Do Economists Recognize an Opportunity Cost When They See One? A Dismal Performance or an Arbitrary Concept?

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Ferraro and Taylor (2005) asked 199 professional economists a multiple-choice question about opportunity cost. Given that only 21.6% answered ''correctly,'' they conclude that professional understanding of the concept is ''dismal.'' We challenge this critique of the profession. Specifically, we allow for alternative opportunity cost accounting methodologies—one of which is derived from the term's definition as found in Ferraro and Taylor— and rely on the conventional relationship between willingness to pay and substitute goods to demonstrate that *every* answer to the multiple-choice question is defensible. The Ferraro and Taylor survey question suggests difficulties in framing an opportunity cost accounting question, as well as a lack of coordination in opportunity cost accounting methodology. In scope and logic, we conclude that the survey question does not, however, succeed in measuring professional understanding of opportunity cost. A discussion follows as to the concept's appropriate role in the classroom.

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1. Introduction

In an influential article, Ferraro and Taylor (2005) ask a large sample of PhD students and economists ''a very simple question that tests their understanding of opportunity costs'' (p. 1). Here is the question in its entirety:

> ***Please Circle the Best Answer to the Following Question:***
> *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 defend answer B ($10) as correct in the following passage:

> Given the correct answer was the least popular, we believe it worthwhile to state why $10 is the opportunity cost of seeing Eric Clapton. When you go to the Clapton concert, you forgo the

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$50 of benefits you would have received from going to the Dylan concert. You also forgo the $40 of costs that you would have incurred by going to the Dylan concert. An avoided benefit is a cost, and an avoided cost is a benefit. (2005, p. 4)

Ferraro and Taylor (2005) acknowledge that the question was adapted from p. 4 of Frank and Bernanke's textbook, *Principles of Microeconomics* (2001). Subsequently, Frank approves of the question's adaptation in the introduction of his popular economics book, *The Economic Naturalist* (2007b, p. 5), and reaffirms that the uniquely correct answer may be derived via a basic understanding of opportunity cost. The 199 economists who answered the adapted question responded as follows: A. $0 (50 responses); B. $10 (43 responses); C. $40 (51 responses); D. $50 (55 responses).

In response to the Ferraro and Taylor study, Becker (2007, p. 14) poses the following open question, "Could it be that graduate textbooks, as in my presentation on the shadow prices of teaching and research, have correctly given up on the introductory economics course idea of an opportunity cost in favor of more useful measures of price?"[1] Further, Margolis (2007) states, "But this does not really show that professors of economics have a grossly inadequate grasp of a routine technical term in their discipline, only that Ferraro and Taylor's rather odd question happens to trigger the sort of cognitive mechanism that accounts for illusory responses elsewhere" (p. 104).

Challenging the notion that the previous question "is straightforward and should not require great cognitive effort by PhD-level economists" (Ferraro and Taylor 2005, p. 6), we use standard economic assumptions to show that *any* of the four responses can be defended as correct.[2] In light of alternative interpretations, we argue that the question is not an appropriate instrument from which to gauge understanding of economic cost and related concepts. Moreover, we contend that opportunity cost accounting is sufficiently arbitrary to preclude it from reliably indicating one's understanding of marginal analysis. In fairness to Ferraro and Taylor, we suggest several difficulties involved in framing a valid question on opportunity cost.

Colander, Gaastra, and Rothschild (2010) present a pedagogical analysis of the "top-down" (e.g., centralized) and "bottom-up" (e.g., decentralized) costs of market restrictions. In so doing, the authors are able to texture the pedagogical analysis of a traditional economic concept. This article seeks the same general end in its treatment of opportunity cost accounting and logic. The remainder of this article is structured as follows. Section 2 explains the plausibility of answer D ($50) as a "correct" answer. Section 3 explains that willingness to pay for a Dylan ticket should be variable. Section 4 validates answer B ($40) as plausibly correct. Section 5 discusses conditions under which answer A ($0) is plausible as a "best" answer, section 6 discusses the concept's appropriate role in the classroom, and section 7 concludes the article.

