COST-BENEFIT ANALYSIS *AND* WELL-BEING ANALYSIS?

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INTRODUCTION

Under Executive Order 12,866,[1] as supplemented by Executive Order 13,563,[2] federal agencies are required to prospectively assess the costs and benefits of significant regulations, and also to assess the costs and benefits of alternatives if the annual impacts of the regulations are expected to be equal to or greater than $100 million.[3] These analytic requirements can be traced back to the Ford administration, which used cost-benefit analysis (CBA) to determine whether major regulations would have inflationary impacts.[4] More generally, the roots of such analyses can be traced back to the 1800s, when economists began developing the foundations of welfare economics that underlie the practice of CBA today.

In recent years, some psychologists and economists have become increasingly interested in how individuals rate their own happiness or life satisfaction—often referred to as subjective well-being. In their provocative article, John Bronsteen, Christopher Buccafusco, and Jonathan Masur criticize the conduct of CBA, focusing on the approaches used to value outcomes such as increased prices, unemployment, and reduced mortality risks.[5] They argue that well-

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1. Exec. Order No. 12,866, 3 C.F.R. 638 (1993), *reprinted as amended in* 5 U.S.C. § 601 note at 745 (2006), *and* 5 U.S.C. § 601 note at 126 (Supp. V 2012).

2. Exec. Order No. 13,563, 3 C.F.R. 215 (2012).

3. *Id.*; Exec. Order No. 12,866, 3 C.F.R. 638. Implementing guidance is provided in OFFICE OF MGMT. & BUDGET, EXEC. OFFICE OF THE PRESIDENT, CIRCULAR NO. A-4, REGULATORY ANALYSIS (2003), *available at* http://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a004/a-4.pdf.

4. OFFICE OF INFO. & REGULATORY AFFAIRS, OFFICE OF MGMT. & BUDGET, EXEC. OFFICE OF THE PRESIDENT, REPORT TO CONGRESS ON THE COSTS AND BENEFITS OF FEDERAL REGULATIONS 10–11 (1997).

5. *See generally* John Bronsteen, Christopher Buccafusco & Jonathan S. Masur, *Well-Being Analysis vs. Cost-Benefit Analysis*, 62 DUKE L.J. 1603 (2013).

being analysis (WBA) would effectively address their criticisms by replacing the monetary measures of value used in CBA with well-being units.[6] As a counterpoint, Matthew Adler explores the research on subjective well-being in detail.[7] He concludes that the use of well-being data in policy evaluation is premature, given the need to clarify how well-being should be defined as well as the need to improve how it is measured.[8]

Framing this discussion as "WBA versus CBA" seems far too narrow, however. CBA and WBA aim to provide different types of information, both of which are likely to be of interest to decisionmakers. CBA is not, and should not be, the sole basis for decisionmaking. Rather, it answers a particular question: How can we best allocate scarce resources, given our understanding of individuals' preferences? In CBA, preferences are measured by individuals' willingness to trade money (which represents the ability to purchase other goods and services) for the benefits provided by a particular regulation. WBA asks a somewhat different question: How can we best allocate these resources, given our understanding of individuals' subjective well-being? In this case, well-being is measured by how individuals rate the happiness or life satisfaction associated with various states of being, such as income level or degree of health impairment. Those involved in the policymaking process have diverse interests and goals, and are likely to find these—as well as other types of analysis—useful.

CBA's longevity—and the substantial resources devoted to its development and implementation—suggests that policymakers find that it aids them in making difficult choices. CBA is not the only type of analysis used to inform regulatory decisionmaking, however. Government-wide guidelines instruct agencies to also prepare cost-effectiveness analyses.[9] These analyses involve dividing regulatory

6. *Id.* at 1617–18.

7. *See generally* Matthew D. Adler, *Happiness Surveys and Public Policy: What's the Use?*, 62 DUKE L.J. 1509 (2013).

8. *Id.* at 1599.

9. *See, e.g.*, OFFICE OF MGMT. & BUDGET, *supra* note 3, at 9 ("Both benefit-cost analysis (BCA) and cost-effectiveness analysis (CEA) provide a systematic framework for identifying and evaluating the likely outcomes of alternative regulatory choices. A major rulemaking should be supported by both types of analysis wherever possible. Specifically, you should prepare a CEA for all major rulemakings for which the primary benefits are improved public health and safety to the extent that a valid effectiveness measure can be developed to represent expected health and safety outcomes. You should also perform a BCA for major health and

costs by an effect measure—such as tons of pollution averted, number of lives extended, or quality-adjusted life years (QALYs) gained—to estimate the cost per unit of benefit.[10] Agencies also often use break-even analysis to determine how large nonquantified benefits would need to be to equal the costs of the rule.[11] Both types of analyses are designed in part to address the difficulties inherent in estimating diverse regulatory impacts and in determining their dollar value, and in part to provide differing types of information.

In this Commentary, I begin with some background information on the conduct of regulatory CBA and its role in decisionmaking to provide context for what follows. I then discuss how CBA deals with selected issues that have implications for the further development of WBA. I conclude that WBA could be a useful supplement to CBA, but that more work is needed to determine how it can be best implemented.

