

What Does Critical Thinking Mean in Teaching Economics: The Big and the Little of It

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I. What is Critical Thinking?

Teaching students to use critical thinking skills is a frequently stated goal of many, if not all fields, including the vast majority of economics courses. This may be a reaction to the plea from employers for colleges and universities to produce graduates who can solve problems and connect the dots on complex issues, in spite of the inability of those employers to describe exactly what skills make such critical thinkers (Korn, 2014).

There is widespread agreement among economists that critical thinking capabilities are an admirable objective for economics courses. But a serious issue remains. What does “critical thinking” really mean for economists? How is this generally admired catch-phrase to be implemented? What does an instructor actually do to teach critical thinking? And how do we know whether students really have learned to think critically?

In this introductory section of this symposium we consider a variety of the standard interpretations of “critical thinking,” ranging from the proper use of deductive reasoning in informal logic to tending to find fault with an argument or analysis. As a result of the former, critical thinkers are more likely to unveil improbable claims, more likely to make reasonable requests for evidence, and more aware of rhetorical ploys that appeal to emotions, biases, and prejudices (Oljar and Koukal, 2019). Critical thinkers are curious. They do not accept claims at face value. They ask many “how” and “why” questions; they possess the virtues of intellectual integrity, intellectual humility, intellectual civility and a sense of justice.

In thinking about teaching critical thinking in economics we find it helpful to distinguish big-think from little-think critical thinking (or thinking outside the box versus thinking inside the box). Little-think critical thinking involves learning a set of tools, models and methods that economists have found useful in understanding some aspect of economics. It is “critical thinking” in the sense that it provides an entrée into a way of thinking that economists find useful. Since the assumption is that trained experts such as economists think critically relative to non-experts, teaching critical thought necessarily involves teaching the models and methods that experts use. We call such thinking “little-think” critical thought because it involves learning the existing models and methods (inside the box), not necessarily reflecting critically on those models and methods to decide where they are relevant (outside the box). Using our terminology, learning existing science is primarily learning little-think critical thought—here are empirical regularities and laws that scientists have found and here are the methods that they use to find them.

In economics that expert little-think critical thinking has been embodied in what are often called neoclassical models that contain insights such as: Incentives matter; people make choices that involve tradeoffs reflecting costs and benefits, and pricing systems create incentives that align private interests with the general interest. This neoclassical narrative often arrives at suggestions about policy, which include numerous explicit and implicit assumptions about the models and how they relate to reality. It also includes knowledge of empirical methods, and the tools economists use to gain information from data.¹ Understanding economists' neoclassical narrative requires a good knowledge of the tools and models that economists use. Many of the general little-think critical thought methods taught in economics are shared by all the sciences. Today, much of economics little-think critical thought is best understood as an application of scientific methods to economic questions.

Big-think critical thinking is different. It is grounded in the methodology of philosophy and the humanities rather than science. It has no scientific empirical test of what will be accepted as true, but instead relies on reflection and instinctive feelings. It is often critical of existing expert critical thought models and methods, and recognizes the potential fallibility of all experts, including scientists. Big-think critical thought is more concerned with where the neo-classical model doesn't make so much sense, where a method is inconsistent with the real world, where inside the box thinking is likely relevant, and where it is not. It explores what economists say they do according to their stated methodology, and what they really do. It is reflective, by which we mean that it includes thoughtfulness turned on little-think critical thought.

Big-think critical thought addresses questions that have no reasonable quantitative answer within standard mathematics. It sees science as relevant for a subset of questions amenable to quantitative analysis, but sees many important questions as not being answerable by science. They must be resolved with other methods. It sees science not as a method that always arrives at an unchallengeable truth, but rather as a changing amalgam of educated common sense methods that have evolved, and will continue to evolve as computational and analytic technology evolve to arrive at a limited understanding of the truth.

Critical thought involves both the big and little. All sciences have state-of-the-art little-think models and methods, which are powerful, but which also have limitations and problems. All sciences encourage experts to be aware of the limitations of those models and methods. It is a balancing act. Little-think critical thought is what separates an expert from an arm chair ruminator. Big-think critical thought is what keeps experts honest, either because of self-constraint (when self-critiques are included within the methodology of the discipline), or because of outside reminders by qualified critics (when the self-critique is not included within the lessons of the discipline). Big-think critical thought can be thought of as playing an Inspector General, or Ombudsman role within the field.

¹ It is grounded in Lord Kelvin's worldview that "when you can measure what you are speaking about, and express it in numbers, you know something about it, but when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts advanced to the stage of science."

Big-think critical thought encourages experts to refrain from claiming more expertise than they actually have. In economics it emphasizes that the neoclassical model is *a* model, not *the* model, economists' method is just *a* method, not *the* method, and that many policy conclusions supported by deductive models used by economists involve assumptions that do not match the reality that the models allegedly describe, which means that they may not be relevant to the real world problems to which they are applied. It reminds experts that to arrive at policy conclusions, normative judgments have to be made, and that science alone cannot be a definitive guide to action.

