

# Quit Lying and Address the Controversies: There Are No Dogmata, Laws, Rules or Standards in the Science of Economics

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Forthcoming in the *American Economist* (Spring 2007)

2005-2006 Presidential Address, Midwest Economic Association, Chicago IL, March 25, 2006.

## I. Introduction

The “No Child Left Behind” K-12 education initiative is associated with The National Assessment of Educational Progress (NAEP). The NAEP Economics Framework project website <<http://www.naepecon2006.org/projoverview.asp>> states that its advisory panel “assures that the assessment specifications meet recognized technical standards.” This pre-college thinking has permeated advice on the teaching of economics at the post-secondary levels:

Here we offer a strategy for refocusing the Principles course on economic literacy ...The Voluntary National Content Standards in Economics are the building blocks of our Principles course. The 20 Standards provide an operational definition of economic literacy ...the core of economic knowledge and descriptions explaining what students should be able to do with that knowledge. (Hansen, Salemi and Siegfried, 2002, 464.)

But there are no standards in the science of economics. I will argue here, as I have elsewhere, that other than a need for honesty there are no rules, laws or dogmata in economics and attempts to impose K-12 thinking in higher education will, to paraphrase Veblen, render university faculties to be nothing more than high school teachers masquerading as something much greater.<sup>1</sup> Doing in universities what is arguably legitimate for high schools is remedial education (or training) and not higher education.

## II. Controversies in Science

One might assert that if economics is truly a science then like other sciences it must have a core of non-controversial principles that stand the test of time. Even without knowing much if anything about other sciences, however, academic economists should be aware of heated debates in the natural sciences from reading the *Wall Street Journal* and like media sources readily available to them. For instance, *WSJ* articles by Begley

(2005a; 2005b) detail such controversy. MIT's Frank Wilczek (who shared the 2004 Nobel Prize in physics) is quoted by Begley saying that some alleged laws of physics are rightfully disputed, giving as an example the concept that mass is conserved, a staple from introductory courses. Wilczek is quoted saying "But that couldn't be more wrong. Massive particles such as protons are built of quarks and gluons, which have zero mass (unless they are moving). Mass is far from conserved." From high school physics we learn that for every action there is an equal and opposite reaction; yet, Wilczek is quoted by Begley saying that is not universally true: "It fails for magnetic forces between charged particles."

Begley tells of high school biology teachers presenting without question that auxin promotes plant growth, when the reality is far more complex as seen in the raging controversy over how, if at all, it does so. She reports that only recently did Indiana University's Mark Estelle and colleagues find that auxin attracts and binds plant proteins that silence growth-promoting genes. It is the enzymes that then devour the silencers that allow growth genes to turn on. Astronomers argue over the dark matter that pervades the universe. Thus, an up-to-date textbook should state that dark matter exists but its composition remains an enigma. Begley's examples of controversy in the natural sciences that are not being taught in introductory science classes goes on and on but can be summarized with the quote from physicist Lawrence Kraus of Case Western Reserve: "Every scientific theory is constantly under scrutiny and has unknowns at the edges."<sup>2</sup>

### **III. Looking Back**

The idea that students need a sense of the historic development and mastery of basic concepts in a science to be literate in the science was dismissed by Richard Feynman (co-recipient of the Nobel Prize in Physics in 1965, and at the time a faculty member at the California Institute of Technology) when he was asked to teach Caltech's undergraduate 2 year introductory course in physics (Glenick, 1992). Before Feynman, the normal introductory university physics courses went through the historic basic concepts reaching atoms and molecules in the final weeks. Feynman, however, gave short shift to physics before the 1920s going right to quantum physics in his second lecture, which at the time was the sexy stuff that students could get excited about.

