

Teaching Principles of Economics in College: Challenges, Strategies, and Frameworks

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Abstract

This paper briefly discusses common goals for teaching Principles of Economics, identifies the key learning challenges to undergraduates, and proposes a practical pedagogy for inclusive teaching and experiential learning. Aiming to spark interest, engage students with the analytical contents, and develop marketable skills, effective instructions of economics may include the following: (1) Introduce scientific methods and apply its procedures to economic inquiries; (2) Sketch a big picture, then help students connect the dots; (3) Instill economic way of thinking via real-life phenomena; (4) Utilize data visualization, news, policies, and research findings for lecture or online discussions; (5) If possible, explain theoretical concepts and models intuitively, graphically, and quantitatively; (6) Share expert-led lecture videos, schedule regular short quizzes, conduct polls and surveys; (7) Assign hands-on individual presentations and group research projects. Focusing on teaching Principles of Microeconomics and Macroeconomics, this paper provides unified theoretical frameworks, respectively. Examples of experiential learning student research projects are included.

Key words: Bloom's Taxonomy, Learning Outcomes, Principles of Economics, Scientific Procedures.

JEL classification: A22, D00, E00, G30.

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1 Introduction

Economics is a decision-making social science. It can help to better understand the economy and inform rational choices and public policies. Students would benefit enormously from taking Principles of Economics courses in college because successful completion of such courses prepares them well for future learning and practices. From a practical perspective, Principles of Economics serves as a core curriculum for general education purposes and a pre-requisite for majors and degrees in business, finance, management, and public affairs. Professional certifications such as Chartered Economist, CPA, and CFA also demand a mastery of extensive knowledge in economics. When it comes to measurable monetary benefits, an economics degree pays far more on the job market than degrees in other social sciences (Bleemer and Mehta, 2022). In the 2021 updated College Salary Report, applied economics and management ranks number seven among the highest paying jobs in the U.S. with a bachelor's degree, catching up with engineering and computer science.¹ For the past decade or so, starting from some very prestigious U.S. universities and colleges, an increasing proportion of economics departments have been (re)classifying their degree programs as STEM fields (Marshall and Underwood, 2022). New developments and trends continue to emerge in the field.

Why does economics major stand out in the higher education arena? While this paper intends not to seek a definite answer, going over the learning objectives and outcomes across a small sample of economics departments might provide some clues.² Within the context of a liberal arts education, what their statements have in common include an emphasis on critical thinking, quantitative reasoning, statistical analysis, problem-solving, communication and writing skills. Consistent with Allgood and Bayer (2017, pp. 661-662), the learning objectives are set to provide rigorous training for students in economics. More specifically, among the five essential competencies in economics summarized in their paper, "the ability to apply the scientific process to economic phenomena" seems most challenging yet most fundamental because it requires students at introductory level microeconomics to "explain how economists use the scientific process to expand understanding of individual decision-making, market outcomes, and government policies, and apply the process by practicing curiosity and hypothesis testing."

In nature, economics is a social science, and indeed the only social science honored with a Nobel prize. Unfortunately, economics education neglects an introduction to students the scientific methodology and procedure. As noted in Allgood and Bayer (2017),

Scientific inquiry is the essence of economic research, yet explicit attempts to teach students what we actually do are sparse. Instead, as teachers we tell students what they need to know, with little attention to teaching them how to use economics to learn about the world around them.

¹<https://www.payscale.com/college-salary-report/majors-that-pay-you-back/bachelors>

²We selected ten colleges and universities via google search by typing in "economics learning goals and outcomes." This school list consists of Barnard, Bowdoin, Bryn Mawr, Pomona, Williams, University of Washington, University of Illinois, Rutgers, UC Berkeley, UCLA.

At the introductory level, the challenge of quantitative reasoning and modeling aside, the lack of knowledge on scientific procedures in economics education may constitute the bulk of the iceberg. If we economics instructors are not familiar with the nature of science and the procedures for conducting scientific inquiry, how do we expect our students to think critically, ask good questions, distinguish concepts and models from reality, identify assumptions, formulate hypotheses, challenge theory with evidence, not to mention to solve complex real-life problems. In fact, while all economists are trained in research during graduate schools, a good number are not acquainted with designing experiments for testing hypotheses, and few appreciate scientific principles and methodology.

