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# CLARIFYING (OPPORTUNITY) COSTS

by Daniel F. Stone\*

## Abstract

Opportunity cost is widely considered to be a fundamental concept in economics. But the definition of the term continues to be both unclear and controversial. I describe how the term is widely used in two distinct ways, both in academic and non-academic contexts. I propose a practical way for educators to clarify the concept and related terminology.

**Keywords:** opportunity cost, implicit cost, explicit cost, economic cost, thinking like an economist

**JEL Codes:** A22, A21

“We learned about this cool thing called opportunity cost in economics today” –my college freshman year roommate, early fall, 1997

“What’s the difference between opportunity cost and just cost?” -me

“It’s hard to explain. . .” -roommate

## Introduction

Opportunity cost is widely considered to be a fundamental concept in economics. And yet it continues to be controversial. In a study that drew much attention, Ferraro and Taylor (2005) found that only 21.6% of professional economists correctly answered a seemingly simple question on the topic.<sup>1</sup> Potter and Sanders (2012) argue that the answers that Ferraro and Taylor (2005) claim were wrong were actually defensible and that the concept is fundamentally arbitrary. Becker (2007) questions the idea’s usefulness. O’Donnell (2009) also argues the concept is unnecessary and hence perhaps should be dropped. Polley (2015) argues the concept is deep but simply misunderstood due to lack of application at higher levels of economic education.<sup>2</sup>

Why is this ostensibly straightforward idea the subject of such debate? Part of the explanation may be that the term opportunity cost simply sounds like something other than what it is. “Opportunity cost” sounds like just one type of cost—that of a forgone opportunity. And indeed some people use the term this way, for example, saying “the opportunity cost of college” to refer to just the lost opportunity to pursue other earnings. But the term is typically defined in textbooks as “everything you must give up” to pursue an action, i.e. the full economic cost of an action. So the textbook definition implies the opportunity cost of college is forgone earnings plus direct costs, such as tuition. In the next section I provide evidence that the term is regularly used in these two distinct ways, in both academic and non-academic contexts.

This ambiguity has been noted by others before, but its prevalence and importance have not been recognized. One might respond that the textbook definition is unambiguous, it is simply parsimonious and thus subject to misinterpretation. This would then raise the question, is the definition too parsimonious? The recent debate in the literature, and in particular the lack of clarity about the correct answer to the Ferraro and Taylor problem,

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would seem to imply the answer is yes. In fact, one of our field's points of pride is that we attempt to define terminology with precision. Since it is typically a goal of the start of introductory classes to teach students what it means to think like an economist, it would seem appropriate to stress the value of precision in definitions, and be especially careful to avoid this kind of vagueness. And regardless of whether one thinks the existing definition is too parsimonious or not, one must admit it is confusing to have two terms (opportunity cost and economic cost) for the exact same concept.

How should teachers and other practitioners proceed? Can we make major changes to textbook definitions that have existed for decades? Probably not. Does that mean there is nothing that can be done now? Fortunately, no. The two components of full economic cost alluded to in most opportunity cost discussions—direct cost, and indirect cost of a forgone opportunity—happen to already be well represented by other existing textbook terms, explicit and implicit costs. These terms are typically not introduced until a much later chapter on production. I thus make the modest proposal of moving these terms up to the initial discussion of the opportunity/economic cost concept. Defining economic costs using these terms early on would allow students to easily see the distinction between these two key types of costs; i.e. to more clearly get the point of how economic costs can be deeper than plain-English costs. I also propose a more precise definition for the term implicit cost, which should both clarify how to determine its value, and that this term represents just the *best* forgone option (and not all forgone options), and I discuss variants in presentation and applications. These definitions facilitate the analysis of simple, but non-trivial cost-benefit decision problems, which should help students to understand the key ideas—and make the correct answer to the Ferraro and Taylor problem unambiguous.

## Definitions and usage of cost terminology

A standard textbook definition of opportunity cost is “the opportunity cost of an item—what you must give up in order to get it—is its true cost” (Krugman and Wells 2012: 7). That is, it is defined as what is often just called “economic cost”: the net sum of everything that must be given up in

order to obtain an item. Most books provide this definition in the first chapter and refer there to the concept being fundamental to the field, but do not provide formalization of the concept except by example (e.g., discussing how the opportunity cost of college includes both tuition and lost alternative uses of time, such as income from work). See O'Donnell (2010) for a systematic documentation of textbook definitions.

