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Paul J. Ferraro*

Laura O. Taylor†

*Georgia State University, pferraro@gsu.edu

†Georgia State University, laura_taylor@ncsu.edu

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Do Economists Recognize an Opportunity Cost When They See One? A Dismal Performance from the Dismal Science*

Paul J. Ferraro and Laura O. Taylor

Abstract

One expects people with graduate training in economics to have a deeper understanding of economic processes and reasoning than people without such training. However, as others have noted over the past 25 years, modern graduate education may emphasize mathematics and technique to the detriment of economic reasoning. One of the most important contributions economics has to offer as a discipline is the understanding of opportunity cost and how to apply this concept to all forms of decision making. We examine how PhD economists answer an introductory economics textbook question that requires identifying the relevant opportunity cost of an action. The results are not consistent with our expectation that graduate training leads to a deeper understanding of the concept. We explore the implications of our results for the relevance of economists in policy, research, and teaching.

KEYWORDS: economic literacy, graduate education

* Authors may be contacted at PO Box 3992, Department of Economics, Andrew Young School of Policy Studies, Georgia State University, Atlanta, Georgia, 30302-3992. The authors would like to thank Peter Bluestone, Douglas Campbell, and Robynn Cox for research assistance, as well as David Colander, Robert Frank, Don Fullerton, Anne Krueger and three anonymous referees for helpful comments.

INTRODUCTION

“Equipped with thousand-plus page encyclopedic texts, many instructors feel they must acquaint students with every economic idea that has ever been written about. The unfortunate result is that, when the dust settles, most students leave these courses never having fully grasped the essence of the subject. For example, the opportunity cost concept, so central to our understanding of what it means to think like an economist, is but one among hundreds of concepts that go by in a blur. Opportunity cost is more important than, say, the idea that the short-run average cost curve is tangent to the long-run average cost curve at the output level for which capacity is at the optimal level. But one would never realize that from the relative emphasis these topics receive in many first-year courses.” -- Robert H. Frank’s *Introductory Microeconomics* syllabus (1999, Cornell University)

In an influential paper, Colander and Klamer (1987) surveyed students at seven top-ranking graduate programs in Economics. Based on the responses, they argued that graduate programs emphasized mathematics to the detriment of empirical content and economic reasoning. The report from the Commission on Graduate Education in Economics (COGEE), developed by a dozen eminent economists, echoed this sentiment (Hansen, 1991; Krueger et al., 1991) and included an oft-quoted concern that graduate programs generated “too many *idiots savants*, skilled in technique but innocent of real economic issues” (Krueger et al., 1044-1045).

In an update to his earlier study, Colander (2005) finds that students in the same graduate programs place a somewhat smaller emphasis on mathematic skills and much more on empirical applications, but building skills in economic reasoning continues to receive relatively less attention. We examine Colander’s conjecture that strong skills in economic reasoning are still lacking in the profession by asking Ph.D. economists and Ph.D. students attending the 2005 ASSA meetings a very simple question that tests their understanding of opportunity costs. The concept of “opportunity cost” is arguably the most fundamental concept in economic reasoning and thus an appropriate starting point for considering Colander’s conjecture. While we acknowledge that the responses of economists to a single question is a narrow context from which to make inferences about the entire discipline, we believe that the answers to our question offer substantial insight into the training of economists.

SURVEY DESIGN

Four graduate students administered the survey to voluntary participants at the 2005 Allied Social Sciences Association (ASSA) meetings in Philadelphia. Students intercepted potential survey respondents in the general meeting space of the primary hotels in which ASSA functions were taking place. The survey consisted of one question related to opportunity cost, and five follow-up questions asking respondents if they are a student, the year in which their Ph.D. was awarded if they are not a student, their major field of study, whether they have taught an introductory economics course, and the institution from which their degree was awarded or, if they are a student, the institution they attend.

Table 1. Characteristics of Respondents.

| <i>Characteristic</i> | <i>Response^a</i> | <i>Percent</i> |
|--|---------------------------------|----------------|
| Student | 64/192 | 33 |
| Year Ph.D. was Awarded (if not a student) | 1991 ^b [1962 – 2004] | n/a |
| Degree is from a top-30 institution | 83/185 | 45 |
| Respondent has taught introductory economics | 120/197 | 61 |

^a Respondent characteristics are reported as: {the number for which the characteristic is present}/{total number of responses to the question}.

^b Mean year [range] in which the Ph.D. was awarded.