For the most part, economists receive little training in teaching or the use of different pedagogical techniques (McCoy and Milkman 2010; Walstad and Becker 2010; Allgood et. al., 2015). As professional training and experience take time, the learning-by-doing process is sometimes costly, successful teaching requires instructors to find effective ways to identify and help student overcome their key learning challenges. While there is no one size fits all teaching strategy, good teachers are expected to guide students to see the big picture, connect the dots, and develop essential skills.

As economics departments and profession set learning objectives for students, instructors follow and revise their pedagogy as a means to an end. To meet general learning outcomes and the five essential competencies in Allgood and Bayer (2017, pp. 661-662), focusing on teaching Principles of Economics, we apply the Bloom's taxonomy in this paper to identifying the key learning challenges to students and adopting targeted pedagogical strategies: (1) To help students see the forest and instructors unify lectures, we lay down simplified theoretical frameworks for Microeconomics and Macroeconomics, respectively; (2) To help students connect the dots, we clarify how different chapters (topics) can fit into the framework and how the framework can further extend to more advanced studies; (3) To help students develop high-level applicable skills, we design and share our experiential learning projects.

The paper proceeds as follows: the rest of the introduction section first identifies key learning challenges and suggests corresponding pedagogical solutions. Section two details the pedagogical strategies for teaching Principles of Microeconomics and section three for Principles of Macroeconomics. Section four concludes.

1.1 Learning challenges

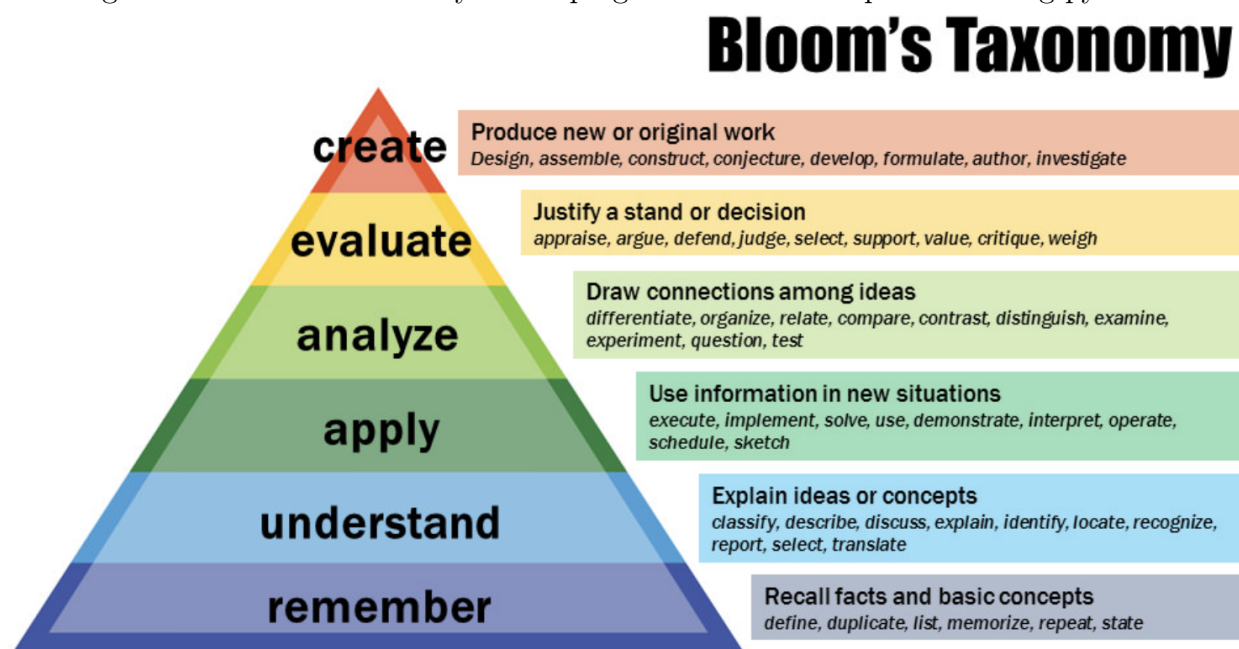
While common learning difficulties (e.g., the lack of interest, the tendency to give up, and the tendency to oppose the teachers) appear at different stages of instruction, college-level economics learning faces more technical challenges in the process of knowledge comprehension and application.³