I. COST-BENEFIT ANALYSIS IN THE REGULATORY REALM

In the United States, the starting point for regulatory CBA is often an authorizing statute that requires an agency to take action to address a particular problem or set of problems. The statute typically defines the goals of such action and establishes some constraints on what action may be undertaken.[12] After the agency identifies the options to be assessed, it estimates baseline conditions in the absence of intervention and likely responses to each option. Both are predictive exercises: most regulations are not implemented immediately, and many years may elapse before the regulations' effects are fully felt. As a result, baseline conditions and the effects of each option may change over the time period considered. Economic theory, combined with scientific evidence, provides the foundation for

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safety rulemakings to the extent that valid monetary values can be assigned to the primary expected health and safety outcomes.").

10. For more information on the use of this approach in regulatory analysis, see generally INST. OF MED. OF THE NAT'L ACADS., VALUING HEALTH FOR REGULATORY COST-EFFECTIVENESS ANALYSIS (Wilhelmine Miller, Lisa A. Robinson & Robert S. Lawrence eds., 2006).

11. OFFICE OF MGMT. & BUDGET, *supra* note 3, at 2 ("If the non-quantified benefits and costs are likely to be important, you should carry out a 'threshold' analysis to evaluate their significance. Threshold or 'break-even' analysis answers the question, 'How small could the value of the non-quantified benefits be (or how large would the value of the non-quantified costs need to be) before the rule would yield zero net benefits?'").

12. The authorizing statute may also circumscribe the extent to which CBA may be used in setting regulatory requirements.

these predictions and valuations, allowing analysts to build on many decades of research in explaining and forecasting behavior.

Although the effects of the regulatory options are typically divided into costs and benefits, there is no principled distinction: decreased benefits can be categorized as costs, and decreased costs can be categorized as benefits. Often (but not always), regulatory analysts use the term "costs" to refer to the reallocation of real resources associated with regulatory compliance, including direct compliance expenditures, any offsetting savings, and resulting impacts on market supply and demand. Consistent with economic theory, the value of a real resource is determined by its opportunity cost—its value in its best or most beneficial use. Thus the cost of a regulation is estimated based on the net opportunity cost of forgone goods and services that result when regulatory compliance reallocates resources away from what would otherwise be produced and consumed.[13]

These costs usually can be estimated using market data.[14] For example, for an air-pollution regulation that addresses industrial emissions, the U.S. Environmental Protection Agency (EPA) would collect data on the types of technology and process changes that the industry could implement to meet the requirements, and would then predict which options would be implemented by firms with various characteristics and estimate the total costs that result. The EPA would also consider the effects of compliance costs on supply and demand conditions in the regulated industry, as well as the effects on markets for related goods and services.[15]

The term "benefits" is generally (but again, not universally) used to refer to the purpose for which such resource reallocation is required—that is, the statutory or other goals that the regulation is intended to achieve. For regulations subject to the executive-order analytic requirements, these goals often include decreasing risks to

13. In this context, market rates are used to discount future impacts to reflect the opportunity costs of diverting resources from other uses over time. *See* OFFICE OF MGMT. & BUDGET, *supra* note 3, at 31–35; U.S. ENVTL. PROT. AGENCY, EPA 240-R-10-001, GUIDELINES FOR PREPARING ECONOMIC ANALYSIS 6-1 to 6-20 (2010), *available at* http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-50.pdf/$file/EE-0568-50.pdf.

14. For more information on how both costs and benefits are estimated in regulatory analysis, see OFFICE OF MGMT. & BUDGET, *supra* note 3, at 14–42; and U.S. ENVTL. PROT. AGENCY, *supra* note 13, at 5-1 to 8-26.

15. The analyses of costs and benefits generally include both qualitative discussion and quantitative assessment of uncertainty. For related requirements, see OFFICE OF INFO. & REGULATORY AFFAIRS, *supra* note 4, at 38–42, and U.S. ENVTL. PROT. AGENCY, *supra* note 13, at 5-1 to 8-26.

human health (or safety) and longevity as well as to the environment.[16]

For outcomes such as decreased health and environmental risks, valuation is more difficult because these risk reductions are not normally bought and sold in the marketplace. Thus, nonmarket methods must be used to estimate individual willingness to pay (WTP) or individual willingness to accept compensation (WTA).[17] For a beneficial outcome, such as decreased health risks, WTP represents the maximum amount of money an individual would voluntarily exchange to obtain the improvement, given his or her budget constraints, whereas WTA is the smallest amount an individual would accept to forego the improvement. In either case, consistent with the concept of opportunity cost, money is used to indicate the amount of other goods and services an individual would willingly trade to obtain or forgo the improvement. Regulatory analysts often rely on WTP rather than WTA estimates, both because WTP studies often dominate the relevant valuation literature and because regulatory analyses typically address improvements from the status quo rather than compensation for forgoing an improvement.[18]

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16. Air-pollution regulations issued by the EPA dominate the set of regulations that are subject to the executive-order analytic requirements, both in terms of the number of regulations and the magnitude of their impacts. *See, e.g.*, OFFICE OF INFO. & REGULATORY AFFAIRS, OFFICE OF MGMT. & BUDGET, EXEC. OFFICE OF THE PRESIDENT, DRAFT 2012 REPORT TO CONGRESS ON THE BENEFITS AND COSTS OF FEDERAL REGULATIONS AND UNFUNDED MANDATES ON STATE, LOCAL, AND TRIBAL ENTITIES 13–14 tbl.1-2 (2012), *available at* http://www.whitehouse.gov/sites/default/files/omb/oira/draft_2012_cost_benefit_report.pdf.

