

# LAWRENCE SUMMERS' MEMO, OR WHY COST-BENEFIT ANALYSIS IS NOT A MORAL COMPASS FOR ENVIRONMENTAL POLICY ANALYSTS†

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ABSTRACT. Economic cost-benefit analysis is used by environmental policy analysts as a primary tool for assessing policy efficacy. Economists often stress that cost-benefit analysis is simply a calculation method, and not a guide to appropriate action. However, as cost-benefit analysis is used normatively by policy analysts, it should be evaluated as a moral compass for environmental policy decision-making. I argue that environmental policy analysts cannot rely on cost-benefit analysis to provide morally-acceptable guidance in decision making. When it is taken to be a ready reference for “right” action, a number of problematic tendencies demonstrate why it is not a neutral tool for analyzing policy.

## 1. MOTIVATING THE DISCUSSION

On December 12, 1991, former World Bank Chief Economist and current President of Harvard University, Lawrence Summers, signed a memo<sup>1</sup> claiming that “dirty industries” should be moved to developing countries for the following reasons: (1) since the cost of toxic pollutants is measured by lost wages due to pollution-related sickness and death, dirty industries should be located in the country with the lowest wages, (2) many developing countries are vastly “under-polluted,” when compared to industrialized nations, and (3) there is less demand for a clean environment in developing countries.<sup>2</sup>

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<sup>1</sup>On display at: <http://www.whirledbank.org/ourwords/summers.html>.

<sup>2</sup>I will examine his argument in greater detail at a later point.

How can someone as intelligent as Lawrence Summers be convinced that this normative argument is validly supported by the economic premises? This paper works to show that to rely on economic cost-benefit analysis in environmental policy decision-making is to tacitly support Summers' fallacious reasoning.

Cost-benefit analysis is firmly advocated by a large majority of environmental policy analysts as a primary tool for assessing policy efficacy. As the science of cost-benefit analysis has developed into an industry of its own, to what degree should efficiency analysis be relied upon as a primary guide in policy analysis? In the words of Allen Kneese from his essay *The Faustian Bargain*, "Cost-benefit analysis cannot answer the most important policy questions associated with the desirability of developing a large-scale, fission-based economy. To expect it to do so is to ask it to bear a burden it cannot sustain. This is so because these questions are of a deep ethical character."<sup>3</sup> To use cost-benefit analysis in environmental policy decision-making is to employ an analysis tool with morally problematic tendencies which are exasperated in environmental applications. It is first necessary in such a critique to form an understanding of economic cost-benefit analysis.

## 2. THE FOUNDATIONS OF COST-BENEFIT ANALYSIS

Essentially, cost-benefit analysis (henceforth CBA) is simply an economic formalization of the mental process of "weighing the pros and cons." CBA examines the costs and benefits associated with an action such that a net-benefit can be determined (in terms of profit or utility).<sup>4</sup>

To understand how economic CBA is used in evaluating environmental policy, we would do well to examine the nature of the "formal system" CBA and investigate into its implicit economic assumptions.<sup>5</sup> A common definition of "economics" is the social science concerned with how individuals

<sup>3</sup>Allen Kneese as quoted by Olson, Mancur 374.

<sup>4</sup>See the Appendix for a mathematical generalization of this.

<sup>5</sup>To my knowledge, there is no completely formalized system of CBA (in contrast to the extensively formalized systems of arithmetic, i.e. Russell and Whitehead's *Principia*

and society allocate scarce resources. Accordingly, cost-benefit analysis is the analysis of how actions result in costs and benefits as a function of resource allocation. From the intuition that people prefer the outcomes of some actions to those of others, the first axiomatic assumption of CBA can be stated as follows.

CBA AXIOM<sub>1</sub>: Actions that increase well-being are *a priori* superior, or *preferred*, to those that improve well-being by a lesser amount.

In terms of policy decisions, policies that increase well-being are *a priori preferred* to those that improve well-being to a lesser extent.<sup>6</sup> It follows that all resource allocations can be ranked from least to most preferred (in principle).

The postulate that *economic agents* (individuals, firms or governments) prefer what increases their well-being the most is coupled with another axiomatic assumption that is fundamental to the study of costs and benefits of actions:

CBA AXIOM<sub>2</sub>: Economic agents act as to obtain their *most preferred* allocation of resources.<sup>7</sup>

From these axioms, a central tenet of the CBA calculus can be supported. If economic agents prefer actions that increase their well-being, and agents act according to their preferences, then the following theorem is derivable:

CBA THEOREM<sub>1</sub>: Actions of economic agents reveal information about resource allocations' value to well-being.