However, as noted by Frank and Bernanke (2011: 7), the term is also used in a different way: “some economists use the term *opportunity cost* to refer only to the implicit value of opportunities forgone.” The authors go on to say “virtually all economists would agree that [opportunity cost is defined as (total) economic cost],” implying to the reader that this discrepancy is not much of an issue. But the latter definition—the “implicit value of opportunities forgone”—is often the definition used in practice. In fact, both Frank and Krugman and Wells themselves include passages in their books that imply use of the second definition. Krugman and Wells (2012: 244) write, “If you choose to be a full-time student, the opportunity cost of that choice is the income you would have earned at a full-time job.” But this is just part of opportunity cost as the authors have previously defined it (“the income you would have earned at a full-time job” is not “the opportunity cost”). Frank (2010: 334) writes “[accounting cost] does not subtract opportunity or implicit costs from total revenue.” This implies opportunity costs are separate from accounting costs. Here are a few more examples. O'Donnell (2009: 31) writes “implicit (or opportunity) costs” (implying equivalence). Colander (2010: 278) says “total cost is explicit payments... plus the opportunity cost of the factors,” implying the opportunity cost of the factors is separate from the direct factor costs. Stiglitz and Walsh (2006: 169) write “Individuals often forget to include opportunity costs when they are making important decisions,” implying opportunity costs only describe the less direct and thus more forgettable type of costs.<sup>3</sup>

The second usage of opportunity cost may be even more prevalent in non-academic settings. In a typical example, Sabhlok (2013) writes, “With huge lost opportunity cost and debt, many graduates take jobs that never required a degree in the first place.” The Wikipedia page for “economic cost” on 9/3/13 said, “The economic cost of college is the accounting cost plus the opportunity cost” and on 6/4/14 said,

“Economic cost differs from accounting cost because it includes opportunity cost.” Each passage implies opportunity and other costs are separate.<sup>4</sup>

## A practical solution

One option for resolving this ambiguity would be to stick with the textbook definition and explain to students that the second usage of the term is common but simply incorrect. This approach would not address the root of the problem though. The fact that the second usage is so common has likely arisen from the textbook definition being terse and arguably incomplete (what exactly must be given up to do something?) and also from “opportunity” indeed sounding like it refers to a non-standard, indirect type of cost. Moreover, this approach would not eliminate the confusion from two terms (opportunity cost and economic cost) having the same meaning.

Instead, I suggest exploiting the existence of the less ambiguous and controversial terms implicit cost and explicit cost. These terms tend to be buried in later chapters on producer theory and firm costs. But when generalized appropriately they can easily be used to capture the key conceptual distinction between the more obvious costs directly associated with a choice, such as the monetary price of a retail good, and the more subtle cost of a lost alternative. The “obvious” cost is the explicit cost, and the cost of a lost alternative is the implicit cost. The total is the economic cost.

I thus propose the following generalized definitions, which assume an agent must choose exactly one action from a (finite) set of options. I discuss possible simplifications just below.

**Definition 3.1.** *The explicit cost of action  $X$ ,  $C^E(X)$ , is the direct cost (reduction in the agent’s goal), i.e. the cost of  $X$  that is independent of the attributes of any alternative to  $X$ .*

**Definition 3.2.** *The implicit cost of action  $X$ ,  $C^I(X)$ , is the value of the best forgone alternative, which is the maximum value of the benefit (improvement in the agent’s goal) minus the explicit cost for an alternative to  $X$ .*

**Definition 3.3.** *The economic cost of an action  $X$ ,  $C(X)$ , is the explicit cost of  $X$  plus the implicit cost of  $X$ :  $C(X) = C^E(X) + C^I(X)$ .*

The term “goal” is likely sufficient for the introductory level context, but, to be clear, refers to the agent’s objective function. Educators who wish to simplify these definitions could drop the references to goals (the parentheticals in the explicit and implicit cost definitions) and assume up front that all costs and benefits are measured in dollars, and perhaps also explain that a benefit (for  $X$ ) for consumers measured this way is equivalent to the maximum the consumer is willing to pay for  $X$ . In fact, I would advise taking this route, but provide the broader definition here in the interest of generality. The text after the comma in the explicit cost definition could also be dropped to simplify it.

