.

Benefits to Society

Increased high school graduation for program participants results in benefits to society in two ways. First, there is a general economic benefit from having a more educated workforce with higher labor productivity. Second, there are societal benefits through the employer-paid health insurance market due to better health outcomes for high school graduates.

Indirect Benefits – Deadweight Cost of Taxation

When the government imposes taxes to pay for programs, those dollars are removed from the private sector economy. This can create inefficiencies, such that government spending "costs" more than the total dollars spent. This concept is known as the deadweight cost of taxation. There is a high level of debate around the appropriate value of deadweight cost. To account for this and other types of variability, BFR uses a Monte Carlo simulation to vary the value of deadweight cost and other inputs in calculating expected benefits and costs (see below). In the case of deadweight cost, the simulation samples a deadweight cost value from a triangular probability density distribution, using low, modal and high values of 0%, 50% and 100%, respectively. On average, if one taxpayer dollar is spent, there will be an additional deadweight cost of $0.50.

The deadweight cost of taxation is applied both to the program costs and to the benefits of reduced government spending as a result of the program. The deadweight cost of running the program is subtracted from the avoided deadweight cost produced by the program benefits, and the net amount is added to the total program benefits. Deadweight cost is not calculated for increased tax dollars obtained through increased earnings outcomes.

Net Present Value

When comparing the benefits and costs of a program, it is important to consider that the program costs usually occur immediately or over a few years, while the program benefits can extend many years into the future. The BCA model calculates program benefits up to 50 years after program participation. Because society generally values a dollar today more than a dollar in the future, the BCA model includes a discount rate that is applied to costs and benefits that occur in future years. The modal discount rate used is 3.5%. In the Monte Carlo simulation, discount rates are drawn from a triangular distribution between 2%, 3.5%, and 5%. The social discount rate can vary in different circumstances, and there is some debate about the correct rate. This range of values is consistent with rates used by federal government agencies and scholarly experts.

Optimal Return on Investment

The benefit-cost analyses compare program benefits to program costs in order to calculate what BFR has coined the program's Optimal Return on Investment (OROI). This is the ratio of program benefits to program costs, and represents the dollar value of benefits that can be expected for each dollar spent on the program. An OROI of greater than $1.00 indicates that the program's expected benefits exceed its costs. The inclusion of the word "optimal" in the OROI is meant to emphasize that while the BCA incorporates Illinois-specific data as much as possible, the program's effect size is based on national research and implementation with fidelity. Therefore, the OROI represents the return on investment Illinois can expect if the program is implemented according to best practices as established by the research. BFR conducts a qualitative program assessment, the SPART, to accompany each program's BCA. The SPART is intended to provide insight into how a program has been designed and implemented in Illinois, and to make recommendations for further evaluation and improvement.

Risk Assessment – Monte Carlo Simulation

As stated above, the BCA model has many inputs which are estimated with varying degrees of uncertainty. To quantify the uncertainty of the BCA inputs and program effect size used in calculating the OROI, BFR runs a Monte Carlo simulation for each program. The BCA is run 10,000 times with inputs randomly sampled from probability distributions around their expected value. Table 5 below describes which inputs BFR varies in the Monte Carlo simulation, and the distributions from which they are sampled.

Table 5: Input variation in Monte Carlo

Model Input	Sampling Distribution
Program effect size	Normal; based on random-effects standard error produced by meta-analysis
Program costs	Triangular; variance is determined at the program level based on BFR and agency assessment of the degree of uncertainty of program marginal cost estimate
Crime victimization costs	Triangular; variance +/- 0.1
Criminal justice system costs	Triangular; variance +/- 0.1
Criminal victimizations per conviction	Triangular; variance +/- 0.2
Deadweight cost of taxation	Triangular; low = 0%, modal = 50%, high = 100%
Discount rate	Triangular; low = 2%, modal = 3.5%, high = 5%

Source: Washington State Institute of Public Policy.

In addition to expected program costs, benefits and OROI, BFR also reports the percent likelihood that program benefits will exceed costs based on the Monte Carlo simulation.

This technical appendix was produced by BFR for assessments in the Adult Crime and Juvenile Justice policy domains. Additional technical documents will be released along with the corresponding policy domain assessments. For further information, visit www.budget.illinois.gov.

References

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