In examining the implications of this theorem, it is obvious that CBA rests upon tenuous claims. Nevertheless, the axiomatic standpoint that

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*Mathematica*). However, it suffices to assume that CBA does have an essential structure composed of axioms implying more advanced theorems.

<sup>6</sup>See Kopp, Krupnick and Toman, *Cost-Benefit Analysis and Regulatory Reform: An Assessment of the Science and the Art*, 2.

<sup>7</sup>See VanDeVeer, Donald; Pierce, Christine, 307.

preference is a measure of well-being is of cardinal importance to economic CBA. “The validity of the ‘preference satisfaction’ assumption has been debated since Bentham, and will continue to be debated. There is nothing we can add to the debate but to note simply the crucial importance of the assumption to the intellectual foundation of CBA.”<sup>8</sup>

As *preference* is a key component of the CBA axiomatic framework, it is important to say a little about the conditions placed upon preference in microeconomic science. Two axioms are posited to condition the way in which economic agents prefer:

CBA AXIOM<sub>3</sub>: Economic agents have unlimited wants or desires for resources.<sup>9</sup>

CBA AXIOM<sub>4</sub>: A quantity of some resource or good is always substitutable for a quantity of some other resource or good.

These assumptions about preference seem problematic, and require explanation. CBA AXIOM<sub>3</sub> does not play a key role in my critique of CBA’s use as an environmental policy decision-making tool.<sup>10</sup>

AXIOM<sub>4</sub> conditions *substitutability* of preferences for goods. Consider two goods  $F$  and  $C$ . For some quantities of these two goods (or a ‘bundle’ - call it  $D$ ), the axiomatic belief is that one can always subtract a certain amount of one good while adding a certain amount of the other good such

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<sup>8</sup>See Kopp, Krupnick and Toman, 4.

<sup>9</sup>See VanDeVeer, Donald; Pierce, Christine, 307.

<sup>10</sup>Yet it is in need of conceptual critique. Essentially, this axiom is justified by the claim that “goods are assumed to be desirable - i.e., to be *good*. Consequently, consumers always prefer *more* of any good...” (Pindyck and Rubinfeld 64). This axiom does little more than instantiate the *heap fallacy*, i.e. arguing that since some quantity of a good increases benefit, and a little more of that good still increases benefit, an infinite amount of the good will increase benefit. In reality, it is quite impossible to think of a good that could be continuously desired to infinite amounts. Of note, one of the main purposes for the axiom’s existence is “pedagogical...it simplifies graphic analysis” (Pindyck and Rubinfeld 64).

that the new combination is *preferred equally* to the previous bundle by an economic agent (see FIGURE 1). Therefore, for any two goods  $F$  and  $C$ , AXIOM<sub>4</sub> tells us that there must be an *indifference curve* ( $U_1$ ), which represents all the equally preferred combinations of the goods.

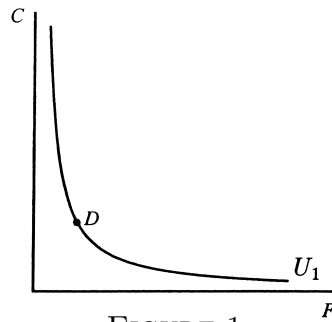


FIGURE 1

If two goods are always substitutable at some rate without affecting preference, then the rate at which they can be substituted reflects a *rate of exchange* that implies *equal value* of the goods. In a modern market economy, currency is the primary substitutable good for trade and all goods establish exchange rates, or prices, with the currency.

Now the question is: what can be said about prices from the CBA axioms and theorems? Since money is itself a good, then an agent who chooses to substitute money for a good (i.e. to buy it) finds the good to be at least as valuable to them as the amount of money. From CBA THEOREM<sub>1</sub><sup>11</sup> and CBA AXIOM<sub>4</sub><sup>12</sup>, another significant element of CBA is derivable:

CBA COROLLARY<sub>1</sub>: Price is a measure of value.