Approximately 200 participants in the ASSA conference completed our survey, and they represented graduates of over 70 different institutions.¹ As Table 1 indicates, approximately 45 percent of our respondents were from institutions currently ranked in top-30 economics departments (Coupé, 2003).² Approximately one-third of the sample were students. Among respondents who have already received their degrees, the mean year of graduation is 1991 (median = 1995). There are respondents who received their degrees as early as the 1960's and as recently as 2004. In addition, approximately 61% of our sample, including both students and Ph.D. holders, have taught an introductory economics course at the university level.

The opportunity cost question we presented to respondents was adapted from page 4 of Robert Frank and Ben Bernanke's textbook, *Introduction to*

¹ Less than ten percent of individuals approached refused to answer the survey.

² We use two alternative sources for economics department rankings: Dusansky and Vernon (1998) and Coupé's update of his article for the period 1993-2003, available on his website (www.econphd.net/rank/rallec.htm). All results are unaffected by which source we use to define the top-30 departments.

Microeconomics (2001), and was presented exactly as follows to ASSA survey respondents:³

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

SURVEY RESULTS

We were surprised by the diversity of opinion regarding the value to which the term “opportunity cost” applies. As Table 2 indicates, the most popular answer was \$50, with 27.6% of respondents choosing this answer. The second most popular answer was \$40, with 25.6% of respondents choosing this answer. The third most popular answer was \$0, with 25.1% of respondents choosing this answer. The correct answer, \$10, was the least popular, with only 21.6% of respondents choosing this answer. In essence, the answers given to us by well-trained economists appear to be randomly distributed across possible answers.

Table 2. Opportunity Cost Survey Results.

| | Number of Observations | Number Choosing Answer (Percent) |
|---------------------|------------------------|----------------------------------|
| Answer is “A. \$0” | 199 | 50 (25.1%) |
| Answer is “B. \$10” | 199 | 43 (21.6%) |
| Answer is “C. \$40” | 199 | 51 (25.6%) |
| Answer is “D. \$50” | 199 | 55 (27.6%) |

³ We simplified the question by paring the text and rendering the format multiple-choice rather than open-ended. We also made the question more precise by writing that there are no other costs involved other than those stated in the question.

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 \$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. Thus, the opportunity cost of seeing Clapton, the value you forgo by not going to the Dylan concert, is \$10 – i.e., the net benefit forgone.

Based on our conversations with faculty and students who answered the question, we believe that respondents who answered \$50 erroneously believed that only the willingness to pay to see Dylan was relevant. Respondents who answered \$40 seemed to conflate the cost of the ticket to see Dylan with the opportunity cost. We are less certain about why many respondents chose to answer \$0, but our conversations indicate that many decided there must be no opportunity cost if the Clapton concert was free.

We also examine whether there are differences in responses across respondent characteristics. As Table 3 indicates, Chi-square and Fisher-exact tests reveal no significant differences in the percentage of correct answers when we compare: students and those who have graduated; graduates from top-30 institutions and graduates from all other schools; or respondents who have taught a principles course and those who have not. To speak directly to the impact of the Krueger et al. (1991) report, we divide our respondents into two cohorts based on the year in which they received their Ph.D. We assume that the earliest we might see changes in graduate programs as a result of the Krueger et al. report would be the year after the report was published. Students who matriculated in 1992 would graduate in 1996 or later. Thus, we divide our respondents into two groups: those who graduated prior to 1996 and those who graduated after 1996 or who are currently students. As Table 3 indicates, there is no significant difference in the percentage that chose the correct answer between these two groups. These results are not sensitive to our choice of graduation year to define the cohorts. There are no significant differences between the two cohorts no matter which year we choose as the “cut-off” date (we considered all years between 1991 and 2003).

The only significant difference we see across groups of respondents is by major field of study/research. We broadly categorize respondents into five areas: business economics, applied microeconomics, micro-theory, macroeconomics/international economics, and methods. Although not reported in Table 3 for succinctness, pair-wise comparisons of the number of correct responses by field indicate a significant difference between macro/international and applied microeconomics and between macro/international and micro theory, although the difference with applied microeconomics is only significant in a Fisher-exact, one-sided test. Macro/international is not significantly different from business economics or methods at any conventional level of significance. Given the small

Table 3. Opportunity Cost Survey Results by Major Cohort.