Over 40 years ago economists, such as the late G. L. Bach, who was then Chair of the American Economic Association's Committee on Economic Education, championed the idea of emphasizing a few basic economic concepts in the hopes that students would at least retain something (although his principles textbook was encyclopedic). The late Ben Lewis, also a chair of the AEA Committee on Economic Education bemoaned the fact that his beloved short list of economics laws was being eschewed by mathematical innovations in the rapidly advancing science of economics. He lamented:

Ours was an economy of principles, law and order. The Law of Self-Interest and the Law of Supply and Demand governed our microconcerns, and our macroconcerns were few and slight. Says Law insured us against anything more troublesome than exceptional . . . money was kept in order by Gresham's Law. No one dreamed of questioning the constitutionality of our laws . . . The Depression opened the door . . . through the open portal came a couple of mathematicians. They stayed to dinner. They, too, were movers – they moved in . . . my old world was gone; economics began its frantic scramble for recognition as an exact science.” (1970, 6-7)

To heed the advice of those who continue to advance the doctrinaire teaching of concepts such as opportunity cost and comparative advantage, self-interest and incentives, supply and demand, marginal costs and benefits and the like, with little or no discussion and questioning of the conditions required for their use in analysis and ignoring innovations in economics are giant steps backward in the teaching of economics.

If for no reason other than the time constraint, to say nothing of learning theory, classes in any subject cannot be encyclopedic. The number of concept to be taught must be limited by the amount of time available for learning. This observation, however, does not imply that a short list of outdated concepts be emphasized to the exclusion of more appropriate alternatives. For example Victor Fuchs (2004) tells of his use of the case method in the 1950s and how he came to believe that in teaching his philosophy is captured by the aphorisms of “less is more” and “there is no teaching, only learning,” which 50 years later are two views that are still being advanced by many in the economic education movement as novel. But unlike many of the current advocates of the “less is more” philosophy, Fuchs calls attention to the limitations of economics and the need for honesty in spelling out the shortcomings of economic analysis. Similarly, eminent

economist and textbook author Edmond Malinvaud (2004) warns teachers of economics to avoid a set of dogmatic and typically invalid methods of old and the misuse of so-called stylized facts as if they were empirically valid. There must be real empirical support for the analysis we advance in the classroom or students will rightfully dismiss us as dreamers or worse yet, frauds.

#### **IV. Outdated and Misused Ideas**

During an office interview of a newly minted Ph.D. candidate for an entry-level professorship, I asked her to relate the ideas of equilibria in economics science to what students see in the popular press. She paused and said, “Well, supply and demand . . .” I asked how she would respond to satirist P. J. O’Rourke’s assertion (in *Eat the Rich: A Treatise on Economics*, 1999) that textbook supply and demand graphs do not help much in analyzing situations that are found in newspaper headlines? I did not get much of an answer.

I was equally bemused by a viewer chiding provocative TV Talk show host Bill O’Rielly (October 10, 2005) for going after the energy companies for “gouging,” saying he should understand competitive free markets because he surely used supply and demand to negotiate his compensation package on the FOX network.<sup>3</sup> He responded that Enron demonstrates how markets can be manipulated and that he actually took a lower salary to be with FOX.

A recent house guest who teaches masses of introductory students berated me for maintaining a lawnmower and cutting my own grass because my comparative advantage lay elsewhere. He called my attention to an example in Gregory Mankiw’s (1998) textbook in which a hypothetical question is raised as to whether highly paid basketball star Michael Jordan should cut his own grass, at an alleged opportunity cost of \$10,000, given that a neighbor girl can be hired at \$20. My house guest did not appreciate my calling his attention to the enjoyment I and possibly Jordan get from cutting grass, not being dependent on others, and multitasking (joint production of physical conditioning and grass cutting -- one minute walking behind the lawnmower is one less minute on a treadmill).<sup>4</sup> Curiously, Gary Becker’s 1992 Nobel Prize winning work on productive consumption (activities that enhance both utility and wealth) was ignored by Mankiw and my academic economist house guest.