The essence of critical thinking is to approach questions with an open mind and to base conclusions on logical deductive reasoning and evidence, while recognizing our limitations of being open-minded. Critical thinking involves developing a structure for independent, self-directed, self-disciplined, and self-monitored thinking (Paul and Elder, 2008), and, most importantly, exposing it to widely accepted intellectual standards. Critical thinking is the study of arguments, formulating principles that distinguish good reasoning from bad reasoning, understanding the logical connections between ideas, knowing the difference between premises and conclusions, factual claims and inferential claims, and deductive and inductive reasoning (Oljar and Koukal, 2019). It is the *objective* analysis of facts to form a judgment that includes the rational, skeptical, unbiased analysis or evaluation of factual evidence so we can know what to do and what to believe. Fundamentally, critical thinking requires that any claim to knowledge be based on evidence. Though critical thinking principles are universal, their application to a specific discipline requires reflective contextualization.

Socrates originated the tradition of critical thinking, namely, to reflectively question common beliefs and explanations, distinguishing those that are reasonable and logical from those that lack adequate evidence or a sufficiently rational foundation to warrant acceptance. Plato recorded Socrates' teachings and continued the tradition of critical thinking. Moving forward 2500 years, the distinguished philosopher and proponent of democracy John Dewey (1910) argued forcefully that a curriculum based on building thinking skills would benefit the individual learner, the community, and the entire democracy. A generation later, Edward Glaser (1941) penned a seminal study of critical thinking and education. He argued that critical thinking consists of: (1) a disposition to consider problems and subjects in an objective, thoughtful way; (2) knowledge of the methods of logical inquiry; and (3) skill in applying those methods.

The first of these three components is essential to critical thinking. Working backwards from conclusions to premises is completely unacceptable. In order to "think critically," one must *have an attitude toward inquiry that is open minded, honest, and accepting of conclusions only if they are derived from unbiased evidence*, no matter how closely those conclusions align with the investigator's prior beliefs. People who think critically strive to minimize the attraction of their ego-centric and socio-centric tendencies (Paul and Elder, 2008), and always remain flexible and open to non-traditional alternative perspectives. (Walters, 1994) They try to learn from others rather than argue with others in order to dominate them.

Critical thinking consists of understanding both sides of an issue, being open to evidence that is inconsistent with your ideas, reasoning dispassionately, and insisting that conclusions be inferred from available facts (Willingham, 2007). It also involves the ability to recognize

problems. Scientists engage in critical thinking through repeated comparisons and decisions, comparing new data to existing data, data from a treatment group to data from a control group, and then deciding how to act on those comparisons based on an analysis that employs appropriate statistical tests (Holmes, Weiman, and Bonn, 2015).

In practice the term critical thinking is probably more frequently used in the sense of passing judgment on an argument or analysis. This is understandable, as the word “critical” derives from the classical Greek *krinein*, which refers to judging, discerning, or estimating the value of something according to well established professional standards of proof (Oljar and Koukal, 2019). These professional standards of proof include principles and norms of good measurement (e.g. using a 5 percent or 1 percent tolerance for error as the standard of statistical significance rather than 6 percent or 2.5 percent), as well as solid deductive logic.

The components of good fault-finding include a thorough understanding of the question, the reasons for its occurrence, and the context in which it arises as well as understanding the logic of the argument, recognizing unstated assumptions (e.g. all markets are competitive, only things measured in GDP contribute to happiness), and collecting accurate evidence pertaining to it. They also include identifying what information is relevant for addressing the question, appropriately collecting that evidence, including facts, and unbiased, reliable, and sourced data, and appropriately analyzing the evidence and drawing warranted conclusions.

The principles of good measurement include reliability (trustworthy and unbiased information), accuracy (reflecting sound survey and statistical methodology), relevance to the question at hand, transparency (reproducibility by others), consistency (in an ever-evolving world), timeliness, and accessibility (American Economic Association Committee on Economic Statistics, 2018). These principles, for example, require adjustments for inflation to compare values over time, as well as consideration of changes in the quality of products and shifting purchase patterns in response to different relative price changes.

We now turn to more specific aspects of critical thinking in the teaching of (mostly principles of) economics. We divide the analysis into “little-think” and “big-think.” Little and big do not indicate anything about importance. We might have used inside and outside. To repeat from above, little-think critical thought involves teaching students the scientific craft of economics; big-think critical thought involves teaching students the recognized limitations of little-think critical thought—what might be called the artistic craft of economics.

II. Little-Think (the neoclassical model)

We begin by examining the standard neoclassical constrained optimization economics framework that uses chains of deductive reasoning in conjunction with simplified models such as [1] supply and demand, [2] marginal analysis, [3] benefit-cost analysis, and [4] comparative advantage. We ask what distinctive approach an economist might offer for judging arguments. What types of criticism would an economics instructor hope her students might use later in their daily lives that those who experienced no economics training would overlook? We want our students to understand how to “think like an economist” and when such thinking is appropriate.

[1] *Supply and demand analysis* shows how a competitive free market serves to weigh the relative value of resources devoted to one use against the value of those resources in their best alternative use (the supply curve). Students should learn that supply depends on costs, which in turn depend on technology, the efficiency with which inputs are converted to outputs, and the cost of the inputs. They should learn why costs reflect the value of resources in their second best use. Students should understand how aggregate supply depends on the supply coming from both individual establishments and the number of establishments providing the product or service, and why costs often rise with increasing quantity supplied because of the rising opportunity cost of successive additional resources needed in production. They should understand how demand depends on income effects and substitution opportunities and the role of diminishing marginal utility in reducing willingness of buyers to pay for successive increments of a product or service. They should learn how excess supply and excess demand induce price changes to either encourage or discourage more production and/or encourage or discourage buyers to use alternatives to satisfy their desires.