17. The concepts of compensating and equivalent variation (or compensating and equivalent surplus for public goods) underlie the use of WTP and WTA. *See* A. MYRICK FREEMAN III, THE MEASUREMENT OF ENVIRONMENTAL AND RESOURCE VALUES 43–94 (2D ED. 2003) (reviewing the basic theory of defining and measuring welfare changes). Compensating variation refers to the payment that would make the individual indifferent between choosing the original situation and a change; equivalent variation refers to the change in income that would lead to the same change in utility as the change in price. The two measures differ in their starting points: for a beneficial outcome, compensating variation references the level of utility without the improvement, whereas equivalent variation references the level with the improvement. *Id.* Although there is some dispute over the meaning of utility in this context, conventionally it is generally understood as a sense of satisfaction associated with the consumption of goods and services—where goods include tangible items and services include intangibles.

18. For more discussion of the theoretical and empirical differences between WTP and WTA, see Lisa A. Robinson & James K. Hammitt, *Behavioral Economics and Regulatory Analysis*, 31 RISK ANALYSIS 1408, 1412–14 (2011) [hereinafter Robinson & Hammitt, *Behavioral Economics and Regulatory Analysis*]; and Lisa A. Robinson & James K. Hammitt, *Behavioral Economics and the Conduct of Benefit-Cost Analysis: Towards Principles and*

Nonmarket valuation methods include stated- and revealed-preference studies. Stated-preference studies typically employ survey techniques to ask respondents about their WTP for the outcome of concern. They include contingent valuation surveys, which elicit WTP for the scenario(s) described in the survey. They also include choice experiments (or conjoint analyses), which present respondents with several scenarios involving outcomes with differing attributes and prices. Estimates of WTP are derived from the way in which respondents rank, rate, or construct equivalent sets of alternatives. Stated-preference methods are attractive because researchers can tailor them to directly value the outcome(s) of concern; that is, the survey can describe the specific health or environmental risks associated with the hazards addressed by a regulation as well as the characteristics of those affected. A key concern, however, is that respondents may have little incentive to respond accurately because the payment is hypothetical. Conducting a study that is likely to yield reasonably accurate and reliable results requires careful design and implementation, following best-practice recommendations developed through many years of methodological experimentation.[19]

Revealed-preference methods consider observed behaviors or prices and preferences for related market goods.[20] For example, wage-risk (or hedonic-wage) studies examine the change in compensation associated with jobs that involve differing risks of fatal or nonfatal injury, using statistical methods to separate the effects of these risks from the effects of other job and personal characteristics.[21] Although this indirect use of market data has the advantage of relying on actual transactions, it is often difficult to find a market good that can be used to value particular regulatory outcomes. In addition, care must be taken to effectively control for the other variables that affect wages or

Standards, 2 J. BENEFIT-COST ANALYSIS, Apr. 2011, at 1, 9–18 [hereinafter Robinson & Hammitt, *Behavioral Economics and the Conduct of Benefit-Cost Analysis*].

19. Sources of recent best-practice guidance are numerous. *See, e.g.*, IAN J. BATEMAN ET AL., ECONOMIC VALUATION WITH STATED PREFERENCE TECHNIQUES: A MANUAL (2002); HANDBOOK ON CONTINGENT VALUATION (Anna Alberini & James R. Kahn eds., 2006).

20. The term "revealed preferences" is used to describe market behavior as well as these nonmarket valuation methods.

21. Such studies typically compare wages and risks across a cross section of individuals at a particular point in time, although more longitudinal studies are now emerging. For an example of a cross-sectional study, see W. Kip Viscusi, *The Value of Life: Estimates with Risks by Occupation and Industry*, 42 ECON. INQUIRY 29 (2004). For an example of a longitudinal study, see Thomas J. Kniesner, W. Kip Viscusi, Christopher Woock & James P. Ziliak, *The Value of a Statistical Life: Evidence from Panel Data*, 94 REV. ECON. & STAT. 74 (2012).

market prices. Because both methods have advantages and limitations, the choice often depends on the characteristics of the outcome being valued (for example, whether it can be modeled as an attribute of a market good in a revealed-preference study), as well as on the availability of well-conducted studies.[22]

Ideally, the values used in regulatory analysis would reflect the characteristics of those affected as well as the characteristics of the regulatory outcomes, given that preferences for exchanging money for various market and nonmarket goods and services are likely to vary depending on these characteristics. In reality, these analyses generally rely on population-average values. In other words, the same values are used regardless of whether a regulation disproportionally affects the wealthy or the poor, or the young or the old. This practice results in part from gaps in the research literature, but it also reflects concerns about the distribution of the impacts.[23] For example, EPA's use of lower values for older individuals when conducting sensitivity analysis of the value of mortality risk reductions led to a significant outcry, suggesting that many view the use of averages as more fair or equitable than the use of values that vary depending on population characteristics. Whether the use of average values is in fact fair depends on how fairness is defined: averages may not reflect the preferences of those affected by the allocation of available resources.