Educators could simplify further by modifying the setup to refer to a binary choice, dropping “maximum” and changing “an alternative” to “the alternative” in the implicit cost definition, and “any” to “the” for explicit cost. One could then explain that the logic applies for choices from larger sets, as the agent can make a series of pair-wise comparisons, eliminating the inferior option until only two options, and then just one, remain. However, then the fact that an option’s implicit cost is the value of just the next-best option would be less transparent. Alternatively, educators might restrict attention to sets of either two or three options, and could make students aware up front about this limited scope. This would make thinking about the alternative options less abstract.

These definitions do not at all change the spirit of the terms’ previous definitions. But in addition to replacing “firm” with “agent”, the implicit cost definition is much more, well, explicit than existing definitions.<sup>5</sup> Krugman and Wells (2012: 244) define implicit cost as “the value . . . of the benefits that are forgone.” Frank and Bernanke (2011: 7) write “the implicit value of opportunities forgone.” My definition clarifies what is meant by “value”: the benefit minus the explicit cost of the next best option. While this might be a simple point, it is not often made elsewhere. It is non-trivial since one might also think “value” should be defined as simply benefit minus (economic) cost. But this would be logically incoherent. To see this, suppose there were just two choices,  $X$  and  $Y$ . If the implicit cost of  $X$  was the benefit of  $Y$  minus the cost of  $Y$ , which includes the implicit cost of  $Y$ , equal to the benefit of  $X$  minus the cost of  $X$ , then the implicit cost of  $X$  would include the benefit of  $X$ ! In other words, this definition would imply part of the cost

of choosing  $X$  is the benefit of  $X$ . This is a contradiction, given the understanding that a benefit of an action is distinct from the action's costs, implying this definition must be incorrect.

## Applications

Providing students with these definitions gives them a framework for formal analysis of relatively rich cost-benefit decision problems. For example, consider this question: "Amanda has to choose one of three options: a new backpack, a dinner out with a friend, and a new vest. The explicit costs are: \$50 for backpack; \$50 for vest; \$30 for dinner. The benefits (in dollars) are: \$70 for backpack; \$60 for vest; \$55 for dinner. What is the economic cost of dinner? Should she go to dinner?"

$C^I(\text{dinner})$  is the maximum of  $\{B(\text{backpack}) - C^E(\text{backpack}), B(\text{vest}) - C^E(\text{vest})\}$ , i.e. the max of  $\{\$70 - \$50, \$60 - \$50\} = \$20$ , and so  $C(\text{dinner}) = C^I(\text{dinner}) + C^E(\text{dinner}) = \$20 + \$30 = \$50$ , which is less than the benefit of \$55, so she should indeed go to dinner. And as mentioned above, these definitions make the correct answer to the Ferraro and Taylor problem unambiguous:  $C(\text{Clapton}) = C^E(\text{Clapton}) + C^I(\text{Clapton}) = 0 + B(\text{Dylan}) - C^E(\text{Dylan}) = \$50 - \$40 = \$10$ .

These definitions can also be used to formally show that if  $B(X) > C(X)$ , then  $B(Y) < C(Y)$  for any other option  $Y$ , demonstrating the validity of the basic cost-benefit decision rule to do  $X$  if  $B(X) > C(X)$ . The definitions can also provide formality to the "no free lunch" claim: that is,  $C(X) > 0$  for (almost) all  $X$ , since even though  $C^E(X)$  is often zero,  $C^I(X)$  rarely is. On the bright side there is always an optimal choice, i.e. an  $X$  for which  $B(X) \geq C(X)$ , since even if the benefits of all options are low, and  $C^E$ 's high, the best choice allows one to give up the even worse  $B - C^E$  of the best alternative.

And while going through these definitions in the first week of class may be more challenging for students than a less formal, more traditional discussion of opportunity costs, an additional benefit of this approach is that it makes the discussion of explicit and implicit costs in the context of producer theory much easier! However, as mentioned in the introduction, these definitions could be useful for providing clarity even if they are just discussed and not used for formal analysis.

## Discussion

I have already addressed several objections to my suggested approach, and provided several possible modifications. What are other objections? One is that what I suggest is trivial and understood by most instructors already. I agree that most of the ideas and observations in this paper are not new. However, the implicit/explicit distinction is not trivial and obvious to students—if it was, why would it be presented in later book chapters on production? And the debate over Ferraro and Taylor implies the relationship between the implicit/explicit distinction and the correct definition of opportunity cost is not known and agreed upon by all.