Based on the acknowledged Bloom's Taxonomy, the Center for Teaching of Vanderbilt University helps instructors visualizes the learning process in a hierarchical structure. In Figure 1, moving up the learning pyramid would require increasingly more demanding cognitive and practical skills that

³For a discussion of the difficulty in learning economics at high-school level, interested reader may refer to Inayati et al. (2018), accessible from <https://knepublishing.com/index.php/Kne-Social/article/view/1884>

must be acquired via training and practice. At a principles level, the basic requirements include "remember" and "understand," intermediate requirements focus on "apply" and "analyze," advanced requirements shall comprise "evaluate." In practice, students taking Principles of Economics are not expected to perform rigorous evaluation or produce new or original work ("evaluate" and "create").

Figure 1: Bloom's Taxonomy for helping students climb up the learning pyramid



Source: Vanderbilt University, Center for Teaching [Website]

Table 1: Mapping Learning Outcomes to Learning Challenges in Principles of Economics

Five Essential Competencies in Allgood and Bayer (2017)	General Learning Objectives by Economics Departments	Learning Pyramid in Bloom's Taxonomy
1. Apply the scientific process to economic phenomena	critical thinking; problem-solving (quantitative reasoning)	understand; apply; analyze
2. Analyze and evaluate behavior and outcomes using economic concepts and models	critical thinking; quantitative reasoning problem-solving;	remember; understand; apply analyze; evaluate
3. Use quantitative approaches in economics	critical thinking; quantitative reasoning problem-solving	understand; apply; analyze
4. Think critically about economic methods and their application.	critical thinking; quantitative reasoning problem-solving	remember; understand; apply evaluate
5. Communicate economic ideas in diverse collaborations	critical thinking; problem-solving; communication; collaboration.	remember; understand; apply analyze; evaluate

For each of the essential competencies for students of economics (at all levels and across the major), what are the corresponding skills requirements and learning challenges? Summarized in Table 1, we map the general learning objectives and the "action words" from the Bloom's Taxonomy to the essential competencies. As shown in the middle column, all learning outcomes and competencies involve a certain amount of critical thinking and problem solving, either directly or indirectly. As critical thinking plays the most fundamental role in scientific inquiry, it is yet the most challenging intellectual process that undergirds all academic skills.⁴

Quantitative reasoning skills are explicitly related to three of the five competencies. In introductory microeconomics, basic algebra and geometry are applied to marginal analysis, cost and benefit analysis, and market equilibrium analysis. In introductory macroeconomics, reading, interpreting, and analyzing financial and macroeconomic data patterns (value, change, growth, trends, fluctuations) are indispensable to modeling and evaluating economic conditions and policy outcomes. Depending on specific types of problems being addressed, the application of scientific process to economic phenomena and communication of economic ideas in group works might or might not involve quantitative reasoning.

From learning outcomes to "action words" in Bloom's learning pyramid, all five competencies involve "understand" the topics well beyond simply "remember." Indeed, almost all call for "apply" and "analyze" to various extents, three demand "evaluate." In other words, to meet the five essential competencies amounts to climbing up the learning pyramid to almost to the top—a formidable task for any serious economics departments or programs.

1.2 Pedagogical strategies

Based on the simple mapping analysis above, we propose to adopt and implement the following strategies to help students in principles courses climb up the learning pyramid step by step, targeting to achieve the general learning outcomes and essential competencies in economics education. The procedures are transferable to intermediate and advanced level courses and instructions.

1. Introduce scientific methods and apply its procedures to inquiries.
2. Sketch a big picture, then help students connect the dots.
3. Instill economic ways of thinking via real-life phenomena and personal examples.
4. Utilize data visualization, news, policies, and research findings for lecture or online discussions.
5. If possible, explain theoretical concepts and models intuitively, graphically, and quantitatively.
6. Share expert-led lecture videos, schedule regular short quizzes, conduct polls and surveys.
7. Assign and supervise hands-on individual presentations and group research projects.