Otherwise, regulatory analyses generally consider distributional effects (who gains and who loses) separately from economic efficiency (the net national benefits of the regulation). The standard rationale for this distinction is that the tax and income-support system can achieve redistributional goals more efficiently than a regulation that is primarily designed for other purposes. For example, if an environmental regulation makes the wealthy wealthier and the poor poorer, the tax and income-support system can be designed to take away the gains and redistribute the funds to the losers. Money

22. Typically, regulatory analysts rely on existing valuation studies given the substantial time and expense associated with conducting new primary research. This benefit-transfer approach requires careful review of the literature to identify high-quality studies that address an outcome sufficiently similar to the outcome of the regulation. Most regulatory analyses value various outcomes (for example, morbidity risks, mortality risks, or ecological risks) separately. They then aggregate the results (taking care to avoid double counting) using a damage-function approach because relatively few primary-research studies yield values that account for all of the effects of an individual regulation (for example, all of the impacts associated with less polluted air). *See* U.S. ENVTL. PROT. AGENCY, *supra* note 13, at 7-51 to 7-57.

23. Lisa A. Robinson, *How U.S. Government Agencies Value Mortality Risk Reductions*, 1 REV. ENVTL. ECON. & POL'Y, 283, 295 (2007).

transfers can be targeted on the outcome (income) and the population of concern (the poor), while other types of policies typically provide more heterogeneous benefits (such as reductions in air pollution-related health and ecological risks) to more heterogeneous populations (both rich and poor individuals living in areas with high air pollution).

Regardless of whether one accepts this rationale, policymakers are interested in information on regulations' distributional effects. Agencies are required to report such information under the guidelines for regulatory analysis—as well as under other statutes and executive orders—and may be required to alter the regulation if certain groups (for example, children, low-income populations, or minority groups) are likely to be disproportionately harmed.[24]

The approaches used in regulatory analysis have evolved significantly over time, as experience with these methods has increased researchers' understanding of how to best estimate the value of regulatory impacts. For example, Maureen Cropper, James K. Hammitt, and I discuss the many ways in which the methods used to estimate the value of mortality risk reductions (the Value per Statistical Life or VSL) have improved in recent years.[25] These improvements have led to more stringent criteria for evaluating the quality of individual studies and for determining which estimates are most suitable for use in regulatory analysis. EPA historically relied on a set of twenty-six VSL studies, identified in a 1992 review, that included twenty-one revealed-preference studies of job-related risks and five stated-preference studies.[26] The resulting VSL estimates ranged from less than $1 million to almost $20 million, with a central estimate of $7.4 million (2006 dollars). More recently, the U.S. Department of Transportation (DOT) applied new best-practice criteria that resulted largely from an EPA Science Advisory Board review of a paper developed by EPA staff.[27] The DOT identified nine

24. For requirements related to impacts on children and low-income and minority groups, see Exec. Order No. 13,045, 3 C.F.R. 198 (1998), *reprinted as amended in* 42 U.S.C. § 4321 (2006); and Exec. Order No. 12,898, 3 C.F.R. 859 (1995), *reprinted as amended* in 42 U.S.C. § 4321 (2006).

25. *See generally* Maureen Cropper, James K. Hammitt & Lisa A. Robinson, *Valuing Mortality Risk Reductions: Progress and Challenges*, 3 ANN. REV. RES. ECON. 313 (2011).

26. *See* U.S. ENVTL. PROT. AGENCY, *supra* note 13, at B-1 to B-2.

27. The EPA has not yet determined how to best implement the resulting recommendations in its own analyses. *See* U.S. ENVTL. PROT. AGENCY, VALUING MORTALITY RISK REDUCTIONS FOR ENVIRONMENTAL POLICY: A WHITE PAPER 46–47 (2010), *available at* http://yosemite.epa.gov/ee/epa/eerm.nsf/vwan/ee-0563-1.pdf/$file/ee-0563-1.pdf ("These studies

labor-market studies suitable for use in its regulatory analyses that result in estimates ranging from about $7 million to about $13 million, with a mean of $9.1 million (2012 dollars).[28] None of these studies had been completed at the time of the original EPA review; the DOT rejected all of the older studies due to the availability of improved data sources as well as evolving understanding of best practices.

Another example of CBA's evolution is the estimation of employment impacts. The conventional wisdom is that regulation will increase production costs in the affected industries, and that these costs will be passed on to consumers as increased prices, which will lead to decreases in the quantities demanded, thereby reducing employment. Recent research suggests that this set of assumptions is flawed because it fails to consider the underlying characteristics of the affected firms and markets as well as the many ways in which they may respond to a regulation. Richard D. Morgenstern, William A. Pizer and Jhih-Shyang Shih note that industry and market conditions may limit the extent to which costs are passed on to consumers as well as the extent to which price changes affect demand.[29] In addition, as production costs rise, more labor and other inputs may be required to produce the same output. Compliance activities also may be more or less labor intensive than pre-regulatory production. Thus, regulation may lead employment to increase, decrease, or remain the same.