[2] A hallmark of economics is thinking “on the margin,” and distinguishing *marginal analysis* from analysis relying on averages or totals. For either private profit maximization or public policy decisions the key is to think in terms of the extra benefits versus the extra costs of producing a little more or a little less output or policy activity. To compare marginal benefits with marginal costs that are realized at different times, expected benefits and expected costs must be adjusted to reflect their values at the time a decision is made about them, called discounting.

[3] *Benefit/cost analysis* compares the net present discounted value of advantages (benefits) against disadvantages (costs) at the time when a decision is made whether to proceed with an action. As long as marginal benefit of an activity exceeds marginal cost, people are better off doing more of it, and vice-versa if marginal cost exceeds marginal benefit. It is essential to identify benefits and costs that are implicit as well as explicit. Implicit costs, for example, include the value of foregone opportunities that does not appear on an income statement, and similarly for implicit benefits. Both pecuniary and non-pecuniary costs and benefits should also be considered. For social decision making, benefits must include externalities that benefit people other than the decision maker, and likewise, costs must reflect externalities that affect people other than the decision maker. Costs that have already been incurred and benefits that have already been received are “sunk,” and therefore irrelevant for decisions about the future.

[4] People voluntarily exchange goods, services (and sometimes favors and courtesies) among individuals or organizations within a nation, and among individuals or organizations in different nations because they expect to be better off after the exchange. None of the participants expects to lose as a result of participating in voluntary exchange. Everyone expects to gain and usually does. When exchange applies to groups, some specific individuals within a group may lose from it. *Comparative advantage* creates the opportunity for many win-win exchanges. Various individuals, organizations, or nations may possess different amounts of resources (land [including weather], labor, capital or entrepreneurial skills) or technologies to produce certain products or services. Even if one group has an absolute advantage in resources and skills over another group in producing everything, it can still benefit from producing just those products and services for which it has a *relative* cost advantage and then trading the production it does not need for its own consumption to the others in return for products and services for which they

have a relative production cost advantage. Specialization of production can produce relative cost advantages if there are economies of scale (lower unit costs from producing larger quantities because fixed costs can be spread over more units of output).

The above four elements of economics are central to almost all principles of economics courses. There are many others and in the next few pages we review some of them that tend to be distinct to economics. These include such considerations as [5] behavioral reactions to changes in incentives and the resulting substitutions, [6] unintended consequences of an action, [7] distinguishing correlation from causation, recognizing the possibility of reverse and spurious causation, and [8] identifying omitted factors (explanations) and their likely direction of effect in logical reasoning and regression analysis. They further include [9] an understanding that measures of flows are meaningless unless they report the time period over which they are calculated, [10] how social goals are developed, including the appropriate role of consumer sovereignty and its limitations (we don't let three year-olds eat chocolate bars for dinner even if they "prefer" them to peas). [11] the role of risk and uncertainty, [12] the importance of transactions costs impeding the resource reallocation, [13] price discrimination, [14] the theory of second best, and [15] acceptance of ambiguity. Looking at each more carefully:

[5] The essence of economic analysis is to identify *behavioral reactions* to positive and negative *incentives*. Economic incentives are the additional rewards or penalties people receive from engaging in more or less of a particular activity. They can be monetary or non-monetary, or both. Changes in economic incentives usually cause people to alter their behavior in predictable ways. Economic models are used to predict the direction and size of such changes. Economists measure the magnitude of changes as "elasticities" that reflect percentage changes in an affected behavior in response to a percentage change in an incentive.

[6] *Unintended consequences* are unanticipated outcomes of a deliberate action. They can be beneficial, innocuous, harmful, or perverse (directly reversing the intended consequences). Identifying unintended consequences is a particularly valuable insight because it can help to document all possible benefits and costs before an action is taken. For example, a beneficial unintended consequence occurred when it was discovered that aspirin, designed to reduce pain, also served as an anti-coagulant that reduced heart attacks. A harmful unintended consequence occurred when professional sports leagues decided to allocate new players to teams that needed talent the most to balance competition in their league, and as a result, some teams that had little chance to win the championship deliberately lost games (called "tanking") in order to secure a better selection among new players about to enter the league. As a result, demand for tickets and television viewing declined. A perverse unintended consequence is illustrated by the "Peltzman effect," in which drivers who are coerced into wearing seat belts feel safer while driving, and so drive less carefully and consequently are involved in more accidents of greater severity. Probably the most common illustration of unintended consequences used in teaching economics involves the minimum wage. In order to help low income wage earners, a minimum wage may be imposed with the unfortunate consequence of causing some workers whose value of marginal product is below the minimum wage to lose their jobs entirely, another perverse effect.