As value reflects substitutability and preference, prices measure how much a good increases well-being. Thus, prices are tied together with well-being. One final CBA theorem completes the theoretical foundation for environmental CBA methodology. It can be derived as follows:

<sup>11</sup>Actions of economic agents reveal information about resource allocations' value to well-being.

<sup>12</sup>A quantity of some resource or good is always substitutable for a quantity of some other resource or good.

- (1) Economic agents act as to obtain their most preferred allocation of resources (CBA AXIOM<sub>2</sub>)
- (2) Market transactions are measures of value (CBA COROLLARY<sub>1</sub>)
- (3) The “environment” can be thought of as environmental goods and resources with value,
- (4) ∴ CBA THEOREM<sub>2</sub>: The value of environmental goods can be derived from markets transactions and resource allocations.

### 3. METHODOLOGY OF ENVIRONMENTAL COST-BENEFIT ANALYSIS

The premises in the above argument form the basis for the methodology of environmental CBA. In economics and the CBA framework, “environment” really means “environmental goods,” or aspects of the natural world from which economic agents can benefit. Such aspects may include raw material resources, clean and safe living environments, and the sublimity of the natural world. An amount of lumber or oil can be easily valued, but formulating explicit values for rainforests or animal species is obviously not so simple.

An intricate methodology has been developed for valuating environmental goods. One school of environmental CBA methodology is based on the economic principle of *opportunity cost*, or the idea that when an economic agent engages in some action, they are missing out on the benefit of another possible action they could have been engaged in. Since it is axiomatically true in CBA that economic agents prefer what increases their well-being more, when a person chooses to enjoy an environmental good, they must be passing up other benefits that are less than that of the environmental good. The methodological techniques associated with this approach are known as

“revealed preference” techniques.<sup>13</sup> This approach extrapolates from consumer choices how people value environmental goods.<sup>14</sup> In addition to these methods, “stated preference” methods can be utilized to determine how people value environmental goods.<sup>15</sup> These methods involve asking people directly how much they value their environment.

Each technique, whether it relies on revealed or stated preference, has strengths and weaknesses. Although many questions can be raised in regards to the scientific accuracy of these methods, a complete understanding of the methodological intricacies is unnecessary to my moral critique.

#### 4. HOW CAN CBA BE MORALLY EVALUATED?

In discussing how CBA, a technique of economic science, stacks up as a moral compass for environmental policy analysts, it is first necessary to determine what methods are appropriate for evaluating CBA on moral grounds.

First, should CBA itself be considered a moral theory? Generally, a moral theory is an account or formula that, when applied to analyze a decision-making scenario, offers a statement claiming whether some action is moral or not. As CBA is a technique for tallying up economic costs and benefits, no statement is derivable from CBA that could yield a moral claim, or even a normative statement. Economists emphasize this understanding

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<sup>13</sup>See Willis and Corkindale, eds. *Environmental Valuation: New Perspectives*, 146.

<sup>14</sup>Two common revealed preference techniques are *travel cost models* and *hedonic price functions*. Essentially, travel cost models delineate the value of environmental goods as at least as much as the value of the total price invested in the travel costs consumers incur to enjoy environmental goods. Hedonic price functions utilize statistical analysis to control for variables from consumer data from which information about the value of environmental goods to consumers can be obtained.

<sup>15</sup>The most common stated preference technique is *contingent valuation*, which essentially estimates the value of environmental goods as a function of what consumers explicitly value it, as interpreted through a series of various questions.

of CBA. They stress that CBA is just a calculation tool and that it is not a theory of decision.

But does the fact that CBA is founded on axioms incapable of producing explicitly moral statements render CBA devoid of moral indication? If CBA is *always used* as an action-guiding tool, then in what ways does CBA tend to affect actions and policy decisions in ways that are morally significant? Policy analysts would only invest in CBA when there is a decision that requires its input. If CBA is always used normatively, then it should be considered a normative theory.

I propose the following angle of critique: if the axioms of CBA were slightly modified so that CBA *were actually a moral theory*, then one could straightforwardly investigate how the CBA moral theory measures against other moral considerations. Giving normative life to the pro and con calculator in this way will expose the moral biases inherent deep within the CBA system.