CBA is rarely, if ever, the sole basis for regulatory decisionmaking. Agency decisions must, first and foremost, comply with the authorizing statute and related rulings by the courts. In

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could be combined or synthesized in a number of ways . . . . Our goal is to provide enough information on the analytical options and key issues to receive clear recommendations from the SAB-EEAC on an approach to implement for updating our guidance and on future research directions."); *see also* Catherine L. Kling & Deborah L. Swackhamer, *Review of* Valuing Morality Risk Reductions for Environmental Policy: A White Paper (Dec. 10, 2010), at 1, *available at* http://yosemite.epa.gov/sab/sabproduct.nsf/298E1F50F844BC23852578DC0059A616/$File/EPA-SAB-11-011-unsigned.pdf (responding to the EPA's request for recommendations).

28. Memorandum from Polly Trottenberg, Under Sec'y for Pol'y, U.S. Dep't of Transp., & Robert S. Rivkin, Gen. Counsel, U.S. Dep't of Transp., to Secretarial Officers & Modal Adm'rs, Guidance on Treatment of the Economic Value of a Statistical Life in U.S. Department of Transportation Analyses 5–6 (Feb. 28, 2013), *available at* http://www.dot.gov/sites/dot.dev/files/docs/VSL%20Guidance.doc.

29. Richard D. Morgenstern, William A. Pizer & Jhih-Shyang Shih, *Jobs Versus the Environment: An Industry-Level Perspective*, 43 J. ENVTL.. ECON. & MGMT. 412 (2002). For a discussion of evolving best practices, see Lisa A. Robinson, *Toward Best Practices: Assessing the Effects of Regulation on Employment*, *in* JOBS AND REGULATION (Cary Coglianese, Adam Finkel & Chris Carrigan eds.) (forthcoming 2013), *available at* http://www.hks.harvard.edu/mrcbg/rpp/Working%20papers/RPP_2013_02_Robinson.pdf.

addition, most regulations have potentially significant impacts that cannot be quantified but are important to decisionmakers and other stakeholders. Physical outcomes (for example, lives extended, illnesses averted, or stream-miles protected) must be estimated before they can be valued, but it can be extraordinarily difficult to answer questions like: How does this regulation affect the ecological health of the region? Or: To what extent does this regulation affect the probability and consequences of terrorist attacks?[30] As mentioned earlier, agencies often supplement or replace CBA with cost-effectiveness analysis or break-even analysis due largely to difficulties in quantifying or valuing benefits, consistent with related government-wide guidance.[31] CBA can best be understood as one of many tools that provide useful information for decisionmaking.

WBA faces many of the same challenges as CBA. Some are independent of the type of analysis that is conducted: statutory constraints can only be changed by congressional action, and quantification of additional impacts requires scientific research. However, as illustrated by the examples of evolving practices noted above, understanding what is being measured, and how to best measure it, is a challenge that CBA practitioners have worked to address for many years, and one that WBA practitioners now face.

II. SOME ISSUES AND OBSERVATIONS

Why is CBA useful? Fully answering this question requires far more space than is available here, but I provide some observations that seem relevant to the comparison of CBA and WBA as well as to the further development of WBA. I address the selection of values, the inclusion of mental and emotional states in valuation, the respect for individual preferences, and the mechanism for achieving redistributional goals.

30. The EPA routinely includes lists of several potentially significant effects of air pollution on human and ecological health that it is unable to quantify in its regulatory analyses. *See, e.g.*, U.S. ENVTL. PROT. AGENCY, 2006 NATIONAL AMBIENT AIR QUALITY STANDARDS FOR PARTICLE POLLUTION: CHAPTER 5: BENEFIT ANALYSIS AND RESULTS 5-1, 5-5 tbl.5-2 (2006), *available* at http://www.epa.gov/ttnecas1/regdata/RIAs/Chapter%205--Benefits.pdf.

31. OFFICE OF MGMT. & BUDGET, *supra* note 3, at 2, 9–14. The U.S. Office of Management and Budget provides annual reports to Congress that document the extent to which full CBAs have been conducted for the regulations reviewed each year and that discuss related issues. *See, e.g.*, OFFICE OF INFO. & REGULATORY AFFAIRS, *supra* note 16, at 21–31.

A. Selecting Values

Both CBA and WBA face the challenge of determining how best to value outcomes, given limitations in the available research. In CBA, theory is directly linked to practice, aiding analysts in identifying preferred methods for valuation and in selecting among available studies. Although there are many unresolved or disputed issues, this foundation enables analysts to explain what it is that they are trying to measure (WTP or WTA), to describe the methods that would ideally be used for such measurement (revealed or stated preferences), to identify research practices that are most likely to lead to accurate and reliable results, and to discuss how the limitations in the available data and research affect the estimates.