[7] Much evidence used in economics involves *correlations*, ranging from perfect positive correlations to perfect negative correlations. Correlations can be between the values of

series or between the rank order of values in series; they can be linear or non-linear. Correlations are useful because they allow prediction of events. While correlations suggest relationships, they alone are not sufficient to discern causation. Correlation between A and B can arise because A causes B, because B causes A, because C simultaneously causes both A and B, because both A causes B and B causes A, or because A and B are just randomly correlated. Causation requires a counterfactual dependence. It requires an appropriate temporal relationship (cause precedes effect) and *ceteris paribus* (everything else held constant). The most popular modern technique to identify causation is experiments with randomly assigned treatment and control groups. This is how experimental vaccines and therapeutics are tested for effectiveness. It is also used frequently to test public policy interventions in the economy. While statistical tests of hypotheses are used to determine whether there is truly a correlation between two variables under the condition of a specified tolerance for error (usually 1 percent or five percent) they are not definitive. Statistical significance can tell us that we would make an error only one percent or five percent of the time if we were to conclude that two variables are always correlated. However, just because two variables are correlated, or even if one is determined to cause the other, the correlation is not necessarily interesting or meaningful if the magnitude of the relationship is small. To be *economically meaningful* a relationship between two variables must be sufficiently large in terms of its magnitude. In a causal relationship, if A causes B, B must change enough in response to a one unit change in A to be worthy of concern. The economically meaningful relationship is reflected in the coefficient of an independent variable in a regression, while the statistical significance is reflected by the standard error of the estimate.

[8] The most commonly used statistical technique in economics is multiple regression analysis and its many complications (e.g., non-linear as well as linear regression) and extensions. Regression analysis is most useful for *eliminating extraneous variables* that may be affecting both A and B simultaneously (see [7] above). By including otherwise overlooked variables that affect both A and B simultaneously, the possibility of C affecting both A and B while A and B themselves are not directly related can be eliminated. Only extraneous variables that affect both A and B need to be controlled when exploring the relationship between A and B.

[9] *Stocks and flows* are the foundation of system dynamics modeling. A stock is the value of something at a point in time that must be specified for the measure to be meaningful. A flow is the change in the value of a stock over a time period that must be specified for the flow to be meaningful. To measure a flow one needs two points in time: a start and an end time. A balance sheet shows a stock at a point in time. An income statement shows the change in a stock, or income, over a period of time. It reflects the rate of accumulation of a stock. Income, earnings, saving, investment, and depreciation are flows. A bank balance is a stock.

[10] All economic systems strive to achieve a set of *social goals*, including economic efficiency, equity, freedom, growth, security, and stability, among others. The importance of each of these goals is reflected by individuals through citizen sovereignty. How these goals are prioritized collectively—and how successful an economy is at attaining these goals—influences the quality of life for all its citizens. Voters and policymakers decide how best to achieve these goals. Achieving these goals is difficult because in many cases there are trade-offs. Actions designed to achieve one goal often interfere with achieving other goals. Resolving such conflicts among people who have different opinions about the relative importance of each of these goals

as well as different interpretations of what the goals mean is a perennial challenge in every economic system. Social goals have the characteristic of a public good, because everyone in a society must share the extent to which chosen social goals are pursued and achieved.

[11] *Risk* refers to decision-making situations when future events are known with measurable probability. *Uncertainty* relates to situations under which either the outcomes and/or their probabilities of occurrences are unknown to the decision-maker. Risk can be controlled and analyzed much easier than uncertainty, although both reflect a situation where some aspect of the future cannot be foreseen. People are able to make arrangements to protect themselves against risk (e.g. by diversification or purchasing insurance), but not uncertainty. Individuals may have preferences for or against taking risk and for or against experiencing uncertainty.

[12] A *transaction cost* is the cost of making an exchange. Search costs (to find a buyer or a seller), the cost of decision-making, costs of enforcing an agreement, cost of bargaining, monitoring, and performing due diligence for an exchange are transaction costs, as are legal fees, communication costs and transportation expenses. High transaction costs can influence firms to make inputs internally rather than outsource their production (thus delineating the extent of the firm), and can encourage consumers to “do-it-yourself” rather than hire a service provider. Money lowers transaction costs by eliminating the need to engage in barter. Because transaction costs are often fixed in size, larger exchanges can exploit economies of scale to lower transactions cost per dollar involved. Frequency of transactions, specificity about what is being exchanged, and the absence of chances for opportunistic behavior also lower transactions costs.

[13] Many products and services of similar grade and quality are sold to different buyers at differing prices, some higher than they would have been if every buyer purchased at the same price. This can enhance the gains to the sellers. To accomplish this a seller must have market power (otherwise a competitor will offer to sell at a price below the discriminatory price), must be able to determine the willingness and ability of buyers to pay so as to know how much they can charge, and must be able to prevent the buyers who receive lower prices from turning around and selling to other buyers receiving higher prices at prices below the discriminatory prices (called arbitrage). *Price discrimination* often, but not always, adds output that in the absence of discrimination would have been withheld from the market so as to create artificial scarcity that would elevate the single price in the market. With discrimination, sellers can sell to those willing and able to pay more at their reservation prices, and still sell to others willing to pay above costs, but less than those who value the product or service the most. Thus price discrimination can actually increase efficiency, although it transfers wealth from those buyers who pay the higher price to the seller.