Is it really true that many of the things of interest to students and things that they see and hear in the popular media lend themselves to supply and demand analysis, comparative advantage assessment, and like ideas that are advanced as the bedrock of introductory classes? Is one really economically literate if he or she has mastered the rhetoric of outdated textbook economics? Given modern advance in the science of economics, literacy today implies that a student confronted with an application of a supposedly immutable principle can articulate why the underpinned key assumptions are likely not met in the real world. Students who are literate in economics should be able to recognize that there are no “principles of economics” in the sense of basic truths in economics. The principles that economists think they are teaching are in fact theories underpinned far too often with assumptions that are unlikely to be met in actual circumstances and which when blindly applied give erroneous results.

For example, when imperfect information leads to the use of price as a measure of quality -- as in used-car markets, insurance, and labor markets -- then an equilibrium may be characterized by inequality between quantities demanded and supplied, and a neat separation of demand and supply curves may not be appropriate. Scarcity of concert tickets may actually increase their attractiveness making static demand curve analysis meaningless. Similarly, supply and demand curves are arguably unidentifiable in the case of medical and legal services.

The traditional competitive model of the Arrow and Debreu variety is based on a collection of identical items. If one tries to define a market for an individual, such as that for Bill O’Reilly, then it is not a competitive market. Saying that the relevant object is not the individual TV personality Bill O’Reilly but all such talk show hosts implies competition but all talk show hosts cannot be treated as homogeneous as in a competitive market. As Joseph Stiglitz (1987) wrote some 20 years ago, we need to articulate the

...difference between economies in which the law of supply and demand is repealed and those where it still holds . . . markets in which commodities are completely homogenous – with respect to location and the date as well as other characteristics – are almost inherently sufficiently thin so that the postulate of perfect competition is inapplicable. Markets that are sufficiently ‘thick’ to be competitive are almost always nonhomogeneous.(25)

Using the textbook supply and demand graphs, an instructor will have problems correctly guiding a student who comes in with a quote such as this from Michael Collins, a retail partner at Bain & Co. in Chicago:

Making the 1,000<sup>th</sup> DVD player is a lot more efficient and less expensive than making the first, and that's reflected in the lower price. The difference between the manufacturing cost of the 1 millionth and the 2 millionth is miniscule. (El Boghdady and Musgrove, 2003, E2)

Traditional discussions of supply curves are problematic when marginal costs are approximately zero, as is the case for many information-based goods with which students are familiar. The identification of supply and demand shifts are further complicated when demand for a product depends in part on its widespread usage. The idea that a fall in the price of capital relative to the price of labor necessitates a shift out of labor and into capital was refuted by the Cambridge controversy when the entire notion that capital (or labor) could be treated as homogenous was contested.

Students do need to learn about supply and demand, but they also need confirmation that textbook-style competitive markets with demand and supply curves that might work for agricultural commodities, at least in an idealized world, do not work for all items of interest to them. Students need to see situations in which increasing or decreasing a price does not automatically imply higher or lower profits, but they don't need to spend hours calculating meaningless elasticities. They need to know about the principle of comparative advantage, but they also need to learn the difference between static and dynamic analyses<sup>5</sup> and learn how risk is defined and reduced through diversification, not specialization.<sup>6</sup> Students recognize that there is satisfaction in doing things oneself and that behavior toward risk must enter decisions – we are not all nor are we always risk neutral, risk adverse or risk lovers. Thus, how can instructors expect students to ignore these things when they are given rigid multiple-choice tests on overly simplistic and outdated economic concepts?<sup>7</sup>

## **V. Standards**

Any professor of economics can identify the field's traditional basic concepts. The trick is to recognize and articulate the shortcomings of simplistic analysis before students rightly dismiss it as irrelevant and then wrongly dismiss all of economics with it.

Bright and motivated students will view standards that are based on out-dated ideas and inappropriate methods of analysis, no matter how hard and complex, as dismal. For instance, the driver's test administered by Britain's Driving Standards Agency is regarded as one of the hardest in the world. Only 44 percent of takers pass, compared with 79 percent in Germany and 61 percent in New York State; yet, 20 percent of those passing the British test have accidents within a year of passing (Calian and Stecklow, 2002). This test is mocked as outdated, remaining relatively unchanged since the 1920s – correct actions include: using the hand break to bring the car to a stop; being able to back around a corner and up one block next to a curb without touching the curb; never crossing hands when turning the steering wheel; looking in the review mirror before activating the turn signals; etc. Within the United States, the claim is made that state law and medical exams have become dated as seen in the California exam where more than 50 percent of the state law takers fail, including Stanford Law School Dean Kathleen Sullivan, (Bandler and Koppel 2005).