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[1] John Stuart Mill is commonly attributed to have first recognized the concept of opportunity cost. Particularly, Mill's (1848) analysis of land prices considers the effect of opportunity cost. Thornton (2007), however, finds that Richard Cantillon (1755) demonstrated an understanding of the concept many years earlier. The popularity of the opportunity cost concept was further propagated by Alfred Marshall (1893) in his theory of quasi-rents. In the following year, D.L. Green (1894) introduced the phrase "opportunity cost" to economics literature. The concept was further developed by, among others, Philip Wicksteed (1910, 1914), Frank Knight (1928, 1934), Armen Alchian (1968), James Buchanan (1969), and Robert Nozick (1977).

[2] Margolis (2007) calls the question "odd" and compares it to the "Monty Hall problem" in its ability to generate illusory responses.

2. Why Answer D ($50) Could Be Correct

Ferraro and Taylor (2005) argue that the opportunity cost of seeing the Clapton concert is ($50 − $40) = $10. They explain, "When you go to the Clapton concert, you forgo the $50 of benefits you would have received from going to the Dylan concert. You also forgo the $40 of costs that you would have incurred by going to the Dylan concert. *An avoided benefit is a cost, and an avoided cost is a benefit*" (italics added, p. 4). Although Ferraro and Taylor refer to the foregone $40 ticket price as a *benefit* of seeing Clapton, they subtract the $40 from the *cost* of seeing Clapton. If the foregone $40 ticket price is indeed a benefit of Clapton, they might, more correctly, have added the $40 to the *benefit* of seeing Clapton. The method used by Ferraro and Taylor is not necessarily wrong, but it is arbitrary and contradicts their own definition of cost. Below, we explore an alternative methodology that more closely matches their definition of an opportunity cost. Let B_c be the willingness to pay for Clapton concert, B_d be the willingness to pay for Dylan, and p_d be the market price of Dylan.

Compared to methodology I, treating the foregone ticket price as a benefit rather than a cost increases the *benefit* of seeing Clapton by $40 while simultaneously increasing the cost of seeing Clapton by $40. Although the decision based on cost-benefit analysis has not changed qualitatively, the cost of seeing Clapton is now calculated to be $50.[3] The alternative methodology performs equally well in allowing one to properly utilize marginal analysis in describing a decision process. Therefore, the cost of seeing Dylan could be calculated as $50.

Indeed, one might think of the opportunity cost notion as an input in marginal analysis. Ferraro and Taylor admit that seven of nine surveyed introductory economics textbooks "do not provide the reader with enough information to answer our opportunity cost question correctly" (p. 10). Given the arbitrary nature of opportunity cost accounting, a major critique of the primary survey question is that it does not require marginal analysis.[4] The following quote (Ferraro and Taylor 2005, p. 10) discusses professional reactions to the survey question.

> In conversations with colleagues who did not choose $10, some have suggested that the correct answer 'depended on what one meant by value.' In particular, a common response has been to propose that those choosing $50 were focused on the 'gross' opportunity cost as opposed to the 'net' opportunity cost of seeing the Clapton concert. *We have never heard or read of the need to be precise about the 'type' of opportunity cost to which one is referring.*

This quote exhibits the type of confusion that exists because of a lack of operational standardization. Furthermore, there has not even been *discussion* within the discipline about a standardized "type" of opportunity cost. Ferraro and Taylor (2005) use accounting method I to obtain the answer of $10. A large number of their colleagues describe using accounting method II to arrive at an answer of $50. Both answers are justifiable, yet both answers are arbitrary. As it stands, applications of marginal analysis reside in a black box of sorts, and the concept of opportunity cost hosts myriad (vaguely nuanced) textbook definitions and understandings. Ferraro and Taylor use a follow-up question to further test understanding of opportunity cost. Their question follows.

> **Please Circle the Best Answer to the Following Question:**
> *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*

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[3] This analysis was inspired by an MBA student's answer to this question on a midterm essay.
[4] The question does not include the benefit of attending the Eric Clapton concert.

Table 1. Cost/Benefit Accounting in the Survey Problem

	Benefit of Clapton	Cost of Clapton
I. Ferraro and Taylor (2005)	$B_c - p_c = B_c - \$0$	$B_d - p_d = \$50 - \$40 = \textbf{\$10}$
II. Alternatively	$B_c + p_d = B_c + \$40$	$B_d + p_c = \$50 + \$0 = \textbf{\$50}$

$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 minimum amount (in dollars) you would have to value seeing Eric Clapton for you to choose his concert?
A. $0 B. $10 C. $40 D. $50

Note that this question differs from the original only in its final sentence. Ferraro and Taylor state the correct answer as $10, but they do not explain how they arrive at this answer. It is clear that the answer once again depends on accounting method. Table 1 establishes alternative cost accounting methodologies, and Table 2 considers answers to the follow-up question according to the alternative cost accounting methodologies established in Table 1.