[14] The *theory of second best* states that if one optimality condition in an *economic model* cannot be satisfied, it is possible that the next-best solution involves changing other variables away from the values that would otherwise be optimal. Politically, the theory implies that if it is infeasible to remove a particular market distortion, introducing a second (or more) market distortion in an interdependent market may partially counteract the loss of the first, and lead to a more *efficient outcome*. An example would be to encourage monopoly so as to restrict output in an industry, e.g. oil, that produces substantial external costs (e.g. pollution) that it does not take into account in its profit maximizing calculations.

[15] Teaching students how to think critically also involves improving individual's *acceptance of ambiguity* because in many instances conclusions are inexact and/or subject to multiple interpretations. Economics is a social science, focusing on human behavior, rather than a natural science, and subject to imprecision. An example of what might cause ambiguity of results is selection bias. It occurs when individuals or groups in a study differ systematically from the population of interest leading to a systematic error in a correlation or regression analysis. It often occurs when individuals self-select into either a treatment or control group. For example, in testing a vaccine for COVID-19, if individuals are allowed to decide for themselves if they are in the treatment or control group, those who are elderly and those with underlying health conditions may choose the treatment group. If this were to occur, a vaccine candidate that is actually effective inadvertently may show more cases of infection in the group that takes the vaccine compared to the treatment group because those in that treatment group were naturally (without the vaccine) susceptible to many more infections than those in the control group. This can lead to an incorrect conclusion about the efficacy of the vaccine.

There are, of course, many other little-think elements of critical thought that we teach in economics. They are all useful, but are they enough? Do they need to be supplemented by some big-think critical thought elements? We turn now to that topic.

III. Big-Think Critical Thought and the Teaching of Economics

Our primary interest here is the teaching of economics, not how economics is done; we give specific attention to the question of what should be taught in the introductory course. We ask: How much of the introductory course should be devoted to teaching little-think critical thought relative to big-think critical thought? We don't think the question has a definitive answer. The introductory course should include a blend of both, with the appropriate mix depending on many considerations outside the course itself, such as other avenues in which students will study either big- or little-think methods. Much of the course will obviously emphasize little-think critical thought. To what degree, however, should the teaching of the course point out and discuss problems with the little-think model and methods? The answer likely differs among students. Students who will focus on philosophy would likely be better served by a more little-think focus, (since they will get big-think critical thought in their philosophy classes) whereas students who will focus on science would likely be best served by more big-think exposure. Even if students are not exposed to big-think critical thought in other courses, they may get it elsewhere in their life experience, or by learning-by-doing. Moreover, big-think critical thought can be taught in many different ways. It can be conveyed in informal discussions about the usefulness of models as well as in deep epistemological reflections.

Our goal here is not to discuss the need for big-think critical thought in economics. If the reader thinks that economics has no problems in its methods and models, then the question we pose—how much big-think critical thought to teach is answered—we should primarily teach little-think critical thought. Similarly, if the reader thinks that economics is simply ideology hiding as a science, the question is also answered—we should teach primarily outside of the box critical thought since the inside the box models can only lead students astray.

We believe most economists embrace neither of those extremes, but rather fall somewhere in the middle. Economics as presented in standard textbooks is useful, but it also does not capture the nuance that good economists use in applying the models and theory to real world issues. This makes the question of what blend to teach a pedagogical question about teaching economics, not a question about the nature of economics. Given that the goal is to have students learn both aspects of critical thinking as part of their overall education, where should they learn each component? Focus too much on little-think models and methods, and students can come away believing that economics is more defined by its little-think models than it is. Focus too much on big-think critical thought, and students may never come to appreciate the power of the little-think models, nor gain the technical competence to use them.

Introductory Economics is Not Succeeding in Conveying the Nuance of Economics

In making this tradeoff, there is a strong argument to focus on little-think critical thought. In economics, as in any field, since the only place students will learn little-think models and methods is in economics courses, there is a natural tendency and need to focus on them. Formal big-think critical thought is the subject matter of history of science and philosophy classes. Introductory economics classes should not, in our view, try to present *formal* big-think critical thought. Critical theory and critical realism are *not* subjects for introductory economics. But, to give students a sense of how economists use models, it is our belief that *informal* big-think critical thought needs to be part of a future expert's education, including economists, and that that training should start in the first course. As an example, consider the introduction of demand curves. It is important to show students that demand depends on the distribution of income and wealth, and that a shift in income or wealth will alter demand curves. Using conventional models we implicitly assume that the existing distributions of income and wealth are "appropriate," without much thought as to whether we agree that they are.

Supply also depends on the distribution of income and wealth. For example, marginal benefits and marginal costs create incentives to engage in an activity, say to work hard. However, the income and wealth distribution of an economy can also affect those incentives. Some individuals who see great income and wealth inequality, and who see no pathway to financial success from their initial situation, may discount marginal benefits and exaggerate marginal costs so as to reduce their incentive to work hard, thus reducing supply. Others, observing the same income and wealth distribution from the same initial situation may think it is extraordinarily important to work hard to scale the steep hill to financial success, thereby increasing supply.

Another example is the assumed goal of policy, where texts generally accept it as "maximizing social utility" with little discussion of the enormous complexity that a specification of society's goal hides. Economists have discussed alternatives in depth; for example Amartya Sen's focus on capabilities (Sen, 1985) and Edmond Phelps' focus on flourishing (Phelps, 2013). If introductory economics did more to show "thinking like an economist" as including such out-of-the-box considerations students would come away from an introductory course with a much more nuanced, and we believe empathetic, view of economics.

