Predicting the Benefits (and Costs) of Anti-Poverty Policies

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Outline

- Why should we care about costs and benefits?
- What is cost-benefit analysis (CBA)?
- How does CBA differ from fiscal analysis?
- What are the essential elements of CBA?
- How can CBA be applied to poverty interventions?
Why should we care about the costs and benefits of anti-poverty policies?

- Make best use of available anti-poverty resources
- Potentially expand resources by identifying less direct benefits
  - Avoided budgetary costs in other programmatic areas (criminal justice, health)
  - Politically relevant avoided social costs (reductions in crime and child abuse)
  - Politically relevant economic benefits (increases in productivity)
What is cost-benefit analysis (CBA)?

- CBA is a protocol for systematically assessing alternative public policies in terms of their efficiency
  - Assess efficiency in terms of net benefits
  - Choose policies that would maximize net benefits

- CBA is comprehensive
  - It seeks to include all valued impacts
  - It gives “standing” to everyone in society

- CBA is prospective
  - What net benefits would result if a policy were adopted (including continuation or replication of existing program)?
Conceptual Foundations

- **Willingness to pay**
  - Policy impacts are valued in terms of individuals’ willingness to pay to obtain or to avoid them.
  - Benefits are the algebraic sum of these willingness-to-pay amounts.

- **Opportunity cost**
  - What is the value of real resources (labor, etc.) in their next best uses?
  - Costs are the algebraic sum of the opportunity costs of the resources needed to implement the policy.
How does CBA differ from fiscal analysis?

- Fiscal analysis includes only changes in government revenues and expenditures
  - Bottom line like that of private organization
  - Often not comprehensive across government units

- CBA includes all impacts valued by people with standing
  - Net revenues may be larger, smaller, or the same as social benefits
Differences between fiscal and social costs and benefits

- Expenditures may not equal opportunity costs
  - Distorted markets (monopoly rents, price changes)
  - Owned goods (administrative pricing of space)
  - Transfers to people (social benefit and social cost)

- Opportunity cost of tax revenue greater than revenue
  - Dollar of expenditure funded by taxes has social cost of \((1+\text{METB})\), where METB is the marginal excess tax burden
  - Net social cost of transfer of $T is not 0 or $T but $T*\text{METB}
    
    \[
    \text{social benefit} = \text{T}, \quad \text{social cost} = \text{T}(1+\text{METB})
    \]
  - Estimates of METB for property tax: 10 to 20 percent
What are the essential elements of CBA?

- Identify all relevant impacts
- Monetize all impacts with appropriate prices
  - Sometimes market prices
  - More often “shadow prices” that take account of distortions, especially missing markets
- Discount for time
- Take account of uncertainty
- Report net benefits
Identify Impacts (Comprehensively!)

- Measure impacts relative to current policy
- Real resources used (case worker and client time; materials; space)
- Primary impacts from evaluation (reductions in child abuse, unemployment, substance abuse, crime; improved health, better educational outcomes)
- Secondary impacts
  - Student achievement -> increased probability of HS graduation, reduced delinquency and criminality, higher earnings, etc.
Monetize Impacts

- Various approaches to inferring willingness to pay and opportunity cost (the focus of courses in CBA)
  - Revealed preferences
  - Stated preferences
- Missing markets---shadow prices from research (value of a high school degree)
Shadow Prices

- Direct valuation
  - Social cost of a crime: harm to victim (tangible and intangible) and criminal justice system costs (fear of crime?)
  - Productivity gain from high school completion: present value of increased earnings over working life

- Vertical linkage
  - Student achievement -> productivity gain
  - Reductions in child abuse -> reductions in delinquency -> reduction in adult crime

- Horizontal linkage
  - Higher productivity -> reductions in crime & improved fertility choice
Vertical linkage: Washington State Institute for Public Policy child abuse CBAs