In pursuing this line of reasoning, I modify CBA so that it is a moral theory in addition to retaining its regular functions (theoretical foundation and methodological techniques):

**CBA MORAL THEORY:** *When faced with a significant decision-making situation, first examine the net benefit of relevant actions for a given economic agent using CBA techniques for inferring value. The moral action is the action which is most efficient, and therefore ought to be done.*

What actions will this CBA moral theory recommend given an environmental policy scenario? One natural case study is readily available for examination: Lawrence Summers' memo.

## 5. COST-BENEFIT ANALYSIS AND THE SUMMERS' MEMO

Summers' internal World Bank memo argues that dirty industries should be moved to developing nations for reasons of economic efficiency. Summers' argument functions as a prime example of why economic analysis should not be relied upon as a primary policy analysis tool in matters as delicate and

moral in nature as environmental policy. A closer examination of Summers' argument will provide insight into whether the CBA moral theory would deem Summers' recommendation as moral.

Summers' first reason for supporting dirty industries being moved to developing countries is that "[since] the...costs of health impairing pollution depends on the foregone earnings from increased morbidity and mortality,...a given amount of health impairing pollution should be done in the country with the lowest cost, which will be the country with the lowest wages."<sup>16</sup>

Will the CBA moral theory dub this argument moral? It can first be observed that the CBA axioms interpret "labor" as a good, for it is a resource from which benefit is derived. By the substitutability criterion of preference, there is must be some rate of substitution for each country's average worker. If an individual with productive capacity becomes unable to work due to a pollution-related illness, then there is a cost to society of at least the value of the forgone productivity.<sup>17</sup> So, when a worker dies, society incurs a loss in total value is equal to the amount a worker contributes to GDP each year.<sup>18</sup>

If the average *per capita* income (essentially, this can be thought of as average productive capacity) of a U.S. worker is equal to \$36,300 (USD) and the average per capita income of a Mexican worker is equal to \$8,900 (USD)<sup>19</sup>, then the average US worker is roughly four times more economically productive than the Mexican. As unhealthy concentration of pollutants associated with "dirty industries" is correlated with increased morbidity and mortality of workers exposed to those concentrations, there should be some

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<sup>16</sup>See <http://www.whirledbank.org./ourwords/summers.html>.

<sup>17</sup>In microeconomics, the value of the productivity of labor should be roughly equal to the value of the wage.

<sup>18</sup>GDP, or gross domestic product, is the amount (in money) of how much goods and services a country produces in a year. It is the sum of all *consumption spending* (consumer goods), *investment spending* (buildings, houses, and machinery), *government spending*, and *net exports* (revenue of all exported goods minus cost of all imported goods).

<sup>19</sup>Controlled for Purchasing Power Parity; <http://www.cia.gov/cia/publications/>.

estimatable probability of expected adverse health effects among the working population. So, if dirty industries were located in America rather than in Mexico, *ceteris paribus*, the expected loss would be four times greater.

Thus, CBA is bounded to recommend the relocation of all dirty industries from the United States to Mexico. The substitutability criterion of preference requires CBA to be *indifferent* between  $x$  American workers dying and  $4x$  Mexican workers dying, since there would be no difference in net value. However, the error in the logic is clear. One can talk about the average value of Mexican productivity, but one cannot logically equate “a Mexican” with “productive value,” because so much is lost in the reduction. An American life is not equal to four Mexican lives, but inside the CBA system, there is no differentiation because everything is reduced and equated with economic value. Summers’ first premise checks out as valid in the framework of the CBA moral theory. So far, the CBA moral theory concurs with Summers.

Summers’ second line of reasoning for moving dirty industries to developing countries is that “[as] the costs of pollution are likely to be non-linear [because] the initial increments of pollution probably have a very low cost, under-populated countries are vastly under-polluted...[with] air quality that is probably vastly inefficiently low compared to Los Angeles or Mexico City.” If there is increasing marginal adverse health affects per unit of pollution increase, the most efficient allocation of pollution would be an equal distribution (globally). *Ergo*, in calculating the most efficient allocation of pollution, the CBA moral theory would coincide with Summers argument, and “under-populated countries in Africa [that] are vastly under-polluted”<sup>20</sup> would be the most efficient and morally defensible place to increase pollution.

However, overall global efficiency would be maximized at the expense of most of the world population, who reside in rural areas of developing countries. It makes little moral sense to instantiate Summers’ recommendation “when a few people can benefit a lot by making the lives of [many] others

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<sup>20</sup>See <http://www.whirledbank.org/ourwords/summers.html>.