It is our belief that, in general, the core introductory course is not doing so today, and thus is failing many students. Consider Nobel Prize winning economist Esther Duflo's description of what she took away from her introductory class. "I thought of economics as an elaborate hoax (or at best a Panglossian illusion) aimed at justifying the world and keeping it exactly as it was; using simple mathematics to describe some very rudimentary version of it, and "proving" that any attempt to intervene against the smooth functions of the market would wreak havoc." Duflo's sense that introductory economics teaches students rules and justifies certain ideas, rather than providing students with critical thinking tools is, unfortunately, shared by many students. We believe it is, in large part, due to almost exclusive focus on little-think economics. The result is that students come away believing that economists aren't as open minded and cognizant of the limitations of their core models, as we think they are, (or at least should be).

This view of closed-minded economists is shared by many outside critics of economics. We find this critical view that standard economics is closed-minded far too simplistic. If you take any criticism of the economics profession offered by outside critics, you also can find discussions of their arguments within the economics profession. Deep criticisms of the standard economic models are part of the broader economic cannon.² The profession long has recognized problems with its models and methods, but has concluded (perhaps wrongly) that the benefits of using the methods or models outweigh the cost of not using them. Usually the profession decides to continue using a model with appropriate qualification.³ The problem is that the qualifications are often forgotten, and need to be rediscovered by incoming students. For example, most economics courses introduce students to efficient resource allocation by means of supply and demand, as if it is the only alternative, with little consideration to the fact that the efficiency advantages of a competitive market are limited to *competitive* markets only, and many markets are not competitive. Little attention is devoted to the fact that there are numerous alternative methods to allocate resources that economists themselves prefer to a competitive market for certain goods and services. Consider, for example, the widespread use of choosing political leaders by voting, a dinner menu for the household by command, the world sprint champion by a contest, concert tickets by who gets in line first, lottery winners by a random draw, spouses and friends by personality characteristics, and funerals by equality (everyone gets one).

Introducing students to the debate about the usefulness and limitations of economists' models and methods⁴ encourages students to see that big-think is not in opposition to little-think critical thought, but rather complementary to it. Big-think critical thought exists not because

² Examples of such internal big-think considerations can be seen in George Akerlof's, "Sins of Omission and the Practice of Economics" (2020) and, Albert Hirschman's "Against Parsimony: Three Easy Ways of Complicating Some Categories of Economic Discourse" (1984). There are more examples further back in economics' history, such as found in the writings of institutionalist, historical school, radical, and Austrian literatures.

³ This is not a problem of economics alone. Similar types of problems are inherent in any field of study, and problems with method and models don't undermine the usefulness of economist's methods and models; they just limit their applicability.

⁴ Of course we may be wrong, and to the degree that these outside observers are actually right in their belief that economists are not open-minded and appropriately aware of the limitations of their models and methods, then, as we stated above, the need to focus on big-think critical thought becomes more necessary, but even less likely to be taught within economics.

economics is in crisis, nor because the models currently taught in the introductory course are not the best way to understand some issues. It exists because there are limitations of even the best tools; big-think critical thought reminds researchers about those limitations.

What might be called “enlightened little-think critical thought” is what we believe the introductory courses should be teaching students. Enlightened little-think critical thought is little-think critical thought that has passed through a big-think filter. We believe the teaching of introductory economics should make it clearer than it currently does that those models and methods used by economists have problems, but those problems do not necessarily undermine their usefulness. In our view, the real debate within economics concerns the nature of the filter.

For example, consider the rational choice model. The appropriate question is not: Are people rational? Appropriate questions are: Is it useful to assume that people are rational when developing a model for thinking about economic problems? How should models that assume strict rationality be applied to reality? Where does the model best fit, and where doesn't it fit?⁵ What if the rational choice model distributes resources in a fashion that market participants believe is not “fair?” People tend to respond to perceived fair treatment with fair treatment in return. But if they perceive that they are treated unfairly, they may respond with retaliation, even when such reactions may not maximize their material wealth.⁶ Our point is that if a rational choice model is used with appropriate caveats, (kept in the back of one's mind, as Alfred Marshall put it) then whether the assumptions are globally true is not an issue of debate. The sophisticated view of the rational choice model is that it has advantages—it is tractable, and often comes to definitive results. This makes it a useful tool that provides insight into how the economy works and into various policies that one might implement to change the situation.

Consider Dani Rodrik's criticism of standard economic analysis of international trade and globalization. He accepts that the model is useful, but argues that standard economics presents free trade and globalization in a far more positive light than is warranted. It isn't that the basic trade model is wrong; it is that the context within which the model is presented to students doesn't adequately take into account the distributional effects of that trade and the costs of the regulatory requirements of allowing free trade. Once those are considered, a strong argument can be made that the standard trade model significantly underestimates the costs of globalization.

Or consider Gary Becker's analysis of statistical discrimination—which highlights dimensions of discrimination that other approaches miss. By following the incentives, and ignoring rationalizations that are often invoked to obfuscate selfish actions, it provides insight into discrimination. Does it always happen? No. Does it miss other aspects of discrimination and not capture systemic racism? Yes. Is it nonetheless a useful tool when used in an appropriate context? Yes. Most mainstream economists, even those whose policy views differ enormously from Becker's, are likely to see it as useful, even after it has passed through a big-think filter.