Using cost-benefit analysis, methodology II implies that an individual would need a benefit of $50 to make the Clapton concert worthwhile. Meanwhile, methodology I implies that $10 is the correct answer. Ferraro and Taylor report that 44% of respondents answered $10 to the above question but do not report the proportion of respondents answering $50. The following example is further representative of the confusion surrounding opportunity cost accounting.

An Alternative Opportunity Cost Example

For methodological comparison, we consider an alternative opportunity cost example. The example, summarized in the following sentences, appears on p. 6 of Frank and Bernanke's (2010) textbook. In the example, there is a ticket price of $10 ($p_M$) to see a movie. One must forgo a $20 ($W_B$) babysitting job in order to attend the movie, where the reservation wage of the babysitting job is $0 ($p_B$). Willingness to pay for the movie (B_M) is not given in the example. Table 3 lists the benefits and costs of the movie according to the two opportunity cost accounting methodologies I and II.

In stating that the opportunity cost of going to the movie is $30, Frank and Bernanke reveal their use of accounting method II. In reference to the question Frank and Bernanke admit to students, "We must warn you, however, that some economists would use the term opportunity cost to refer only to the implicit value of opportunities foregone. Thus, in the example just discussed, these economists would not include the $10 ticket price when calculating the opportunity cost of seeing the film" (p. 7). Frank and Bernanke (2010) are essentially warning students that some economists use accounting method I. However, as we have shown, method I was the preferred method of Frank (2007a) when answering the Ferraro and Taylor survey question. In other words, while Frank and Bernanke warn students of *other* economists using method I in their textbook *Principles of Microeconomics*, Frank *defends*

Table 2. Accounting for an Alternative Cost/Benefit Question

	Benefit of Clapton	Cost of Clapton
I.	$B_C - p_C$	$B_d - p_d = \$50 - \$40 = \$10$
II.	$B_C + \$40$	$B_d + p_c = \$50 + \$0 = \$50$

Table 3. Movie Benefits and Costs

	Benefit of Movie	Cost of Movie
I.	$B_M - p_M = B_M - \$10$	$W_B - p_B = \$20 - \$0 = \$20$
II.	$B_M + p_B = B_M + \$0$	$W_B + p_M = \$20 + \$10 = \$30$

method I in his book the *Natural Economist* (2007b). We emphasize that Frank's ability to use cost/benefit analysis is sound. Our goal in this comparison is simply to reveal that nonstandardized accounting can lead to confusion within the discipline, especially in regard to economic education. The previous quote from Frank and Bernanke honestly assesses the very accounting issue that contributed to the variety of answers in the primary Ferraro and Taylor (2005) survey question.

3. Revealed Willingness to Pay

Based on their original question, Ferraro and Taylor (2005) assume that the market price for the Dylan concert is \$40, the market price for the Clapton concert is \$0 (since the ticket is free and has no resale), and willingness to pay for the Dylan concert is fixed at \$50. The following textbook quote uses typical reasoning found in principles of economics textbooks:

> The Cost-Benefit Principle tells us that a given person will buy the good if the benefit he expects to receive from it is greater than its cost. The benefit is the buyer's reservation price, the highest dollar amount he would be willing to pay for the good. The cost of the good is the actual amount that the buyer actually must pay for it, which is the market price of the good. (Frank and Bernanke 2010, p. 65)

Based on the quote, the consumer in the original survey question will **never** choose the Clapton concert over the Dylan concert because willingness to pay for the Dylan concert is always greater than market price. This conclusion is drawn from a standard interpretation of willingness to pay and from market price. The Frank and Bernanke (2010) quote implies that willingness to pay can exceed market price for only one good in a choice between two *mutually exclusive* goods.[5] In choosing one option over the other, the consumer reveals that he or she was *not* willing to pay the price of the other good under the circumstances. If you do not pay the price of a good under a given set of circumstances, in other words, this reveals that you are not willing to pay at least the price of the good under those circumstances. If willingness to pay for Dylan is fixed at \$50 and market price is \$40, then the consumer simply cannot choose the Clapton concert. Thus, the Ferraro and Taylor question loses plausibility provided the assumption that willingness to pay for Dylan is fixed at \$50. Given that the availability and price of substitute goods bears upon one's willingness to pay for a good, a variable willingness to pay stands to reason. Relaxing this assumption makes the question plausible but also jeopardizes the existence of a unique answer.