(either now or in the future) miserable.”<sup>21</sup> Yet this is exactly the recommendation a normative CBA theory would support. Hence, inherent in the CBA framework is this tendency towards environmental injustice.<sup>22</sup>

Summers’ third argument for moving dirty industries to less developed countries is that “the demand for a clean environment for aesthetic and health reasons is likely to have very high income elasticity.”<sup>23</sup> *Demand* and *income elasticity* require definition. *Demand* in economics refers to consumers’ willingness to purchase some quantity of a good given its price. So, if demand for clean water increases, consumers are willing to purchase the same amount of water at a higher price. *Elasticity* of demand refers to the amount of change in quantity demanded of a good due to a change in the price. If the price for a good increases slightly and quantity demanded for that good decreases significantly, the good is “price elastic” (as it has a bouncy response to changes in price). It is important to note that value of a price is a function of income. For example, the value of \$1 for a household of with a yearly income of \$100,000 is relatively small compared to the value of that dollar for a household with a yearly income of \$10,000.

Summers refers to the demand for a clean environment as possessing “high income elasticity,” or the notion that as income increases from less developed countries to developed nations, people become more willing to trade money for a clean environment, because the *value of the cost* for a clean environment decreases as incomes increase. It makes sense that clean air and an aesthetically-pleasing environment are *demand*ed less in developing countries, in the relevant sense of the word demand. In the CBA system,

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<sup>21</sup>Kopp, Krupnick and Toman 13-14

<sup>22</sup>Economists would argue that either (1) this problem can be fixed in practice by weighting techniques, or (2) that it is a political matter. The first point is a matter between economists and is beyond the bounds of this paper, whereas the second all but proves my argument: that CBA itself cannot be relied upon as a moral guide in environmental policy analysis.

<sup>23</sup>See <http://www.whirledbank.org/ourwords/summers.html>.

less demand indicates less preference, which indicates less value to well-being. Therefore, the CBA moral theory would hold Summers' third reason as logical, as it follows that the most efficient allocation of clean air is in the wealthiest nations.

It is evident how CBA misinterprets decreased demand in developing nations as decreased value to well-being; CBA cannot compute that people of lower income may *prefer* (in the irrelevant sense of the word) a clean environment, but are simply unable to afford it. This invalid derivation of value to well-being from demand is reflected in statistical valuations of environmental goods from market data. Hence, CBA imposes an undemocratic "market voting booth," where votes are weighted by wealth. In this way, CBA tends to compound problems of environmental injustice, rather than solve them, as would be expected of a moral compass.

As relying on consumer demand furthers problems of environmental injustice, there is yet another reason why the use of consumer data may not provide the proper guidance for environmental policy analysts. It is unreasonable to expect that people demonstrate their ethical values as citizens through their rational choices as consumers.<sup>24</sup> In a liberal democratic society, what people reveal as their preferences as individual consumers varies greatly from what they hold as socially important. "Not all of us think of ourselves primarily as consumers...As consumers, we act to acquire what we want for ourselves individually; each of us follows his or her conception of the good life. As citizens, however, we may deliberate over and then seek to achieve together a conception of the good society."<sup>25</sup> As CBA brings consumer data to the analyst rather than citizens' values, CBA undemocratically weights value in favor of the wealthy. The CBA moral theory and Lawrence Summers agree on all counts: move the dirty industries to developing countries.

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<sup>24</sup>See Sagoff, Mark. *The Economy of the Earth* 27.

<sup>25</sup>See Sagoff, Mark. *The Economy of the Earth* 27.

## 6. CONCLUSIONS

Most would agree with the words of Jose Lutzenburger, Brazil's former Secretary of the Environment, who wrote in response to Summers' leaked memo that "[your] reasoning is perfectly logical but totally insane...Your thoughts [provide] a concrete example of the unbelievable alienation, reductionist thinking, social ruthlessness and the arrogant ignorance of many conventional 'economists' concerning the nature of the world we live in..."<sup>26</sup>

However, that Summers' argument is problematic should be shadowed by the fact that cost-benefit analysis would appraise his argument as, in the words of Mr. Lutzenburger, "perfectly logical." There is cause for alarm concerning the purportedly innocuous<sup>27</sup> pro and con calculator. We cannot allow CBA's cogency in *efficient* action to be interpreted as wisdom in *correct* action. To do so is to reduce the moral complexity of environmental policy decision-making to the "totally insane" logic of Lawrence Summers' memo.