⁵ Such considerations are part of the economic debate even among Chicago trained economists, as can be seen in Richard Robb's recent book, *Willful* (2019).

⁶ Many exchanges create large economic rents. Consider, for example, the contract of a star basketball player whose next best earning opportunity is to work as a carpenter. When large rents are created, there are considerable opportunities for either party to an exchange to believe they did not receive a fair share of those rents.

If students are not taught the nuance with which the Becker model can be used by sophisticated economists, students will come away from the core introductory course either thinking the statistical model is the way all economists analyze discrimination, not that it is a useful tool to capture certain aspects of discrimination. What we believe students should come away with is a belief that Becker's analysis is a useful tool for all economists, regardless of their normative and policy views.

Beginning students could easily be taught that economists are aware of the limitations of the Becker model and are working on expanding economists' analysis to integrate endogenous norms into the analysis. Once norms are integrated, so that people's "preference" for discrimination is determined endogenously, the policy implications can change considerably. Economists are well aware of this, and researchers such as Marianne Bertrand (2020) are offering a richer study of discrimination, incorporating feedback effects on norms into the analysis, rather than assuming norms and tastes are exogenous. A big-think filter would show students that models that don't integrate norms into the analysis are incomplete, and introduce economists' attempts to develop new models. Big-think critical thought would emphasize to students that as economics evolves, its models change, and would make students less likely to draw strong policy implications from the models they learn, and more likely to see the models as tools for thinking about problems, not as providing policy answers to problems.

For example, economists' thinking on minimum wages has changed, as new empirical work has suggested that the distortive effects are less important than the standard efficiency model presented in most texts make it seem. Another example is the recognition that pricing a good can change the nature of the good, as is suggested by the experience of increasing the charge to parents for late pickups from a day care, or the pricing of blood or organs. A big-think filter would also recognize the importance of the perceived fairness of the initial distribution of wealth in the importance of efficiency as the primary goal, and the importance of non-endogenous preferences to drawing any policy conclusions from the economist's standard model.

It isn't only economist's models that have changed, so too have its methods. Modern economics is much less logical positivist than it was in the past, relying less on fully specified deductive models, which have been subjected to rigorous empirical verification. That "positive science" approach proved impossible decades ago. Instead, modern economics relies on what Robert Solow (1997) calls loose fitting positivism, a blend of deductive and inductive analysis, which Charles Peirce labeled abductive. In abductive analysis the uncertainty of our knowledge is recognized and our knowledge of the economy is not seen as Truth, but as truth with a small t—suppositions based on the best knowledge available. That recognition of the uncertainty of our knowledge has changed the nature of economists' research. A major part of scientific research in economics involves developing and using new methods to determine empirical facts. This has occurred both because of the limitations of the positive science approach, and the change in available computational and analytic technology.

This means that today, in its research the economics profession is much more empirically focused than most introductory courses would lead students to believe; deductive theory, especially based on strict neoclassical assumptions, plays less of a role in modern research than it did in the past. Whereas in logical positivism deductive theory came first, and was subject to

empirical verification, today, theory often comes second, and inductive empirical evidence comes first. The introductory texts seldom capture this change, even though the change has been so pervasive that we would argue that the mainstream narrative in economics has changed from what is often called a *neoclassical narrative* that emphasizes deductive modeling based on rationality assumptions, to a *behavioral neo-empirical narrative* that emphasizes the scientific method and openness to a wide range of psychological assumptions and alternative deductive models.

Abhijit Banerjee (2020) conveyed the modern standard economist's view of models when he wrote that "we may want to abandon the ideal of a single, extremely spare, standard model that captures all relevant aspects of economic life. It may be more useful to build models with ingredients tailored to the particular context: specific types of behavioral assumptions that go beyond the "standard" model, specific assumptions about market failures, all based, as best as possible, on results from past research in similar settings. This is in effect what a lot of empirical researchers already do, but mostly on an ad hoc basis, with the result that we continue to default to the standard model whenever our results are not in direct conflict with it."

The Neo-Empirical Introductory Economics Alternative

The change in economics from a neo-classical to neo-empirical format has led to efforts to revise the introductory class to better convey how modern economists approach problems. An example of the change is Raj Chetty's introductory course at Harvard. Chetty's class, "Using Big Data to Solve Economic and Social Problems," ties in closer with modern economic research practice by focusing on teaching a set of tools that allows students to draw causal inferences from data.⁷ It is, as Chetty describes it, an "empirical tools" course, and thus doesn't focus on the logical deductive tools in our little-think critical thought list. It is fundamentally different than the logical positivist empirical approach that connects the textbook model to data. The empirical analysis in Chetty's big data approach does not test the validity of a formal theory. Rather, the goal is to detect patterns, observe regularities, and discover causal effects that can help answer specific policy questions.

Chetty's new introductory class reflects changes in the way microeconomic policy analysis is done. The changes have not (yet) made it to the core of the standard texts, which remain organized around summaries of neoclassical theory with an emphasis on constrained optimization and rational choice models. In the standard texts, behavioral economic insights and empirical approaches to data analysis and policy are presented in side-boxes that are tangential to the textbook core. The Chetty approach reverses the core and the tangential.⁸

⁷ The big data approach is, however, not new to economics. The institutionalist approach of the 1940s through 1960s, which Tjalling Koopmans attacked as measurement without theory relied on a similar approach, albeit with far less data.