- WSIPP did meta analysis to estimate impact of intervention programs on child abuse
- WSIPP did meta analysis of studies linking child abuse to reductions in probability of high school graduation (and other effects)
- Product of these impacts gives the predicted effect of the program on high school graduation
- The present value of increased earnings from high school degree, $175,000, was used as a shadow price for the predicted number of additional graduations resulting from the program
Horizontal linkage: shadow price to convert narrow, but readily measured, outcome to social benefit

- Example: Haveman and Wolfe (1984) household utility approach
  - Estimate non-labor market benefits of schooling (reductions in crime, efficiency of consumption)
  - Rule-of-thumb: non-labor market gains approximately equal to labor market gains

- Wolfe and Haveman (2001)
  - Additional affects: for example, fertility choices of daughters
How can CBA be applied to anti-poverty interventions?

- Identify all impacts
- Monetize using shadow prices
- Take account of uncertainty with Monte Carlo Simulation
Example: Social benefits of increased student achievement

- Measure impact of intervention on student achievement
- Relate achievement to productivity gains
- Monetize benefits to student using present value of increase in earnings due to productivity gain
- Monetize benefits external to student using Wolfe & Haveman rule-of-thumb that these benefits are equal to private earnings
Give me some numbers! OK

- Hanushek (2004) literature review: one-standard deviation increase in mathematics performance at the end of high school increases annual earnings by 12 percent
- WSIPP meta-analysis estimate of annual decay in gain through completion of high school: 8 percent
- WSIPP uses Current Population Survey data to estimate earnings for those with attainment from 9th grade to some college
  - Age 18 to 65
  - Scale up using a fringe benefit rate of .423
  - Assumes average annual real rate of gain in earnings of .013
Estimating productivity benefit of a one-time increase of $\alpha$ standard deviations in test score in, say grade 5

- Using decay rate, project standard deviation increase at graduation
  - $\alpha_{HS} = \alpha / (1 + .08)^{(12-5)} = \alpha / (1 + .08)^7$
  - Annual productivity gain = .12 $\alpha_{HS}$

- Project annual average earnings (taking account of non-workers and productivity growth) in year $i$: $\text{earn}_i$
- Convert to full wage using fringe rate of .423: $\text{EARN}_i = (1 + .423)\text{earn}_i$
Calculate annual productivity gain:

\[ \Delta \text{EARN}_i = .12 \alpha_{\text{HS} \text{EARN}}_i \]

Following Haveman and Wolfe assume external benefits equal productivity gains to get annual social benefits:

\[ \text{SocBen}_i = 2\Delta \text{EARN}_i \]
Calculate the present value of benefits using a social discount rate of d:

\[ \text{PVSocBen} = \sum \frac{\text{SocBen}_i}{(1+d)^{(i\text{-age at grade 5})}} \]

where \( \Sigma \) means sum from \( i=18 \) to \( i=65 \)
Implementing this Procedure

- Use WSIPP average earnings and fringe benefit figures (Aos et al. 2007, 22)
- Convert to current year dollars using the CPI calculator at [http://www.bls.gov/data/inflation_calculator.htm](http://www.bls.gov/data/inflation_calculator.htm)
- Use the $\alpha$ from your evaluation!
Some Issues Relevant to Costs

- Starting point: changes in wages and fringe benefits are program cost

- Possible complications:
  - Some rent? (then transfers so METB times rent, rather than rent, the opportunity cost)
  - Induced turnover? (then take account of costs of replacement)
Taking account of uncertainty

- Sensitivity analysis: systematically vary assumptions
- Better approach: Monte Carlo simulation
  - Assume distributions for all uncertain parameters
  - Calculate net benefits with random draws of all uncertain parameters
  - Repeat process to generate many estimates of net benefits
  - Display and analyze distribution of net benefits
Conclusion

- CBA takes some intellectual courage in moving from your estimates of impacts to social net benefits---be brave!

- Use WSIPP analyses as models
  - High quality analyses
  - Results have influenced state legislature
References