Another objection is that cost definitions are inherently ambiguous and the implicit/explicit distinction does not help to reduce this ambiguity. In response, I would again ask why the implicit/explicit distinction is included in later chapters of textbooks—the fact that these terms are standard implies they do provide additional clarity. I would also point out that the definition of implicit cost only refers to attributes of an alternative action, while the explicit cost definition refers to attributes of the action whose cost is referred to. I am unaware of any examples in which it is unclear what costs should be considered explicit versus implicit, using these definitions.

It would be understandable if educators prefer not to cover cost analysis at the very start of their introductory courses at the level of detail I suggest. Still, it would be ideal to at least have precise definitions available when costs are introduced, for students to have as a reference. Educators who prefer to avoid detailed analysis should be able to talk through the implicit and explicit cost definitions, or simplified versions, and do qualitative analysis or examples if they choose. This would still add clarity beyond the typical opportunity cost discussion in textbooks now.

What then to do with the term "opportunity cost"? It would be unwise for various reasons to suggest just dropping it. The term is not going away, and students should understand how it is used. But given the inconsistency in usage, I suggest it no longer be considered a technical term, with a single, correct definition. I recommend explaining to students the ambiguity in usage in practice. Educators can also continue to use the term when "safe," i.e. in a situation in which there are no explicit costs, as in

that case the two usages—full economic cost, and just implicit cost—are equivalent.<sup>6</sup>

## Conclusion

The point that the true cost of an action often exceeds its direct monetary cost is indeed worth emphasizing at the start of introductory courses. This is often why there is no free lunch. The fact that economic costs are true costs and thus distinct from, and deeper than, plain-English “costs” nicely illustrates how economics as a field can help students better understand the choices of others, and themselves.

It seems seriously problematic for the profession that the definition of the term used to convey these ideas, opportunity cost, used so often in both textbook and non-academic settings, is unclear. This paper proposes a simple and practical way for educators to resolve this issue. I hope this paper connects a few dots enabling both future and current economists to understand these key concepts more clearly.

## Notes

1. The question was: “You won a free ticket to see an Eric Clapton concert (which has no resale value). Bob Dylan is performing on the same night and is your next-best alternative activity. Tickets to see Dylan cost \$40. On any given day, you would be willing to pay up to \$50 to see Dylan. Assume there are no other costs of seeing either performer. Based on this information, what is the opportunity cost of seeing Eric Clapton? A. \$0 B. \$10 C. \$40 D. \$50.” Ferraro and Taylor (2005) said the correct answer was B.
2. See Buchanan (1969) for a seminal discussion, and O’Donnell (2010) and Polley (2014) for other recent papers. O’Donnell (2010) argues that many textbook definitions could be interpreted to include all options given up to pursue a choice, not just the next best option, and proposes calling any option given up, whether it is the next-best or not, a “trade-off cost.” Polley (2014) highlights how many references to opportunity cost do not pay careful attention to units and imply apples to oranges compar-

isons, and are thus not ideal for helping students to understand optimal choice.

3. Another example comes from a referee report for an earlier version of this paper! The report referred to “the textbook example of the economic cost (= direct + opportunity cost) of a college education.”
4. The Wiki page for opportunity cost gives a definition similar to the first textbook definition: “the value of the best alternative forgone, in a situation in which a choice needs to be made between several mutually exclusive alternatives given limited resources.”
5. Krugman and Wells (2012: 244) provide a typical definition of explicit cost as “a cost that requires an outlay of money.” My definition includes this cost but allows for other direct costs, such as psychological costs. For example, if working on a particular job is psychologically painful, this “pain” would be an explicit cost of the job, though non-monetary. An alternative proposal would be to create a new category of costs for this type of cost—direct, but non-monetary costs. As mentioned above, I think it would be impractical to propose new terminology. I think it is reasonable, and consistent with past usage and definitions of the term, to use explicit costs to refer to all direct costs. However, I admit that it could be unclear whether to categorize a psychological cost like this, or to simply reduce the benefit. I do not know of any applications, however, where this ambiguity would be problematic.
6. In fact, this is when the term is perhaps most often currently used in practice, suggesting an unspoken awareness of this ambiguity. For example, when discussing the PPF model, the loss in the Y-axis good from increasing production of the X-axis good by one unit can be safely called the opportunity cost of the X-axis good, or when discussing the choice of studying versus surfing the web, each action can safely be called the opportunity cost of the other.

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