Although Ferraro and Taylor assume that willingness to pay is fixed, the actual language of the question supports the notion that willingness to pay can vary. The original question states, "On any given day, you would be willing to pay up to \$50 to see Dylan." As shown in

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[5] If an individual were indifferent between two mutually exclusive goods, then the respective willingness to pay for each good would be equal to the market price.

Table 4. The Case of Variable Willingness to Pay

	Benefit of Clapton	Cost of Clapton
I.	$B_C - p_C = B_c - \$0$	$B_D - p_D = B_D - \$40$
II.	$B_C + p_D = B_C + \$40$	$B_D + p_C = B_D + \$0$

the previous section, the Clapton concert would never be chosen on "any given day." Hence, it is reasonable to conclude that the day of the Clapton concert term is *not* just "any given day." This dilemma may have caused the deliberate consideration of the question by many surveyed economists that Ferraro and Taylor describe. On "any given day," one can imagine a day in which the consumer decides between a Dylan ticket and a typical activity (e.g., watching television). On such a day, we know that the individual is willing to pay \$50 for a Dylan ticket. In the context of American culture, however, a free ticket to a rock legend's concert is decidedly *more* attractive than a typical activity on "any given day." Hence, we expect that the willingness to pay for Dylan will be less than \$50 on the day in question. Given that willingness to pay decreases when an alternative activity becomes more attractive, one can plausibly conclude that the opportunity cost of Clapton is less than \$10, and answer C (\$10) is not correct. If willingness to pay for the Dylan concert (B_D) declines to \$40 or less on such a day, then the opportunity cost of the free Clapton ticket (according to the Ferraro and Taylor opportunity cost accounting methodology) is \$0.[6] Table 4 makes this point clear.

4. Why Answer B (\$40) Could Be Correct

Although it is unlikely that answer B (\$40) is the *best* answer, it is interesting to note that conditions exist under which this is the case. This answer is unambiguously correct when willingness to pay is rightly treated as variable, the individual is indifferent between the two alternatives, and accounting method II is used. When a consumer is indifferent between mutually exclusive goods, willingness to pay is equal to each good's respective market price.[7] Thus, an indifferent consumer would be willing to pay \$40 for the Dylan concert and \$0 for the Clapton concert. When attending the Clapton concert, the consumer need not buy the Dylan ticket. There is an added \$40 benefit from the Clapton concert, as the consumer avoids the \$40 Dylan ticket (i.e., an avoided cost is a benefit). Similarly, the cost of the Clapton concert is the lost \$40 (B_D) of seeing Dylan (i.e., an avoided benefit is a cost). Thus, with accounting method II and an indifferent consumer, the benefit of Clapton (\$40) is equal to the cost of Clapton (\$40), and answer B (\$40) is correct.

5. Why Answer A (\$0) Could Be Correct

Discussing the validity of answer A (\$0) in a 2007 lecture at Google headquarters, Frank (2007a) states, "I can't think of any narrative under which that could conceivably be the correct answer." However, Answer A (\$0) is the *best* answer when the consumer prefers the free

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[6] We assume that opportunity cost cannot be negative.

[7] This result was explained earlier and was derived from Frank and Bernanke's (2010) textbook.

Table 5a. Firm Example on Cost-Benefit Analysis of *i*th Unit Produced

	Benefit of Producing	Cost of Producing
I. Standard	R_i	C_i
II. Alternative	$R_i - C_i$	0

Clapton concert to the \$40 Dylan concert and accounting methodology I is used. This justification centers on the principle (developed in section 3) that willingness to pay is influenced by the attractiveness of alternatives (i.e., substitute goods).