As stated in Becker, Greene and Rosen (1990), some basic skills may have a high value at one point in time and little value at another; for example, the Polish cavalry was revered as highly skilled and unmatched in discipline and high standards, however, that tradition of excellence came to a tragic end when confronted with the German tank. As with cavalry skills, paper and pencil long division was trumped by an ability to manipulate a slide rule, which fell in value with the availability of the inexpensive hand calculator; the ability to work the hand-held calculator fell in value with the advancement of computer spreadsheets and statistical packages. Since writing with Greene and Rosen, the development of online search engines has made library card catalog skills obsolete.

So, too, in economics: skills, ideas and information become dated. The advent of the modern-day computer, for instance, has turned economics into a more empirical subject, as seen in the work of recent recipients of the Nobel Memorial Prize in Economic Science. Yet, the typical undergraduate curriculum gives little attention to the importance of empirical research and empirical findings. For instance, standard textbook demand and supply analysis is presented as religious dogma to show that minimum wages destroy jobs; yet, empirical evidence by Card and Krueger (1997) has stirred debate about the accuracy of this widely accepted theoretical assertion. Even Levitt and Dubner's (2005) research behind the pop-culture book *Freakonomics* is data driven with

ideas that are at the frontier of economics and not at all in keeping with standard textbook presentations.

Innovations in the science of economics are not making their way into the teaching of economics at the undergraduate level. For example, although Nobel prizes are typically awarded for work completed years earlier, and Zahka (1999) described how the Nobel Laureates' acceptance speeches can be used in teaching the principles of economics, as I report in Becker and Greene (2004) the work of Nobel Laureates is rarely presented regularly in principles textbooks prior to announcement of the award and even seldom afterward.

Although major empirical findings and related debates are regularly reported in the popular press they are not featured in introductory textbooks. Instead what we are beginning to see is a trend toward the presentation of stylized facts, employed to give the appearance of empiricism. True academic debate, such as that between Harvard's Caroline Hoxby and Princeton's Jesse Rothstein over Hoxby's empirical assessment of the importance of school competition, was sufficiently important to make it onto the front page of the *Wall Street Journal* (October 24, 2005) but somehow is not appropriate to be mentioned in textbooks.

A learned professor with refined (or yellowed) classroom notes might argue that current theoretical works and empirical methods of investigation are beyond the grasp of the typical 18- to 22-year old. However, students are aware of the idea of the complex dynamics of chaos theory from movies such as the schizophrenic thriller " $\pi$ ", where Max says, "If you graph the numbers of any system, patterns emerge; therefore, there are patterns everywhere in nature . . . So what about the stock market? A universe of numbers that represents the global economy . . ." A similar theme appears in Tom Stoppard's play, *Arcadia*. An anthology by Watts (2003) provides nearly a hundred passages from both classic and contemporary literature and drama dealing with a wide range of economic concepts and issues. Contemporary movies like " $\pi$ " and plays like *Arcadia* can engage the general movie and theater-going population with current economic ideas.

For example, following the showing of Max's clip from " $\pi$ ," macroeconomics students who have had some exposure to probability theory can be challenged by Mathews' (2000, pp. 242-246) "urn activities" to show the "Polyaprocess" in which

multiple equilibria result from a stochastic time process involving the sequential drawing and replacing of balls based on a stochastic decision rule. Mathews (2001) places the importance of this classroom experiment in an economic context through examples drawn from history.