| | Number of Observations ^a | Number Who Chose \$10 (Percent Correct) | Pearson χ^2 (P-value) |
|---|-------------------------------------|---|--------------------------------|
| <i>Results by Degree Status</i> | | | |
| Ph.D. Candidate | 64 | 12 (20.3%) | 0.2397 (0.624) |
| Degree Already Awarded | 128 | 30 (23.4%) | |
| <i>Results by Rank of Alma Mater</i> | | | |
| Top-30 Institution | 83 | 19 (22.9%) | 0.0031 (0.956) |
| Institution Ranked Lower than 30 | 102 | 23 (22.5%) | |
| <i>Results by Instructional Status</i> | | | |
| Have Taught Principles | 120 | 27 (22.5%) | 0.2549 (0.614) |
| Have Not Taught Principles | 77 | 15 (19.5%) | |
| <i>Results by Year of Degree</i> | | | |
| Student or Graduate Post-1995 | 127 | 29 (22.8%) | 0.0090 (0.924) |
| Graduate 1995 or Earlier | 63 | 14 (22.2%) | |
| <i>Results by Field of Specialization^b</i> | | | |
| Business Economics | 26 | 4 (15.4%) | |
| Applied Micro | 95 | 24 (25.3%) | |
| Micro Theory | 7 | 3 (42.9%) | See text for discussion. |
| Macro/International | 49 | 7 (14.3%) | |
| Methods | 17 | 4 (23.5%) | |

^a The number of observations in a paired group may not sum to 199 because of item non-responses.

^b Examples of fields reported by respondents for our categories are:

Business: "accounting", "finance," and "organizational design"

Applied microeconomics: "labor," "health," "public finance," and "economics of education"

Micro theory: "game theory"

Macro/international: "monetary," "international trade," and "economic growth"

Methods: "econometrics," "experimental economics," and "statistics"

numbers in some cohorts and the potential to define fields in other ways, these differences across fields are intriguing but only suggestive.⁴

DISCUSSION OF RESULTS

Given our surprise, and that of our colleagues, regarding the diversity of responses, we consider several alternative explanations for our results. One might argue that our results could arise if respondents invested insufficient cognitive effort to answer the question and that more respondents would have answered correctly if we had provided an incentive, such as a monetary award for a correct answer. We find this explanation unlikely. First, the question is straightforward and should not require great cognitive effort by Ph.D.-level economists. When budgeting the time endowment for an undergraduate exam, most professors would likely allot no more than one minute to an opportunity cost question. Moreover, respondents spent, on average, close to five minutes answering the survey, which consisted only of the opportunity cost question, and five short follow-up questions about their student status or the year their Ph.D. was awarded if not a student, the institution they attended, their sub-discipline, and whether or not they have taught a principles course. Our interviewers reported that most respondents were clearly thinking about their answers; few respondents made their marks quickly and returned the survey. Some respondents orally noted the questions with regard to institutional affiliation and sub-discipline, and seemed to take their response seriously as a reflection on their alma maters and field of study. Finally, we note that we pre-tested our question with two-dozen colleagues at different institutions, and spoke with most of them after they answered the question. Only 21% answered the question correctly. Not a single pre-test respondent stated that he or she answered the question incorrectly because of random guessing. Instead, all were applying a flawed concept of opportunity cost to the question. For example, a couple respondents believed one needed to know the willingness to pay for the Clapton ticket to answer the question.⁵

⁴ Parametric models also support these findings. We estimated Probit models relating correct answers to each of the factors reported in Table 3. Models were estimated that included the year of degree as a categorical variable, as well as a continuous variable (coded as years since the award of the degree). The models indicate that the only factor that is a significant predictor of the respondent answering the question correctly is the variable indicating that the respondent's field of study is micro theory (the variable indicating macroeconomics is the respondent's field of study was the variable left out of the model).

⁵ As noted by a referee, we could have asked follow-up questions to our survey to determine which of these explanations is most likely. We believe, however, that reader reactions to earlier manuscripts and follow-up discussion with our pre-test sample and colleagues are adequate to gauge the importance of alternative explanations.

Another potential criticism of the survey might be the wording of the question or the way in which we administered the survey. Potential factors that might have influenced our results are the choice of performers who might not have been familiar to everyone, the simplicity of the question itself which perhaps led some respondents to think it might be a trick question, or from the pressure associated with having to answer the question knowing that the respondent's basic grasp of economic reasoning would be judged by a graduate student interviewer (i.e., too much cognitive effort, which could lead to errors). We find these potential explanations curious. The respondents were, after all, among the most well-trained economists on the planet, who make their living by answering questions and engaging in debate with students or with equally well-trained colleagues.⁶ Problems are often framed in terms of *i*th and *j*th players, or with notoriously contrived terms such as the “widget.”