⁸ The reason that behavioral and empirical approaches are presented as tangential is not that textbook writers are unaware of the changes that are occurring in economics. The reason is that, at least to date, the demand for introductory textbooks from economists teaching the course has been for the standard approach, not the new approach. (We say this because the textbook market is highly competitive, reflecting what publishers believe those teaching the course want; publishers have editors, reviewers and focus groups that convey that information to

Suggestions for Change

As exciting as the new focus on a neo-empirical approach to the introductory course is, in terms of balancing big-think and little-think critical thought, in our view a Chetty type course, as an alternative to the current introductory course, goes in the wrong direction. It focuses on a subset of specific little-think skills, and does not even raise many of the little-think issues that are in current introductory courses. It assumes the goal of policy is known, and agreed upon, and that economists' role is to implement a policy as efficiently as possible. Deeper big-think questions, such as how do we decide what problems government should be solving, are not addressed.

For all its faults the standard introductory economics template does often raise questions about market morality, such as "Should a market in body parts exist?" that the neo-empirical approach does not. If taught as a substitute for the standard course, a course such as Chetty's leads students to view economics as a purely scientific field that doesn't require integration with moral philosophy. It presents economics to students as a subdivision of data analysis, not as a full social science with a long history of addressing policy questions in helpful ways. That makes it a useful course, but in our view, too specialized a course to introduce the whole field of economics, or as a stand-alone course that is students' sole exposure to economics.

The current conventional introductory economics course leads thoughtful students to think about big-think issues, even if it does not answer them. It goes far beyond formal economic theory, and provides a rough account of how market processes can guide decisions. It is a variation of Esther Duflo's story about her "the market is wonderful" experience in introductory economics. But her take-away is not what most teachers of introductory economics are trying to convey. That story is more nuanced, seeing markets as simultaneously beneficial and problematic. For that broader qualified story to be head-lined, some big-think critical thought components need to be added to the introductory course. The changes can be incremental. With some relatively small changes in the course (and we believe many professors already teach the course the way we are suggesting), students can grasp a better sense of modern economics and its blend of big-think and little-think economics.

Our suggestion is not to teach a lot of big-think issues, but simply, when we teach the little-think critical thought skills, that we inform students, right from the beginning that good economic thinking includes understanding the limitations of analysis. For the right type goods, markets are great; for others they are problematic. For example, markets work much better in allocating goods that have become commodities than they do in allocating spouses, health care, or education, where the assumptions for allocative efficiency through markets do not fit the real world situation or the goals of individuals or society. Markets work less well when information is poor and distributional goals are important.

Many economists who have thought deeply about what we should teach to introductory students about the methodology of modern economics (which admittedly is not a large number) are hesitant about our suggested more qualified approach. They argue that it is best to first teach

authors.) But, since teachers tend to teach what they have learned in graduate school, that focus away from the behavioral and empirical approaches will likely change only as the cohort of teachers changes as professors age.

students the little-think models and little-think skills, saving the introduction of big-think skills for later classes.⁹ They argue that too much big-think critical thinking too early can reduce student's incentive to learn little-think economics.

The problem with this little-think first approach is that often students never get to the big-think critical thought. That big-think understanding of the limitation of conventional models and methods is part of the economic cannon, but is not included in the introductory course because it is believed that including it would hinder student's learning of the models and methods.¹⁰ It is that pedagogical decision that we believe underlies and reinforces the narrow caricature definition of thinking like an economist used by critics.

Conclusion

So where do we end up? Largely as supporters of the current introductory text structure, as long as that presentation is appropriately qualified. To do that, so that the students recognize it and do not come away from the course with the view that Esther Duflo came away from her introductory course with, we believe courses should add the following big-think critical thought lessons to the little-think critical thought lessons listed earlier:

- The introduction to economics should teach a set of analytic and empirical tools, not a set of answers to policy questions. Economists use these tools not to produce policy answers, but to gain relatively objective insight into the economy and its problems. The traditional supply and demand model is but one of many alternative ways to allocate resources.
- Even with heroic attempts to remain objective, all analytic and empirical tools are entangled with normative elements related to life satisfaction and the role of the income and wealth distribution; they can never be completely separated. Thus, one must always remain open to criticisms related to that entanglement.
- To arrive at policy conclusions, positive tools need to be blended with normative analysis. Recommendations about what you “should do” requires normative judgments that follow from philosophical reasoning, not scientific analysis. Since one cannot derive a “should” from an “is”; all policy has a normative element.
- Conventional economic wisdom about appropriate policy following from economics is just that—conventions, not undebatable truths.

⁹ This view was specifically argued by Greg Mankiw (Mankiw 2016) in response to an article by Colander (2016) that suggested we needed to teach more big-think issues in the principles course.

¹⁰ If one takes any of the standard critiques of economics and searches the economic literature, one can find a deep discussion of the points raised by that critique. Often the critique doesn't change the teaching, but it is not because the critique is not understood, it is because the profession has found that the costs of changing the current way of teaching outweigh the benefits of raising such questions for students.

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