⁴<https://www.criticalthinking.org/pages/defining-critical-thinking/766>

In conducting scientific inquiry, scholars and researchers must always follow established sets of principles, rules, and procedures. Understanding basic scientific procedures and methods are most fundamental to critical thinking and problem solving. In particular for economic inquiries, students would benefit from applying scientific principles to distinguish opinion from reality (e.g., positive vs normative statements); distinguish assumptions from facts (e.g., zero transaction cost, homogenous agents, perfect information); distinguish theory and model from reality (e.g., market equilibrium vs price and quantity); distinguish between the unobservable and the observable (e.g., inflation vs CPI). Scientific methods also include formal introduction to the basic components of a theory and model, formulation of testable hypotheses, examination of empirical evidence for and/or against hypotheses. It is worth noting that the process of science is non-linear, iterative, and not predetermined.⁵ Due to the lack of training prior to college and the mild touch on the topic in most textbooks, the nature and procedure of science are quite foreign to most undergraduates. Therefore, we suggest instructors consider the necessity to prepare and devote at least one or two lectures to scientific methods for economics. As a reference, we recommend the resources below from the UC Berkeley website on "Understanding Science – How Science Really Works."

- Overview of understanding science https://undsci.berkeley.edu/article/intro_01
- Science teaching tools <https://undsci.berkeley.edu/teaching/teachingtools.php>
- Flowchart of science <https://undsci.berkeley.edu/article/scienceflowchart>

Geared up with scientific methods, students are ready to climb up the learning pyramid. The learning process starts from "remember," in some sense, to improve learning outcomes is to reduce rote memorization, enhance understanding, apply the principles to new situations. From the second to the fifth steps, our pedagogy intends to make "remember" easier via "understand" and "apply" with more interesting, realistic and updated lecture contents and assignments. We will explain in detail and illustrate how to implement these strategies in the next two sections.

Using the sixth strategy, we encourage instructors to share, assign, or integrate brief, expert-led, curriculum-based videos into the classroom experience, as some recent experimental evidence suggest improved teaching effectiveness (Beg et. al, 2022). As such, we find the following short videos particularly relevant (and they are completely free of charge). The Crash Course for Economics provides very interesting narratives and teaches good economic intuition to beginners without any mathematical preparation. The two principles courses taught by Tyler Cowen, Alex Tabarrok, and Joana Girante accompany short lectures with quizzes and exams, doable online from the Marginal Revolution University (or simply MRU, the world's largest online library of free economics education materials). As the title suggests, Foundational Concepts in Economics contains 13 videos, together with a free eBook, that "introduce the concepts on which all of economics is founded."⁶

⁵https://undsci.berkeley.edu/article/0_0_0/howscienceworks_02

⁶<https://www.libertarianism.org/books/economics-free-markets-introduction>

- Crash Course - Economics
<https://thecrashcourse.com/topic/economics/>
- MRU Principles of Microeconomics
<https://mru.org/principles-economics-microeconomics>
- MRU Principles of Macroeconomics
<https://mru.org/principles-economics-macroeconomics>
- Foundational Concepts in Economics
<https://www.libertarianism.org/videos/foundational-concepts-economics-introduction>

Applying the seventh strategy, we advise instructors to design data-driven research-based experiential learning activities to help students "apply," "analyze," and "evaluate."⁷ Detailed explanations and samples are provided in the next two sections for teaching Principles of Economics.

To end this section, we come back to the application of quantitative reasoning to economic analysis. As for students taking a principles course, scientific thinking and economic intuition are of first order importance, and basic algebra and geometry are sufficient. Avoid put the cart before the horse. Nonetheless, for students who struggle with basic math tools, we recommend a "math camp" approach in the first two week of class, similar to a TA review session in some universities and graduate programs. In such an assignment, instructors can write a one- or two-page problem sets to cover only essential math tools for modeling and solving economic problems for the semester. A systematic treatment and enhancement of the tools at the beginning of the semester gives students sufficient time to prepare and will support subsequent applications in various economic contexts, as effective instructors are also expected to be able to explain difficult theoretical concepts and models graphically and quantitatively during the lectures.