In contrast, WBA is in its infancy. As Professor Adler notes, there are many conceptual issues that need to be resolved before an overarching framework can be developed that relates measures of well-being to policy goals.[32] The lack of such a framework makes it difficult to determine what measures of well-being and what methods of measurement are most appropriately applied in WBA. The lack of a framework also makes it difficult to describe the uncertainties or biases that result when alternative measures are used as proxies. For instance, in their illustrative example, Professors Bronsteen, Buccafusco, and Masur use one study to estimate the well-being effects of changes in income and morbidity, a second study to estimate the effects of premature death, and a third study to estimate the effects of unemployment. They do not discuss whether the three studies use similar approaches to estimate changes in well-being. More generally, they do not describe how the uncertainties inherent in the selected studies affect the interpretation of their results.[33]

Similar issues arise in CBA. For example, the lack of WTP estimates for nonfatal health risks means that analysts often use cost-

32. Adler, *supra* note 7, at 1584.

33. *See* Bronsteen, Buccafusco & Masur, *supra* note 5, at 1640–43. Although Professors Bronsteen, Buccafusco, and Masur claim that their example demonstrates the feasibility and usefulness of WBA, *id.* at 1645, this claim is difficult to assess. They make several assumptions (for example, the extent to which costs are passed on to consumers, the number of consumers affected, consumers' average income, cancer latency, duration of unemployment, and so forth) that appear to be arbitrary. *See id.* at 1639–45. Would the analysis come to the same conclusions if different assumptions were applied? They also select a relatively old analysis from 1998, *id.* at 1633, that does not reflect more recent advances in valuation or in the approaches used to assess the effects of regulations on employment.

of-illness or monetized QALYs as proxies.[34] Although it is difficult to quantify the uncertainty introduced by the use of these proxies, analysts can discuss their strengths and limitations based on substantial theoretical and empirical research, and can test the sensitivity of their results to different values.

The example in Professors Bronsteen, Buccafusco, and Masur's article also suggests that studies of subjective well-being do not currently provide values for many of the outcomes of concern in regulatory analysis.[35] In addition to the question of whether life-satisfaction, moment-by-moment, or other measures should be used, an obvious problem is that the example uses estimates for "stomach/liver/kidneys or digestive problems" to measure the effects of cancers on well-being.[36] A perhaps less-obvious problem is that the example compares well-being with and without the condition, rather than addressing the small change in the risk of experiencing that condition that is associated with the regulation.[37]

Regulatory analysts have developed criteria for transferring values from one context to another to more rigorously address these types of problems in CBA. The starting point is a description of the regulatory outcome, followed by a search for potentially relevant valuation studies. Analysts then review the studies for quality and applicability. The quality assessment considers, for example, the extent to which each study follows generally accepted best practices and provides evidence of validity and reliability. The applicability assessment considers factors such as the similarity of the risks, the similarity of the populations experiencing the risks, and the ability to adjust for differences between the outcome studied and the regulatory outcome. Depending on the research available, the transfer may rely on a single study or combine the results from

34. *See* Lisa A. Robinson & James K. Hammitt, *Skills of the Trade: Valuing Health Risk Reductions in Benefit-Cost Analysis*, 4 J. BENEFIT-COST ANALYSIS, Mar. 2013, at 107, 116–123.

35. The example is based on a 1998 regulatory analysis that addresses only three outcomes (that is, changes in income, unemployment, and cancer risks), *see* Bronsteen, Buccafusco & Masur, *supra* note 5, at 1633–39, whereas many more-recent regulatory analyses consider a wider range of health and environmental risks, using data and methods that have improved over time, *e,g.*, U.S. ENVTL. PROT. AGENCY, *supra* note 13, at 7-1 to 9-22. The extent to which well-being measures are available for these wider ranges of outcomes is unclear.

36. *See* Bronsteen, Buccafusco & Masur, *supra* note 5, at 1641–42.

37. *See id.* Typically, regulatory analysts are able to estimate risk changes across a large population, but they are not able to identify in advance (nor necessarily able to determine after the regulation is implemented) the individuals affected—for example, which individuals would have become ill or died prematurely in the absence of the regulation.

several studies, and it may involve transferring a point estimate or a valuation function that tailors the estimate to the policy scenario. The uncertainties in the estimates are then addressed qualitatively and/or quantitatively—for example, by conducting sensitivity or probabilistic analysis and discussing the implications. A similar approach is needed for WBA to aid in the selection of suitable, high quality well-being estimates and to provide information on associated uncertainties.[38]

One possible next step in the development of WBA could involve reviewing completed regulatory analyses to identify the types of outcomes in need of valuation, and then reviewing the well-being literature to determine the extent to which well-being estimates are available for these outcomes. This work could be used both to identify areas where more well-being research is needed and to catalog the available estimates for further review for quality and suitability.

B. Including Mental or Emotional States in Valuation

CBA and WBA would presumably use the same approach for predicting baseline conditions and the effects of the regulatory options. The only difference is that WBA would value outcomes in well-being units rather than in dollars, reflecting the psychological impact of the outcomes. Such psychological impacts are, however, already included in the measures used in CBA. Economists generally recognize that decisions to purchase market goods and services, as well as WTP for nonmarket goods or services, reflect psychological responses to their attributes and other aspects of their consumption. Ideally, the research studies used for valuation in CBA would address an outcome that is identical to the outcome addressed by the regulation, so that it elicits the same sort of responses to its attributes. However, as noted above, gaps in the research literature often mean that analysts transfer values from somewhat dissimilar contexts.