Perhaps CBA's most morally problematic attribute affords it one of its greatest strengths: its ability to 'compare apples and oranges' by reducing everything to a quantitative value. This leads to problems where if the productive value of American labor is four times that of Mexican labor, CBA values four Mexican lives and one American life equally. Further, reliance on CBA would tend to deepen problems of environmental injustice, because CBA values environmental goods at what individuals are willing and able to pay for them. Moreover, by assuming that individual consumer preference represents how people value their environment (instead of how

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<sup>26</sup>Unfortunately, Jose Lutzenburger was fired soon after he wrote his response to Summers' memo. It is ironically noted on the "Whirled Bank" website that Summers had quite the opposite experience, as he "was appointed as U.S. Treasury Secretary on July 2nd, 1999, and served through the remainder of the Clinton Administration." For more, see <http://www.whirledbank.org./ourwords/summers.html>.

<sup>27</sup>Economists often stress that cost-benefit analysis is simply a neutral tool and is not a moral theory. However, this stance is indefensible for the obvious reason that environmental CBA is only employed when an evaluation or decision concerning environmental policy is at stake.

social values are represented through citizen behavior), CBA guides policy analysts with information inferred from selfish consumer preference and not citizens values.

If Summers' memo is looked upon with disdain, then the fact that a policy analysis technique fully supports Summers' argument should be cause for concern. CBA is not an adequate moral compass for environmental policy analysts, and we should not share the belief with economists that CBA is a neutral calculation tool, devoid of moral indication. This belief is confused at best, because environmental CBA is only employed when a evaluation or decision concerning environmental policy is at stake. That CBA functions horribly as a moral compass should be sufficient grounds to call into question our ability to entrust the future of our environment to economic science. As CBA is not a moral calculus, it must not be forgotten, as it sometimes is, that it should not be allowed to function as one. Decisions concerning environmental policy should be arrived at through means more sensible and moral in nature than cost-benefit analysis. If cost-benefit analysis is to remain a respectable policy analysis tool, its use must be strictly tempered with other moral checks and balances.

## Appendix

I. A relatively comprehensive and general mathematical formulation for profit ( $\pi$ ) maximization is:

$$(1) \quad f(x) = TB(x) - TC(x)$$

$$(2) \quad FOC \Rightarrow f'(x) = 0 \Rightarrow \left\{ \frac{\partial TB(x)}{\partial x} - \frac{\partial TC(x)}{\partial x} \right\}$$

$$(3) \quad \partial TB(x) = \partial TC(x) \rightarrow MB(x) = MC(x)$$

where we interpret equation (1) as the net benefit associated with an action,  $f(x)$ , is equal to the total benefits associated with  $x$ ,  $TB(x)$ , minus the total costs associated with  $x$ ,  $TC(x)$ . In equation (2) we take the first

derivative (first order condition) with respect to  $x$  to derive *marginal benefit*, or the benefit derived from each additional unit of  $x$  (assuming  $x$  can be interpreted as having at least a single unit), as represented by  $(\partial TB(x))$ , and similarly *marginal cost*,  $(\partial TC(x))$ . In equation (3), the point at which marginal benefit is equal to marginal cost is the point of economic efficiency, profit maximization, or the point at which  $x$  most economically advisable.

For any possible economic action  $x$ , if total benefit associated with  $x$  is greater than total cost associated with  $x$ , then profit will increase as a result of  $x$ . The essence of CBA is identifying and quantifying all relevant benefits and costs such that the expected change in profit or utility can be calculated as a net benefit or loss. CBA simply identifies all the ways in which actions could affect  $TB$  and  $TC$ .

It should be noted that the mathematical structure of the profit maximization holds true for cases where the notion of incremental marginal benefit does not apply, (i.e. to purchase an item or not), because marginality applies when there is at least one additional possible unit of action.

Many complications in CBA arise in determining what counts as benefits and costs, as well as in deciding how to assign dollar values to goods that do not have market prices. Determining such factors in CBA is a dynamic, subjective process, requiring both creativity and adaptability given different scenarios. As a result, CBA analysis is not a uniform procedure, but likely to contain different biases depending on the purpose or motivation for the CBA, as well as the economists running the analysis.

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