2 Principles of Microeconomics

2.1 The big picture

Microeconomics studies individual and public choices under scarcity. In one equation, the big picture of microeconomics can be written as $P(Q_D) = P^*(Q^*) = P(Q_S)$, which states the market equilibrium condition in the demand and supply analysis. The two most vital decision-making variables in microeconomics are price and quantity. The postulate of rationality implies that the economic agent aims to maximize benefit at minimum cost. To optimize, the principle of marginal

⁷Allgood and Bayer (2016) also argue that assessments should go beyond measuring content mastery and should include open-ended tasks that allow students to demonstrate higher order skills, such as formulating questions, interpreting data, and constructing and deconstructing arguments. Some empirical results in Boyle and Goffe (2018) suggest that using a research-based approach to teaching principles of macroeconomics might improve learning.

equalization ($MB=MC$) can be applied to all economic decision-making processes. Remarkably, the opportunity cost can serve as the unifying concept in teaching Principles of Microeconomics. No choice, no cost, no economics.⁸

In the Production Possibilities Frontier (PPF) model, its slope is the opportunity cost representing the tradeoff between two goods in production. In trade theory, it encompasses the comparative advantage behind specialization and exchange. In consumer choice theory and the law of demand, the price paid is the opportunity cost of consumption in which the consumer chooses the optimal quantity to maximize utility, subject to diminishing marginal utility. In production theory and the law of supply, the factor cost enters into the production decision in which the firm decides the optimal output to maximize profit, subject to diminishing marginal product. In market transaction, price and cost are the two sides of the same coin, serving as social coordination signals in resource allocation and income distribution. In market failures, while asymmetric information costs can cause adverse selection and moral hazards, the divergence between private and social costs (benefits) would result in externalities and free-rider problems, calling for potentially a positive role of corrective market design and public policy intervention.⁹

After teaching the basic concept of opportunity cost, instructors can apply it as the analytical framework throughout the lessons. By first focusing on the big picture and then connecting the dots between various topics, instructors will systematically help students master the economic way of thinking. In all, an in-depth understanding of opportunity cost provides the right intuition for economic analysis.

2.2 Connect the dots

Perhaps a more substantial reason for placing opportunity cost at the center of a principles course is its powerful contribution to the decision-making logic underneath accounting and corporate finance.

Accounting records business decisions/transactions in the form of financial statements. Of particular relevance to microeconomics is the income statement that reports company earnings (at the bottom) calculated from its sales revenue (on top) minus accounting costs (in between) for any given period. While undergraduates will learn in Mankiw's textbook that accounting profit and economic profit differ by the amount of "implicit cost," it is more crucial to clarify to students the distinct treatments of costs between accounting and economics. In the income statement, all costs are historical in nature, summing over all imputing production factors (land, labor, capital, and taxes) in the corresponding accounting period. In economics, however, production cost is modeled as a function of output and derived from the production function. The link between the cost function

⁸In a survey-based paper, Modig (2021, p2210) finds that opportunity cost seems to be a key concept among the six important concepts in economics.

⁹For two deeply insightful papers with applications of transaction cost, see Ronald Coase's "The Nature of the Firm" (1937) and "The Problem of Social Cost" (1960). For an excellent multimedia resource on Coase's ideas, see <https://www.essentialscholars.org/coase>

and the production function is the factor price. That is the reason for what we see in the textbook those "mirror-image" graphs mapping marginal product (of input) to marginal cost (of output).

In simple math, suppose the production function is $Q = aL$ and hourly wage is w , accountants will record the cost of labor as $C = wL$, whereas economists will derive $C = C(Q) = wL = wQ/a$. In this way, economists "flip" and "stretch" the MP_L (marginal product of labor) to obtain MC_Q (marginal cost of output). Without providing such derivations, it is no surprise that most students have a hard time understanding the relationship between marginal cost and product. A more fundamental question deserves pondering: If production costs can be directly calculated via factor markets, why bother a convoluted treatment of cost in economics? Here is a bold guess: neoclassical economists model cost as a function of output for the sake of theoretical simplification. Recall that, in economics, the two most essential decision variables are price and quantity. The producer chooses the quantity (and price) to maximize profit, subject to cost constraint. If revenue and cost are plotted against quantity, profit is straightforward to calculate and visualize. In hindsight with the full picture, how wonderful is the neoclassical economics tradition, but it shall be revealed to students by teachers. In fact, accounting and business management do apply this way of thinking in short-term operating decision (variable cost matters) as well as long-term exit decision (fixed cost and overhead cost matter).¹⁰ But again, it is an application of the concept of opportunity cost in doing business—whether the factor has alternative employment options determines its nature as variable cost versus fixed cost for that particular production decision cycle. Alfred Marshall and neoclassical economics could have made our lives easier if they painted the big picture of the economic way of modeling/thinking in the first chapters of their textbooks.