Learned professors accustomed to only chalk and talk teaching methods might also agree that the idea of a Pareto equilibrium is a theoretical concept not to be observed in the real world. But, again, turning to the movies, consider the blonde-in-the-bar clip from “A Beautiful Mind.” I have used this clip as a motivational tool to establish the connection between Adam Smith’s invisible hand and John Nash’s recognition of the role of cooperation with heterogeneous student bodies consisting of both entry-level university students and advanced graduate students.<sup>8</sup> I sandwich this clip between Charles Holt’s (1996) trading-pit simulation (in which a Smithian equilibrium results from students pursuing their individual self-interest as demanders and suppliers) and Pickhardt’s (2005) extension of Holt and Laury’s (1997) classroom simulation in which a less than optimum non-cooperative equilibrium tends to dominate a Nash cooperative equilibrium, which is the Pareto optimum.

## **VI. Textbooks**

Colander (2004) tells how he entered into textbook writing with an ambition to change the way economics is taught, with among other things an emphasis on complexity and dynamic processes. To market books he describes how he was led by reviewers and editors to follow the standard static framework of market clearing prices and AS/AD. He stated that instructors must recognize that textbooks do not represent what the author knows or believes:

a text(book) is not a direct expression of what the author believes, but instead a combination of a much more complicated set of considerations in which inertia and processes, not intellectual or even pedagogical validity, play the central roles . . . users of the books should be aware that that’s what principles of economics textbooks are, and structure their teaching accordingly, adding context to the discussion whenever possible. (39)

Although some textbook authors and their publishers may be pandering to the remedial approach of many college introductory courses that are taught as secondary-

school courses masquerading as much more, it is refreshing to read how Carolyn Shaw Bell (2004) responded in her early days of teaching at Wellesley College when she was assigned to a consumer economics course for which she found the requisite content dreadful. Instead of taking the easy road and going along with material in the textbooks of the day, she “refused to admit this body of prejudice, misinformation and ninth-grade arithmetic into my field of economics,” and began an inquiry into the subject that has lasted over 20 years. This defiance is yet another illustration of how students in institutions of higher education benefit from having a research-oriented economist teach an introductory class versus a docent who can only parrot what is in the textbook or on some standardized multiple-choice test. It is the instructor’s job to bring his or her students current thinking and up-to-date debate going on in the science of economics.

Many intermediate and advanced economics textbook authors present without question the tenets of expected utility theory, even though the work of Nobel Laureate Daniel Kahneman and Amos Tversky demonstrates that decision-makers have trouble with the concept of probability and the valuation of expected gains and losses.<sup>9</sup> The Allais paradox (which is named after Maurice Allais, the 1988 Nobel Prize in economics recipient) can be used to demonstrate the trouble people have ordering uncertain prospects in a way that is independent of irrelevant alternatives – a critical postulate for von Neumann and Morgenstern’s expected utility theory.<sup>10</sup>

One of the insights that Kahneman and Tversky had was that choice problems are usually described in terms of gains and losses, but the utility functions that were supposed to explain the choices were defined in terms of absolute levels. Similar to Harry Markowitz, who won the Nobel Prize in economics in 1990, they decided to adopt changes and/or differences as the sources of utility, which provided the foundation for their “prospect theory,” as used in “behavioral economics” today. Prospect theory replaces the notion of “utility” with “value,” which is defined in terms of gains and losses as deviations from a reference point. The value function for losses is convex and relatively steep, but for gains, it is concave and not quite so steep. In addition, Kahneman and Tversky replaced the probability factor for each preference with a subjective “decision weight” that tends to overweight small probabilities and underweight moderate and high probabilities.<sup>11</sup>

I hear instructors employing traditional textbook economics saying: “students will not understand these calculations!” To those instructors, I ask: what do you think they are teaching in psychology?