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. And even if we were to agree that such a distinction is valid in economic theory, the failure to differentiate gross versus net opportunity cost in the question cannot explain the choices of more than half of the respondents who chose \$40 or \$0.⁷

Nonetheless, as a colleague pointed out, “[n]othing is important about a definition. It is only useful insofar as it helps us to think about a problem and to make the right decisions.” In these regards, we rephrased the question and conducted a second survey. The revised question reads as 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 \$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

⁶ A referee has pointed out, correctly, that there *might* be a selection bias if better economists tend to be too busy to be willing to take our survey during the conference. Given our response rate was over 90%, and that almost half our respondents were from top-30 institutions and should be able to answer the question even if they were not top of their class, we believe selection issues are minimal.

⁷ A referee has suggested that the reason some respondents chose \$50 as the answer was that they considered the \$40 cost of the Dylan ticket a sunk cost, even though the question does not indicate that the ticket had already been purchased. Again, even if some respondents considered the \$40 ticket price a sunk cost, over 50% of the sample clearly answered the question incorrectly.

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

We changed only the last sentence in the question. The reformulated question is designed to test whether or not economists can identify the relevant tradeoffs that guide decision making under the neo-classical economic paradigm. We posed the question to 34 individuals, of which only 15 answered this rephrased question correctly. A little over half of these individuals were ASSA participants and the remaining respondents were from economics departments at three Ph.D. granting universities in Georgia. The percent that answered the rephrased question correctly (44%) is significantly higher than the percentage that answered the original question correctly ($\chi^2 = 7.87$, p-value = 0.005), but still less than 50%.⁸

In our opinion, the most likely explanation for our results is best summed-up by a question posed to us by a colleague who is a faculty member at a Carnegie Class I research university, who graduated from a top-20 institution, and teaches microeconomic theory at the Ph.D.-level. This respondent answered the original version of the question incorrectly in a pre-test. As we did with many of our two-dozen pre-test respondents, we allowed him to choose again after revealing to him that his answer was incorrect. After three incorrect choices, the correct answer was arrived at by elimination, a common finding in our pre-tests of the survey. Our colleague then posed the following question: “When would I have learned the concept of opportunity cost? I don’t remember hearing that word used in graduate school.”

Indeed, the concept of “opportunity cost” is usually covered in the first week of an introductory undergraduate class and often deemed so straightforward as to not require further teaching time. We reviewed the indexes of three commonly used graduate economics textbooks and the term “opportunity cost” was not listed.⁹ A scan of each page in these books also failed to reveal the phrase, but we recognize that it is nearly impossible to scan a textbook by eye without error. We believe that graduates of Ph.D. programs have not mastered the concept of

⁸ There was little difference in the percentage of correct responses in the ASSA group and the Georgia group: 47% vs. 40%.

⁹ The texts were Jehle and Reny (2001), MasCollé, Whinston and Green (1995) and Varian (1992).

opportunity cost precisely because they have rarely been exposed to situations in which a deep understanding of the concept is required for advancement.

IMPLICATIONS

One may wonder, “So what if Ph.D. economists cannot identify an opportunity cost in a simple contrived question?” We believe that the failure of nearly 80% of our sample to answer the question correctly has important implications for teaching and, to a lesser extent, economic research.

The inability of most Ph.D. economists to answer a simple opportunity cost question implies that students at colleges and universities are unlikely to learn this crucial concept in a way that allows them to apply it in their daily lives. Recall that over half of our ASSA sample had taught a principles course in the past, but only 22.5% of these teachers answered the question correctly. The teaching of introductory economics has long been a target of criticism in the economics profession. As far back as 1963, George Stigler wrote (p.657),

“[T]he watered down encyclopedia which constitutes the present course in beginning college economics does not teach the student how to think on economic questions. The brief exposure to each of a vast array of techniques and problems leaves with the student no basic economic logic with which to analyze the economic questions he will face as a citizen.”

This criticism is still relevant (see, for example, Hansen et al., 2002). The connection between the teaching of principles courses and students’ understanding of opportunity costs is emphasized by the results of an additional survey we conducted. We administered the original opportunity cost question to 358 undergraduate students in the first week of an *Introduction to Microeconomics* course, before any lecture on opportunity costs was given. We asked students to indicate whether they had taken an economics course in the past. Of these students, 270 (76%) had taken *Introduction to Macroeconomics* or a high-school economics course and 86 (24%) had never taken an economics course before. Of the students who had taken a previous economics course, only 7.4% of them answered the opportunity cost question correctly. Of the students who had *never* taken an economics course before, 17.2% answered the question correctly. The difference between the two groups is significantly different (Pearson $\chi^2 = 7.13$, p-value = 0.008). Interestingly, there is no significant difference between the proportion of Ph.D. economists that answered the question correctly (21.6%) and the proportion of undergraduates *with no prior exposure* to economics that answered the question correctly (Pearson $\chi^2 = 0.714$, p-value = 0.398). The data

thus suggest that advanced study is necessary to rectify the damage done to economic intuition by an introductory economics course.