At the center of Corporate Finance, the economic agent is the shareholders and the opportunity cost of their investment decision is defined as the cost of capital. By investing their capital as ownership equity in a company, the shareholders must forgo returns on an alternative venture with comparable level of risk exposure. To compensate for delayed gratification and bearing business risks, shareholders are entitled to residual claims to company earnings in the form of dividends. The cost of capital is therefore the opportunity cost of becoming shareholders of a company, and the size of which is determined by the "surplus value" of the business, according to Karl Marx. What most people view as a profit in accounting sense is indeed a cost in economic sense—there is no free lunch. In a nutshell, the bulk of Corporate Finance involves the applications of the cost of capital to capital budgeting and corporate valuation and investment decisions.¹¹

2.3 Learning activities

In teaching Principles of Microeconomics, what do/would instructors assign to students in the first week or two as homework? It turns out that few instructors have taken advantage of this period

¹⁰<https://www.accountingtools.com/articles/accounting-cost-definition-and-usage.html>

¹¹For a reference of the founding paper in Corporate Finance, see Modigliani and Miller (1958) The Cost of Capital, Corporation Finance and the Theory of Investment.

well. "Why bother? Students need a little time to get a copy of the textbook." After taking a principles class, while most students can tell who the father of economics is, few know what topics were covered in *The Wealth of Nations* (WoN), not to mention how it is relevant to us today. The same situation happens to a majority of economics majors and graduates. Why reading Smith is relevant and important? In the 1991 Nobel Prize lecture in Economic Sciences, Ronald Coase commented on the development of economics in general:

During the two centuries since the publication of *The Wealth of Nations* the main activity of economists, it seems to me, has been to fill the gaps in Adam Smith's system, to correct his errors and to make his analysis vastly more exact....A major task of economists since the publication of *The Wealth of Nations*, as Harold Demsetz has explained, has been to formalize this proposition of Adam Smith.¹²

Considering the foundational role of Smith's WoN, we economics profession should encourage students to read the essentials or condensed versions of *The Wealth of Nations*, providing them with a big picture of the classical themes of economics. The format can be a one- or two-page summary or review on the following books. And it can best be achieved in the first two weeks of class so that instructors can integrate Smith's ideas and insights into subsequent lectures and discussions.

- James Otteson (2018) *The Essential Adam Smith*. The Fraser Institute
<https://www.essentialscholars.org/smith>
- Eamonn Butler (2011) *The Condensed Wealth of Nations*. The Adam Smith Institute
<https://www.adamsmith.org/research/the-condensed-wealth-of-nations>

Since the practical value of student learning activities is driven by their relevance to the lectures and future applications, among a variety of active learning techniques, experiential and inclusive projects are most likely to help students bridge the gaps between theory and practice, connect the dots between the lectures, and develop marketable skills. As such, instructors can design projects on corporate business and market analysis and on government policy analysis and evaluation to integrate various topics in microeconomics. Research-based questions and instructions are provided so that students can answer them step by step. These projects can be assigned individually or as a team work, depending on class size and student preparation. To develop students' presentation and communication skills, in-class PPT presentation or recorded presentation videos can be required upon submission. Two sample projects and student presentations are accessible via the link below <https://sites.google.com/site/19e160/projects>.

¹²<https://www.nobelprize.org/prizes/economic-sciences/1991/coase/lecture/>

3 Principles of Macroeconomics

3.1 The big picture

Macroeconomics studies the overall conditions of the economy. The big picture of macroeconomics is the quantity theory of money. In one equation, it is $MV = PY$, which simplifies the economy from a transaction perspective. The topics introduced in standard textbooks of Macroeconomics are based on the quantity equation: national income or output $Y = C + I + G + NX$, labor market conditions $Y = F(L)$, price level P , interest rate $i \approx r + \pi^e$ and $M_D(i, Y) = M_S = M(i)^*$, monetary and fiscal policies. Macroeconomics (and finance) consists of two pairs of variables that are fundamentally distinct in their measurements and applications: Stock vs flow (e.g., wealth vs income) and nominal vs real (e.g., nominal interest rate vs real interest rate).