### **VIII. Enough Is Enough!**

Becker and Greene (2004) give numerous other ways in which the contributions of the Nobel Laureates in economics can be used to bring more current thinking into the classroom so I will stop with those examples here. An instructor does not have to endorse dynamic analysis, complexity, prospect theory, the more general theories of bounded rationality, or delve into the intricacies of probability theory in decision-making, but those teaching economics today can no longer ignore this work even if the textbooks do. Students are no longer confined to what is in textbooks. The Internet provides them with up-to-date data, headlines, commentary and academics’ views on the economy and current events.<sup>12</sup>

I am not calling for anything like Nobel Laureate Richard Feynman’s dismissal of pre-1920 ideas in his teaching introductory physics. Students need to know the historic rhetoric of economics to communicate in economics, but that level of understanding does not require an unquestioning belief that those concepts can be widely applied in situations where research suggests that they come up short. As reflected in the work of the Nobel Laureates in economics and other well recognized modern day economists, much has been learned to amend, clarify and in some cases replace ideas of old. The process of modifying and replacing the old with the new involves argument and debate. It is contentious.

An economist might rightfully ask why academic economists are not already bringing controversy into their classrooms, if it is desired? In the case of probability and decision-making, Christopher Sims (2001, p. 53) states that few economists have been taught -- and thus they have not given thought to -- the differences and similarities among different definitions of probability, chance and risk and how people behave when confronted with ambiguity and uncertainty. In the case of teaching techniques appropriate for showing controversy, it may be that academic economists do not know what activities are available to teach these new ideas, since they have never seen them in practice in the teaching of economics. As Gail Hoyt (2003) states, possibly academic

economists have not embraced these new ideas and teaching methods because they are experience goods: anticipated high start-up costs keep risk-adverse economists from trying them. Finally, it might be that less-than-secure instructors are fearful of end-of-term student evaluations.<sup>13</sup>

Regardless of the reason for lack of innovation in teaching, ideas in the science of economics, no matter how entrenched, must be questioned in a classroom devoted to higher learning. As with other sciences, there are no divinely sanctioned laws that are beyond question. Students need to learn that the very nature of a science is to have unresolved topics and an on-going scrutiny of theories no matter how steeped they are in tradition. The dumbing down of economics to the dogmatic preaching of a few simple concepts, principles, and axioms of old misses the excitement of modern day economics and is a deceitful representation of the science of economics and a disservice to students seeking a higher education.

## NOTES

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<sup>1</sup> Some might think that I am making a mountain out of a molehill in arguing that there are those in positions of authority who would like to see higher education become more like high school education. But, as chairman of the Board of Regents of the University of Texas System Board of Regents, business executive Charles Miller introduced system wide testing of college students, similar to the high-stakes testing used in public schools. Miller is credited with being a driving force behind the Texas public-school accountability system that is based on standardized tests and which became the national education model for the George Bush administration, Jayson (2005, 8D). In 2005, Miller was selected by Margaret Spellings, U.S. Secretary of Education, to head the newly formed Commission on Higher Education, with the expectation that his committee would recommend testing of college students similar to that being implemented in the University of Texas System, Field (2006).

<sup>2</sup> Becker and Andrews (2004) provide examples to show that higher education involves much more than the teaching of traditional doctrine. It is the academic inquiry that elevates higher education above mere training. They argue that at a research university instruction has the potential to be enhanced because it can be made a part of an integrated and aggressive campaign of inquiry. Active researchers can engage students in the challenging ideas, questions and methods of inquiry at the forefront of their disciplines, whereas docents can be expected only to teach that which they have been taught or learned from textbooks. They call attention to the fact that research is expensive and that public community colleges with no research mission have thrived under the belief that a faculty devoted to research is not essential to performing the less-expensive teaching function. A contextual updating of Gresham's law (inferior currency drives out superior currency) might suggest that the less expensive educational practices of community colleges will force out the more expensive full-time, tenured faculty members teaching at the research universities. As Becker and Andrews demonstrate, there is evidence of this happening with both public research and doctoral institutions increasing the proportions of both part-time and full-time faculty members with non-tenure track appointments. Following the community college model, universities are increasingly looking to part-time and non-tenure track docent-type

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appointments to teach in undergraduate baccalaureate programs. Unfortunately, Gresham's law in this context is just as deficient in assessing effects as it is for monetary policy.