We assert that the opportunity cost of Clapton will necessarily be \$0 (given accounting method I) whenever the individual prefers the free Clapton concert to the \$40 Dylan concert. This follows because the individual cannot be in two places at the same time. If an individual chooses the free Clapton concert, this choice necessarily reveals that he or she is *not* willing to pay the \$40 price for the Dylan concert. We can only conclude that his or her willingness to pay for Dylan, under the circumstances, is less than \$40. Within the question, the Dylan concert is called the "next-best alternative" for the decision maker (as opposed to the "best alternative"). Therefore, it is reasonable to assume that the decision maker prefers the free Clapton concert to the \$40 Dylan concert. The question's choice of language throughout, coupled with consideration of the notion that willingness to pay depends upon the price of relevant substitutes, establishes \$0 (A) as a reasonable *best* answer to the opportunity cost question.

6. The Role of Opportunity Cost in the Classroom

Ambiguity in opportunity cost accounting can be seen as a coordination issue within the economics discipline. Evidence of such a coordination issue can be seen on the popular *Marginal Revolution* blog (September 2, 2005; September 5, 2005). In the blog, Alex Tabarrok (September 2, 2005) and Tyler Cowen (September 5, 2005) discuss the Ferraro and Taylor (2005) survey question. The two well-trained economists utilize different opportunity cost accounting methodologies to arrive at different answers. Moreover, each economist ardently defends his particular interpretation, approach, and answer.

Chapters on the firm are standardized and explicit in their accounting methodology, as seen in Table 5a.

Perhaps the standardized notion of marginal revenue developed because it involves an explicit payment to the seller. The standardized marginal cost is the value of what is given up in the process of achieving the marginal revenue. Suppose the revenue from the *i*th unit (above) is \$12 and the cost is \$8. Table 5b shows the benefit and cost of producing under these conditions.

This standard method of accounting provides economists a common frame of reference. When talking with each other, economists are in agreement that a firm's marginal cost will always be positive and separate from marginal revenue. This is exactly the type of commonality that is lacking in the more general notion of opportunity cost. Although economists typically

Table 5b. Specific Firm Example on Cost-Benefit Analysis of *i*th Unit Produced

	Benefit of Producing	Cost of Producing
I. Standard	\$12	\$8
II. Alternative	\$12 − \$8 = \$4	0

define the benefit of producing the *i*th unit as the revenue (i.e., $12), students (in our experience) often answer that the benefit of producing the *i*th unit is $4. It is important for instructors to realize that students might disagree if asked to calculate the benefit and cost of producing. Perhaps the ultimate goal herein is not to calculate the specific benefits and opportunity costs of a situation but to analyze marginal decision making. In this spirit it is the student's ability to understand *surplus* that is most meaningful. For instance, an instructor could present both methodologies I and II (see, e.g., Table 1 or Table 5a) as alternative means by which to treat foregone value but stress that the same producer surplus of $4 emerges regardless of methodology. As in advanced economics training, a student may be exposed to alternative methodologies and be allowed to choose the manner in which he or she solves a particular marginal decision-making problem.

7. Conclusion

This article has analyzed the survey question and results of Ferraro and Taylor (2005) toward a deeper understanding as to professional meaning and comprehension of the opportunity cost concept. Ferraro and Taylor asked 199 professional economists a multiple-choice question about opportunity cost. Given that only 21.6% answered "correctly," the authors conclude that economists do not understand this basic economic concept. The present article shows that *every* answer to the multiple-choice question is defensible. We allow for alternative opportunity cost accounting methodologies—one deriving from the Ferraro and Taylor definition of the term and all allowing for valid marginal analysis. We also rely on the conventional relationship between willingness to pay and substitute goods to show the potential correctness of each possible survey response.

Additionally, we discuss the only logical meaning of revealed willingness to pay in the case of two mutually exclusive events. If you do not pay the price of a good under a given set of circumstances, this means that you are not willing to pay at least the price of the good under the circumstances. In the survey question this meaning is crucially violated by the assumption of invariant willingness to pay. Although Ferraro and Taylor assume that willingness to pay is invariant to the attractiveness of alternatives, principles of economics textbooks teach otherwise. In general, when the results of a question are used to critique professional economists, one's application of economic reasoning should not preclude the question from being answered correctly. The Ferraro and Taylor survey question suggests difficulties in framing an opportunity cost accounting question, as well as a lack of coordination in opportunity cost accounting methodology. In scope and logic we conclude that the survey question does not, however, succeed in measuring professional understanding of opportunity cost.

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