Defining and measuring key macroeconomic variables (Y, P, M, i) are foundational to the study of their patterns over the business cycles in the short run and of economic growth in the long run. To help student understand the relationships between the key variables, two empirical findings stand out in six decades or so: the Phillips curve (1958) for P and L and the Okun's Law (1962) for Y and L . While classical dichotomy of money neutrality explains well the long run relationship between inflation and money growth, the short run economic fluctuations demand more careful examinations on the role of monetary and fiscal policies.¹³

For decades, the macroeconomic thinking dominant in academia and policy analysis pose a significant challenge to teach macroeconomics to undergraduates, especially in introductory courses. Its origin traces back to the natural rate of interest/output/unemployment, develops to potential output/full employment, and molds into "economic slack" or "output/unemployment/inflationary gap".¹⁴ In order to "close the gap" or "smooth out the business cycle," the mainstream macroeconomic theories and policy-making have been reinforcing each other to model and estimate these hypothetical "stars" on top of unobservable macroeconomic states measured by data subject to frequent revisions. While this practice certainly renders economics more engineering, does it follow good science? How much do we expect our students to appreciate the complex economic system if the best macroeconomists are still stumbling to figure out where the stars are in the universe?¹⁵

3.2 Connect the dots

Macroeconomic conditions and policies impact everyone's daily lives and decisions, from finding a job to budgeting living costs, from taking a mortgage loan to paying taxes. Nevertheless, most people are puzzled by the economy, not to mention equipped with the Principles of Macroeconomics for decision-making. There must be something wrong with the way it is taught or the contents being

¹³Refer to Lucas (2014) for evidence on the long-run correlations between inflation and money growth, .

¹⁴<https://www.ecb.europa.eu/ecb/educational/explainers/tell-me-more/html/what-is-economic-slack.en.html>

¹⁵With concerns in macroeconomics identification issues, Nakamura and Steinsson (2018) likened macroeconomics to meteorology, and current macro policy discussions to ancient belief in rain gods.

taught, or maybe a combination of both. In an ascending order of difficulties, they fall into three major categories when students try to understand macroeconomic issues. Advices are provided on how to help students connect the dots within the quantity theory framework.

First, getting lost in the data and terminology. Indeed, being able to analyze macroeconomic data is an indispensable skill for macroeconomists. Compared with the real world macro data, a typical macro textbook only covers about a tiny set of them. For example, the FRED currently tracks more than 817,000 US and international time series from 108 sources. Fortunately, the majority of macroeconomic indicators are designed to measure price and quantity variables falling into the broad categories of Y , P , and M along the logic of quantity equation. With this big picture in mind, there is no need to ask students to memorize the definitions. Instead, instructors can provide more opportunities in class or homework to help students learn how to describe and compare macro data in contexts.

Second, getting lost in the policy discussions and debates. Before economists, politicians, and policy-makers can learn to agree to disagree, this challenge will never become easier nor disappear. That's exactly the reason why citizens need to learn Economics and be able to participate in policy discussions. With a good understanding of macroeconomic phenomena, basic research skills, together with developing the right economic intuition, we will equip ourselves to distinguish facts from opinions, truth from ideology. The quantity theory views money as a media of exchange and excess money in circulation relative to output will drive up inflation in just a matter of time. This is the right intuition to share with students.

Third and most perplexing, getting lost in the causes and effects. While the same challenge prevail in all scientific inquiries, it is particularly true for social sciences where no control experiment is available and possible. Here again, the right economic intuition matters but subject to solid empirical evidence. Taking as an example again the causes for inflation, the quantity theory also include channel from output Y to price level P . If the quantity theory is true, how much should we trust the "cost-push" and "supply shock" arguments? Examining the data on US in late 1970s and early 1980s, Lawrence White concluded that "supply shock cases are seldom large enough to account for much inflation and are typically short-lived."¹⁶

In its scope, macroeconomics provides a top-down view of the economic and financial system. In practice, its analytical frameworks are essential for understanding the close linkages between real economic activities, financial market transactions, and monetary and fiscal policy actions. In addition, Principles of Macroeconomics serves as foundations for upper level or graduate courses such as Money and Banking, Financial Markets and Institutions, Public Finance, International Finance, and Investments Analysis .

¹⁶<https://www.econlib.org/library/Enc/Inflation.html>

3.3 Learning activities

Macroeconomics is teem with challenges as well as learning opportunities. The Fed, global financial markets, intergovernmental organizations, business news and media provide teachers and students with abundant resources to explore. Based on the enormous amount of real-time macro data and economic reports, creative instructors cannot help experimenting to design lecture contents, assignments or projects to help students connect the dots along many dimensions.