The obvious extension to the above inquiry is to examine introductory economics textbooks upon which lectures are based, and which are likely to be the only economics reference book most individuals will ever read. We examined nine top-selling, college-level introductory economic textbooks to determine the way in which opportunity cost was defined and the way in which practice questions were posed.¹⁰ After reading the introduction to opportunity cost and discussions that include the term opportunity cost, including dialogue boxes and examples for all pages listed in the index under “opportunity cost,” we believe that seven out of nine do not provide the reader with enough information to answer our opportunity cost question correctly. Six of the nine textbooks use phrases such as “the value of the next-best alternative” or “the benefit of the next-best alternative” to define opportunity cost.¹¹ Three of the nine do not refer to “value” but instead refer to “what you give up” when undertaking an activity – the “what” is left undefined.

While the definitions given in the texts we reviewed are correct, they are terse and rely on examples to help the reader gain a deeper understanding of the term and what is meant by “value” or “benefit” of the next-best alternative. However, most texts use one-dimensional examples – examples that only imply foregone benefits of an alternative activity. For example, to describe opportunity cost, six of the nine books discuss the reader’s opportunity cost of attending college or taking a college course, or a hypothetical example of a college athlete who could be playing professional sports and earning a large salary rather than attending college. In all but one of these six textbooks, the opportunity cost is simply the foregone benefit of the next-best alternative (e.g., foregone wages). In only two of the nine reviewed textbooks were the opportunity cost examples rich enough for the reader to realize that one must consider both benefits and costs of the alternative activities. Based on these textbook examples, it is not surprising that fewer than 1 in 10 students with exposure to introductory economics could determine the opportunity cost of attending the Clapton concert in our question.¹²

¹⁰ The textbooks we reviewed were: Arnold (2005), Case and Fair (1999), Colander (2004), Frank and Bernanke (2001), Mankiw (2004), McEachern (2006), Miller (2001), Parkin (2005), and McConnell and Brue (2004).

¹¹ The definitions are all quite similar and very close to what we have written, just arranged slightly differently from a grammatical standpoint. For example, Miller (2001) writes “The value of the next-best alternative is called **opportunity cost**” and Parkin (2005) writes “The highest value alternative that we give up to get something is the **opportunity cost**.”

¹² The situation in high-school is likely as bad or worse. Note that in 23 states, high-school economics teachers are not required to have had any college-level economics courses and thus probably learn their economics from the textbook alone. In the 27 states with minimum course requirements, the average requirement is a single college-level economics course (Aske 2003).

We now turn to a much more difficult question: “Does it matter for economic research if economists cannot identify the opportunity cost in a simple contrived question?” We do not have a clear answer to this question. Obviously, it matters for Ph.D. economists who take jobs in the private or government sectors in which opportunity costs are the fodder of daily decisions, and the only input economists are likely to have. For academic research, it apparently does not matter. Theoretical research rarely requires that an individual calculate an opportunity cost in the form of a word problem. Empirical research tends to focus more on appropriate techniques to make inferences about parameter values in models. But can economists be relevant in the world of ideas and policy if we cannot answer simple, albeit contrived, opportunity cost questions?

CONCLUSION

In their introductory textbook, Case and Fair (2001) write that, “[a] good way to introduce economics is to review three of its most fundamental concepts: *opportunity cost*, *marginalism*, and *efficient markets*. If your study of economics is successful, you will use these concepts every day in making decisions.” We chose one of these fundamental concepts, opportunity cost, and set out to determine if Ph.D. economists and students in undergraduate economics courses had acquired a solid understanding of the concept. Our results indicate that few respondents have the ability to apply the concept to a simple example.

We believe the implications of our results for undergraduate teaching are important. If we are unable to instill in our students a deep and intuitive understanding of one of the most fundamental ideas that the discipline has to offer and the idea whose frequent application could do the most good in peoples’ private and public lives, then we wonder what we can claim as our value-added to the college curriculum.

Moreover, the incomplete understanding of opportunity costs acquired in the undergraduate curriculum persists through graduate education because the concept is neither revisited nor applied in most graduate curricula. In 1991, Krueger et al. (p. 1052) reported that they believed “graduate education can be improved if relatively more emphasis is given to providing students with applications of the tools of economics to economic problems.” Our results suggest there is still ample room for improving the ability of graduate students to apply economic reasoning to real-world problems.

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