For example, when determining what studies to use to value mortality risk reductions associated with homeland-security regulations, my colleagues and I compared the outcomes addressed in

38. For further discussion of benefit transfer, see Robinson & Hammitt, *supra* note 34, at 109–111; and U.S. ENVTL. PROT. AGENCY, *supra* note 13, at 7-51 to 7-57. An example of this approach is the valuation of homeland-security related mortality risk reductions, as discussed below.

available empirical research with the regulatory outcomes.[39] This comparison included the characteristics of those affected (for example, age or income), of the risk itself (for example, illness versus injury, or immediate versus latent effects), and of psychological responses to the risk (for example, the degree to which it is voluntarily incurred, viewed as under the individual's control, or particularly fearsome).[40] Our team ultimately recommended applying the results from a study of job-related risks because we were unable to identify a high-quality study that addresses risks more similar to those associated with homeland-security regulations.[41] However, we noted that, based on the available research, homeland-security-related mortality risk reductions might be valued up to two times higher than more commonplace risks.[42]

Thus the approach to valuation currently followed in CBA appears to account for the types of psychological states measured in research on subjective well-being, although it does not ask the same questions nor use the same scales. The measures it uses appear to be more complete than the measures proposed for use in WBA because the former encompass other aspects of value and more varied mental and emotional states. This does not necessarily mean that there is no role for WBA, however. Supplementing CBA by also reporting the value of outcomes in well-being units has the advantage of highlighting these impacts, which may also be of interest to decisionmakers.

C. Respecting Individual Preferences

Whether policy interventions should be selected so as to reflect the preferences of those affected is a contentious normative issue that I do not attempt to resolve here. However, information on these preferences is a useful input into the policymaking process, aiding decisionmakers in understanding the extent to which their own preferences are and are not shared by those affected.

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39. Lisa A. Robinson, James K. Hammitt, Joseph E. Aldy, Alan Krupnick & Jennifer Baxter, *Valuing the Risk of Death from Terrorist Attacks*, 7 J. HOMELAND SECURITY & EMERGENCY MGMT., Feb. 2010, at 18. This article is an abbreviated and updated version of the report that the U.S. Department of Homeland Security now uses to support the values it applies in its regulatory analyses.

40. *Id.* at 10–18.

41. *Id.* at 9.

42. *Id.* at 17.

When the government regulates, it requires society to reallocate resources to achieve particular social welfare goals. For example, an air-pollution regulation that addresses motor-vehicle emissions is likely to increase the costs of automobiles while reducing associated health risks.[43] CBA reflects these trade-offs by estimating how those affected would weigh the costs and benefits that result. If market data can be used, CBA indicates the actual trade-offs that individuals make; if nonmarket valuation is needed, CBA's goal is to estimate individuals' willingness to make such trade-offs. More fundamentally, CBA—and the welfare-economic theory upon which it is based—respects individual preferences, assuming that each individual is the best judge of his or her own welfare.

WBA does not tell us how individuals prefer to allocate resources. Whereas statistical analysis can be used to estimate the relationship between measures of subjective well-being and income, such analysis does not indicate whether the affected individuals would willingly exchange income for that level of well-being. Nor does WBA ask individuals how they would prefer to allocate money across different goods and services, including nonmarket outcomes such as improved health. Rather, it assumes that individuals would prefer to see resources allocated so as to achieve a higher level of subjective well-being, however defined. Thus, if used as a decision criterion, WBA is more paternalistic: the analyst decides that money should be allocated so as to maximize well-being, even if those affected would prefer to allocate resources differently.

Of course, individuals may make mistakes in identifying their preferences, whether revealed directly through market behavior or indirectly through stated- or revealed-preference studies. These mistakes may result from cognitive errors (for example, limitations in information-processing capacity or misunderstandings of probabilities), which, if pointed out to the individual, he or she would wish to correct.[44] For example, an individual may begin smoking because he or she does not understand the likelihood of addiction, the difficulty of quitting, or the associated health risks. In other cases, behavior that is labeled as a mistake may in fact reflect an individual's

43. Regulatory costs may be absorbed, at least in part, by the firm rather than fully passed on to consumers, potentially affecting profits and wages as well as, or instead of, prices.

44. *See* James K. Hammitt, *Positive v. Normative Justifications for Benefit-Cost Analysis* 9–10 (Regulatory Policy Program, Mossavar-Rahmani Ctr. for Bus. & Gov't, Harvard Kennedy Sch., Working Paper No. 13, 2012).

true preferences. Some may choose to smoke even if well informed, because they are risk seeking rather than risk averse, or because they find that the pleasures of smoking outweigh its risks. How to address affective forecasting errors also raises difficult issues. Although the evidence suggests that individuals adapt to adverse conditions more than predicted, they may have strong preferences regarding avoiding the transition. To take a perhaps extreme example, research suggests that paraplegics and quadriplegics report higher levels of well-being than expected.[45] However, individuals still may have very strong preferences for reducing the likelihood of transitioning into a paraplegic or quadriplegic state.

To the extent that decisionmakers can identify whether market choices or expressed preferences are errors, they may wish to correct the errors when applying values in CBA.[46] However, it is often difficult to separate errors from true preferences. More generally, research by behavioral economists suggests that such errors are context dependent, and additional work is needed to understand how the decisionmaking anomalies and biases identified in that literature affect the choices reflected in regulatory analysis.[47] Such concerns require thinking carefully about the extent to which normative concerns are integrated into the conduct of CBA, but they are not a sufficient reason to abandon it.[48] In fact, some argue that CBA acts as a corrective by providing evidence to counter decisionmaking biases.[49]

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45. *See*, *e.g.*, Richard Schulz & Susan Decker, *Long-term Adjustment to Physical Disability: The Role of Social Support, Perceived Control, and Self-blame*, 48 J. PERSONALITY & SOC. PSYCHOL. 1162, 1170 (1985).