Needless to say, data have become more central in decision-making and are said be the most valuable resource.¹⁷ Utilizing data visualization can be one of the easiest yet most effective approaches to classroom instruction. A picture is worth more than a thousand words or numbers. Almost all students are willing to read and interpret patterns behind macro and finance data in time series plots, cross-sectional graphs, regional heat maps, bubble charts, and dynamic evolutions. A selected list of data resources is shared via <https://sites.google.com/view/biweichen/links>

After learning the basic concepts and measurements, students can best apply them when they act like a professional macroeconomist. Eight times per year, the Fed chair holds FOMC press conference and the first task being performed is a short report of economic conditions and outlooks on economic growth, labor market, inflation, and federal funds rate. In a similar format, instructors can assign individual or group presentations on economic outlook reports to train students' data interpretation and communication skills. Since plenty of websites provide data and graphs for current macroeconomic conditions around the world, students can choose a country or region of their interests and present their own findings after some basic research without the need to prepare data and graphs from scratch.¹⁸ Since most undergraduates are unfamiliar with university research and presentations, general requirements and clear instructions are necessary to help them follow academic standards. In final evaluation, student presentations shall be timed in class or submitted online in recorded videos together with powerpoint slides.

For ambitious instructors who wish to challenge their students further, structured and supervised projects can be designed to help students get a flavor of what macroeconomic research actually looks like done from scratch. Such small research projects can bridge several topics or focus on a special topic at a time with objectives specified at the beginning. Since these projects are based on data collection and analysis in spreadsheet, most students can easily get lost without detailed instructions. Hence, instructors shall break down the whole task into several sections and parts, provide tested data links, research questions, and step-by-step guidance. Sample projects for introductory and intermediate level courses are accessible via <https://sites.google.com/site/19bc3033/projects>. Surprisingly in the multiple courses that I taught, almost all students coming with very diverse backgrounds and preparations were able to complete most project questions and submit a decent work toward the end of class.

¹⁷<https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data>

¹⁸<https://tradingeconomics.com>

4 Concluding Remarks

It is worth pointing out that most colleges and universities do not require students to take Principles of Microeconomics and Macroeconomics in sequence. In fact, plenty of schools allow students to take either one for general education purposes. Consequently, students taking macroeconomics without microeconomics background have not developed enough intuition and analytical foundations for understanding how the complex economic system functions. On the other hand, instructors teaching macroeconomics end up covering the same topics, in particular the demand and supply model, for at least a week or two. From the perspective of academic preparation and intellectual development, the benefit of such practices does not outweigh its cost.

Due to growing pressure for research publication and cost control, the percentage of full-time nontenure-track faculty will likely continue to rise (Allgood et al., 2015). More unfortunate, an increasing number of colleges and universities seemed to underestimate the value of introductory economics and have been outsourcing them to graduate students, adjunct instructors, and visiting professors, perhaps due to their large enrollment and heavy workload. It is not clear that trends in division of labor between research and teaching in the field of economics are win-win for both the universities and students.

After analyzing the five essential competencies for economics students and departmental learning objectives, we identify significant challenges to help students develop critical thinking, quantitative reasoning, problem solving, and communication and collaboration skills in a principles course. We emphasize the fundamental role of scientific procedures in teaching and learning economics and suggest a systematic treatment and introduction. Following the Bloom's Taxonomy, our pedagogical strategies focus on guiding students to climb up the learning pyramid by reducing the burden of "remember," enhancing the lecture contents of "understand," creating experiential and inclusive learning opportunities for "apply," "analyze," and "evaluate."

To implement our strategies, we present two separate frameworks for teaching Principles of Microeconomics and Principles of Macroeconomics, painting the big picture for students. Instructors can then help students connect the dots along several dimensions: (1) observations and explanations (what do we find in the data? what are the explanations?); (2) concepts, assumptions and models (what are the important concepts to summarize and explain the data? how are the concepts applied in the model? how can different assumptions change the result of the model?); (3) intuition and math (how to apply quantitative tools and graphs to modeling economic issues?); (4) sections and chapters (what are the relationships between different sections in each chapter and between different chapters in the book); (5) theory and evidence (how convincing is the theory and model, any supporting evidence or counterexamples?); (6) theory and applications (what are the classical applications? how do economists apply theory and models in practice?); (7) current and future courses (what are the applications of basic concepts and principles to more advanced topics?).

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