<sup>3</sup> The idea (or law) that the demand and supply functions can be isolated to show how changes lead to a competitive equilibria (in which the quantities demanded and supplied are necessarily equated in textbook fashion) are so simplistic that there is an old joke about training (not educating) a parrot to be an economist by teaching it to repeat two words "demand" and "supply."

<sup>4</sup> A few of years ago I presented a version of Becker (1979) in which the shadow prices of teaching, research and leisure were derived to be a function of several parameters in joint production processes with no simple tradeoff between teaching and research. After the presentation someone who taught introductory and intermediate economics asked, "why didn't you consider the opportunity costs of teaching and research?" Ferraro and Taylor (2005) report on economists attending the Allied Social Science Association meetings not being able to correctly identify the opportunity cost in the following hypothetical situation:

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?

They conclude that although the concept of opportunity cost is covered in the first week of an introductory undergraduate course, it is incorrectly deemed to be so straightforward as to not require further teaching time. They also observe that it is not contained in graduate textbooks and clearly should be. They quote a survey responder from a top-20 Ph.D. economics program saying: "When would I have learned the concept of opportunity cost? I don't remember hearing that word used in graduate school."

Could it be that the old idea of opportunity cost is too simplistic to have any true meaning in real decision making? Could it be that the science of economics has moved beyond this simplistic bivariate relative pricing idea? 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? Alternatively, why is there such a divide between undergraduate and graduate education in economics? Could it be that those at the forefront of research in economics and teaching in prestigious graduate programs are misleading their student? These are not rhetorical questions – I seriously do not have the answers.

<sup>5</sup> David Ricardo advanced the idea of comparative advantage some 200 years ago. It requires that the production technologies and resources of the trading partners remain in place – for example,

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one parcel of land is fixed and owned by one country and another piece of land is fixed and owned by another country. Unlike climate and geography, in today's world both capital and technology are not fixed; they quickly can be moved from one country to another. As a result, even if the U.S. has an advantage in the electronic processing of insurance forms today, that technology (as well as related technologies as we have seen) can quickly be moved to India for even greater cost savings. To say that the U.S. has a comparative advantage in processing forms requires the assumption that this technology is fixed to the U.S., which students know from TV viewing and Web surfing to be nonsense. The assumed static world of Ricardo versus the dynamics of technological change cannot be ignored.

<sup>6</sup> Students see articles such as that in *Business Week* "The Nitty-Gritty: How to Do the Math" (January 17, 2000, p. 110), which stated "Happily, about 96% of any one company's risk can be eliminated simply by owning a diversified portfolio . . ." Such headlines can be used to ask students why employees of a company would be wise not to own stock in that company, or why career specialization is risky?

<sup>7</sup> In reviewing a draft of this paper, Bill Goggin observed that a standardized test, if it is not designed to reinforce the incorrect notion that there are immutable principles in economics, would have to explore a student's understanding of the underlying assumptions and what happens to the so-called unassailable prediction when those assumptions are not met. But since that is not the way economics is often taught, many students would likely fail such a test -- Catch-22!!!

<sup>8</sup> Anderson and Engers (2002) correctly point out that the Nash equilibrium portrayed in the movie (all the men including Nash ignore the blonde) is not a sustainable equilibrium because given the strategies of the others Nash himself could score by going for the blonde – as pointed out by one of his male friends in the bar. Given sufficient desirability of the blond, no heterosexual male will be willing to let her walk, unescorted, so any one of them could expect to score given the strategy of the other males.

<sup>9</sup> In the 1970s, Tversky and Kahneman set out to construct a theory to explain the Allais paradox (Allais, 1953), which involves behavior that contradicts the independence axiom and linear probability calculations in expected utility theory. The arithmetic can be demonstrated in an introductory economics class by asking each student to consider two situations (A and B), each involving a choice between two gambles:

Situation A: Which do you choose - Gamble A1 or A2?

Gamble A1 promises a sure win of \$30;

Gamble A2 is a 80% chance to win \$45 and 20% chance of \$0.

Situation B: Which do you choose – Gamble B1 or B2?

Gamble B1 promises a 25% chance of winning \$30,

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Gamble B2 is a 20% chance to win \$45.