46. *See* Robinson & Hammitt, *Behavioral Economics and Regulatory Analysis*, *supra* note 18, at 1410–12 (describing behavioral-economics theories and techniques that can more accurately model costs and benefits); Robinson & Hammitt, *Behavioral Economics and the Conduct of Benefit-Cost Analysis*, *supra* note 18, at 13–16 ("Ideally, the values used in benefit-cost analysis would reflect all of the attributes of the risk, including the ambiguity and fear associated specifically with that risk." (citation omitted)). For a discussion of "laundering" preferences, see MATTHEW D. ADLER & ERIC A. POSNER, NEW FOUNDATIONS OF COST-BENEFIT ANALYSIS 149–53 (2006).

47. For a relatively recent review of the research evidence, see Stefano DellaVigna, *Psychology and Economics: Evidence from the Field*, 47 J. ECON. LITERATURE 315 (2009).

48. For further discussion of positive and normative conceptions of CBA, see James K. Hammitt, Response, *Saving Lives: Benefit-Cost Analysis and Distribution*, 157 U. PA. L. REV. PENNUMBRA 189, 195–98 (2009), http://www.pennumbra.com/responses/03-2009/Hammitt.pdf; and Hammitt, *supra* note 44. For discussion of how positive and normative considerations enter into the conduct of individual CBAs, see Christopher Robert & Richard Zeckhauser, *The Methodology of Normative Policy Analysis*, 30 J. POL'Y ANALYSIS & MGMT. 613 (2011).

49. Cass R. Sunstein, *Cognition and Cost-Benefit Analysis*, 29 J. LEGAL STUD. 1059, 1088–96 (2000).

Such concerns also raise questions about whether similar phenomena may affect the responses to questions about happiness and life satisfaction.

D. Achieving Redistributional Goals

The theoretic framework that underlies CBA also defines its boundaries. As conventionally conducted, it focuses on economic efficiency. Thus, supplementary information is needed to address other outcomes of interest to decisionmakers, such as the distribution of the impacts.

More precisely, in CBA the normative justification for choosing policies that maximize net benefits is the Kaldor-Hicks potential-compensation test. This test suggests that a policy is desirable if it makes the winners better off by an amount large enough to compensate the losers, or alternatively, that it should be rejected if the losers can compensate the winners to not pursue the policy. However, the test does not demand that actual compensation occur. Although applying this test maximizes social welfare as defined within this framework—that is, as the efficient allocation of scarce resources—it does not address the net effect on the distribution of resources. Any regulation is likely to have both winners and losers. Although who gains and who loses will vary across policies, in total the gains and losses are not likely to balance at the individual level.

When benefits and costs are measured in money terms, then money can be redistributed, to the extent desired, to compensate the losers.[50] For instance, as noted earlier, a well-designed tax and income-transfer system can be used to achieve redistributional goals. But if net well-being is used as a decision criterion, how can well-being be redistributed? Presumably, decisions based on the net change in well-being will also lead to gains for some and losses for others, but measuring these values in well-being units rather than in dollars does not provide a mechanism for addressing any inequities that result. Although more thought into how distributional concerns might be addressed in WBA would be useful, this issue may be of lesser concern if we keep in mind how analysis is generally used in regulatory decisionmaking. As noted earlier, analysis generally provides information for decisions but does not determine them. In

50. For simplicity, this brief discussion ignores the complexities of transfers, such as the role of administrative costs and the distortionary effects of taxes.

this context, WBA may provide a useful supplement to CBA, providing additional information rather than a different criterion for decisionmaking.

CONCLUSION: WELL-BEING ANALYSIS AS A SUPPLEMENT TO COST-BENEFIT ANALYSIS

Whereas CBA is viewed as a useful framework for providing information, it is not and should not be the only framework used to inform decisionmaking. Further development of WBA could provide a useful complement that highlights the effects of regulatory changes on self-reported well-being. Work is needed, however, to better define the conceptual framework, to understand advantages and limitations of alternative approaches to measurement, and to develop criteria for selecting well-being estimates based on their quality and suitability for a particular context. Like the approaches applied in CBA, the approaches applied in WBA are likely to evolve over time, and beginning to implement WBA may provide both incentives to conduct related research and insights into how well-being measures can be improved.

Qualitative discussion and quantitative analysis of related uncertainties are also needed. In CBA the shortcomings of various valuation approaches are relatively well understood from both a theoretical and an empirical perspective. As a result, analysts can at minimum describe the limitations of the approach and the implications. Professor Adler's discussion and Professors Bronsteen, Buccafusco, and Masur's illustrative example suggest that more theoretical and empirical work is needed to better understand the limitations and uncertainties associated with applying the WBA approach. Presumably, the goal of both CBA and WBA is to support evidence-based decisionmaking, which requires the ability to discuss both the nature of the evidence and its shortcomings.