Situation B differs from situation A only in that one-quarter of the original probability of winning a positive amount can be realized. Yet, the majority of students typically will prefer A1 to A2 and prefer B2 to B1. Thus, the paradox is demonstrated by actually engaging the students in the choice process.

A von Neumann-Morgenstern utility function and the implied preference reversal of the Allais paradox can be demonstrated by asking each student who said that A1 is preferred to A2 and B2 is preferred to B1 to assign utility values to the two basic outcome of winning \$45 or nothing and then to state the implied utility limits for \$30. For example, a student who says  $u(0) = 0$  and  $u(45) = 1.00$  is implying that  $u(30) = v$ , for  $0 < v < 1$ . Expected utility can now be introduced as the sum of utility outcomes weighted by their respective probabilities:

Gamble A1 promises a sure win of \$30, so  $EU = 1.0(v) + 0(0) = v$

Gamble A2 is a 80% chance to win \$45, so  $EU = 0.8(1) + .2(0) = 0.8$

If A1 is preferred to A2, then  $v > 0.8$

Lottery B1 promises a 25% chance of winning \$30, so  $EU = 0.25(v) + .75(0) = 0.25v$

Lottery B2 is a 20% chance to win \$45. so  $EU = 0.2(1) + .8(0) = 0.20$

If B2 is preferred to B1, then  $v < 0.8$

Kahneman states that the apparent contradiction in this implied utility is not a demonstration of stupidity but a much more interesting issue: the susceptibility to erroneous intuitions about uncertainty and probability.

<sup>10</sup> Allais's problem is a demonstration that the subjective response to probability is not necessarily linear. The difference between probabilities of 0.25 and 0.35 in decision-making is not as relevant as the difference between 0 and 0.10, or between .90 and 1.00. Furthermore, via questioning of students in the classroom, what Kahneman and Tversky (1979) call "reflection" and "loss aversion" can be demonstrated: changing the signs of all outcomes in a pair of gambles almost always caused the preference to change from risk averse to risk seeking, or vice versa. For example, the majority of students in a class typically preferred a sure gain of \$900 to a .9 probability of gaining \$1,000 (or nothing), but they preferred a gamble with a .9 probability of losing \$1,000 over a sure loss of \$900.

<sup>11</sup> For a review of alternative decision theories see Starmer (2000). "Can people learn to be as rational as economic theory supposes," *The Economist* (Aug 30 – Sept 5, 2003, p. 56.) provides an excellent discussion of some of the research supporting behavioralists' views versus the newer research (by John List 2003) supporting neoclassical theory that even introductory students can understand.

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<sup>12</sup> Surfing the Web, students will find less than favorable critiques of textbook economics – for example, Yoram Bauman puts the boot into Mankiw’s 10 principles of economics at <<http://www.improb.com/airchives/paperair/volume9/v9i2/mankiw.html>>. They will find entire journals devoted to showing the fragility of simplistic economics concepts – e.g., the online Post-Autistic Economics Review started by the French students’ protest against neoclassical economics <<http://www.paecon.net>>. A trip to the library will uncover Steve Keen’s (2002) controversial book *Debunking Economics: The Naked Emperor of the Social Sciences*, which could have been more accurately titled *Debunking Textbook Economics*. Keen also maintains an extensive Website at <http://www.debunking-economics.com>, as do other controversial liberal and conservative academic economists, such as Brad DeLong, at University of California Berkeley, [http://www.j-bradford-delong.net/movable\\_type/](http://www.j-bradford-delong.net/movable_type/) or Tyler Cowen and Alex Tabarrok, at George Mason University, <http://www.marginalrevolution.com>. .

<sup>13</sup> Psychologist McKeachie (1997) states: “Many students prefer teaching that enables them to listen passively - teaching that organizes the subject matter for them and that prepares them well for tests . . . research, however, points to better retention, thinking, and motivational effects when students are more actively involved in talking, writing, and doing . . . Thus, some teachers get high ratings for teaching in less than ideal ways.” (p. 1219)

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