Economics 101: An Improved Approach

Working Paper 2012-02

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Abstract
Modern principles of economics textbooks do an admirable job of teaching students to think like economists, but have unfortunately lagged behind the modern discipline in their inclusion of statistical, data-driven analysis. Many traditional presentations of ideas in principles textbooks would benefit from being revised to include more empirical evidence for their theories, so as to more accurately reflect both the nuances of the theories themselves and the methods used by economists to test those ideas. In particular, textbooks’ treatment of the Phillips Curve, Okun’s Law, Lucas Critique, assumptions of rationality, and both the velocity of money and money creation could benefit from a more data-based approach.

Keywords: introductory economics, principles of economics, Phillips curve, Okun’s Law, rational expectations, Lucas critique

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INTRODUCTION

Economics today is a dynamic field, constantly testing its ideas and theories against ever growing collections of data and taking full advantage of modern statistical methods whenever possible. While principles of economics textbooks generally excel in teaching how to think like an economist, they tend to do this by focusing on older theory driven content and thereby lag behind the field in their usage of data-driven analysis. Unfortunately, this approach does not best represent economics as it is practiced today. Furthermore, it can give students the sense of economics being a settled science rather than of it being a discipline continuously reexamining itself in the light of new trends and data, a concern that has been highlighted by other authors (Krueger, 244). Including more data and statistics based analyses in textbooks would further improve students’ understanding of economic thought, how economic research is conducted, and also improve their understanding of the nuances of certain theories already being presented in textbooks today.

We will focus on four main examples, first noting how a few simple graphs can present a more nuanced view of the Phillips Curve. Then, we focus on why Okun's Law would be a good methodological example to include in texts. Next, we examine how data about bond yields provides statistical evidence that questions the rational expectations assumption and helps show students the importance of using empirical examples to test theories. Finally, we consider careful statistical analyses of the velocity of money and money creation and how they challenge the conventional treatment of these subjects in principles texts. These examples provide us with building blocks for introducing students to how economists go about testing hypotheses and to
the key issues surrounding the power, but also limits, of econometrics.

THE PHILLIPS CURVE

In the Phillips Curve’s traditional presentation (Mankiw, pg. 802), students are taught that there is an inverse relationship between inflation and unemployment. In general, textbooks focus on the theory behind this relationship, explaining it with a graph of unemployment against interest rates (fig. 1). While this approach does help clarify thinking about the topic, including a plot of the actual inflation versus unemployment data (fig. 2) would pose a critique of this theoretical approach and thus an opportunity to explore the Phillips Curve’s nuances.

[Insert Figures 1 and 2 near here.]

In particular, one might choose to approach the Phillips Curve data by arguing that the Phillips Curve relationship is subject to the Lucas Critique, since the unemployment-inflation relationship varies over time as policy regimes and the public's expectations change. Textbooks could present graphs of the Phillips Curve relationship throughout different business cycles (fig. 3, 4, 5), illustrating the clear unemployment-inflation relationship in the nineteen-seventies and its later disappearance. By doing so, textbooks would present students the Phillips Curve relationship and its changes over time in a clear and empirical fashion. Such an approach would enhance students’ understanding of the subject and create a launching point for discussion of the use of econometrics and the hazards posed by the shifting nature of economic relationships over time. Just as importantly, this approach would resist presenting the Phillips Curve as a settled relationship, but rather would show it as part of a dynamic landscape of ideas constantly being
explored and tested against the world.

[Insert figures 3, 4, and 5 about here.]

**OKUN’S LAW**

Two of the most critical features of an economy for a student to understand are Gross Domestic Product (GDP) and unemployment. Given their importance, linking the two concepts contributes a great deal to a student’s overall understanding of the economy. Okun's Law (fig 6) represents an effective yet often overlooked tool for teaching this connection. Okun's Law establishes that for each one percent increase in GDP gap, there is a corresponding two percent increase in unemployment, with this relationship being stable across all business cycles and therefore also easily presented graphically.

[Insert figure 6 near here.]

The inclusion of Okun's Law and its supporting data would improve the clarity of the relationship between GDP and unemployment in textbooks, as well as reinforce the importance of data in modern economics. Furthermore, the stability of Okun’s Law over time presents students with an example of a relationship that is apparently immune to the shifts in expectations driving the Lucas Critique’s analysis. Okun's Law thus may serve as a starting point for discussing microfoundations based theories, such as New Keynesianism, and other responses to the Lucas Critique.
RATIONAL EXPECTATIONS AND BOND YIELDS

Assumptions about expectations are a key differentiator between various schools of economic thought, meaning it is important that these assumptions be given a proper treatment in principles texts. The assumption that people have rational expectations underlies many neoclassical theories of economics, so it would be especially useful to expand beyond the typical theoretical treatment of rationality and examine it empirically.

One potential method for testing the predictions of the rational expectations hypothesis is by examining the relationship between United States bond yields and inflation. Since potential lenders would be rational actors, they should realize that future inflation would reduce the value of the interest returned on any bonds and thus should demand a higher interest rate from the government to compensate for inflation. Plotting the 5-year Treasury note yield data against the inflation rate over the next five years yields a graph that does not obviously support the rational expectations hypothesis (fig 7).

[Insert figure 7 near here.]

Where rational expectations might predict a directly proportional relationship between bond yield and inflation, students instead observe three apparently distinct relationships. Each relationship corresponds to a different period of time, in each of which a different sort of relationship between T-note yield and 5-year inflation is observed. The three cases not only include situations where one variable varies widely while the other remains stable, but also includes an inverse relationship between inflation and bond yields.
These results strongly challenge a basic rational expectations model and thus prompt students to consider the drivers of expectations and how to best test such fundamental assumptions as the idea of rational expectations itself. The ensuing discussion could be used as an introduction to an overview of the cutting edge microfoundations models, which try to account for changes in those expectations, and other new areas of research, such as behavioral economics. Of course, with the relationship between inflation and T-Note yield apparently varying by time period, the Lucas Critique may be discussed here as well.

**THE VELOCITY OF MONEY AND MONEY CREATION**

In their presentation of the Quantity Theory of Money, principles textbooks generally mention that the theory assumes the velocity of money is constant or stable, but rarely explore the validity of this assumption. While Mankiw does examine this assumption by showing a graph of the velocity of money against Nominal GDP and M2 (Mankiw, 671), with a similar graph here being shown in figure 8, a graph of the velocity of money over the same time period on its own (fig 9) seems to suggest that the stability of the velocity of money is not so assured. Since the velocity of money is a multiplicative factor, percent changes in its value are more important than changes in its absolute value compared to M2 and GDP, hence the percent change in these variables are analyzed in figures 10 and 11. The spread of the percent change in velocity of money seems no smaller than for any of the other variables.

[Insert figures 8,9,10, and 11 near here.]
Additional exploration of this data seems to confirm the hunch we gained from the graphs, that the velocity of money is not stable. Specifically, we can show statistically that the velocity of money is indistinguishable from a random walk\(^1\), a pattern formed when a variable progresses by repeatedly adding some random factor to its current position. What this means for students, however, is that there is no clear and simple relationship within this data and that further refinement of our analysis of the velocity of money is needed, considering its importance to theories of the money supply. Further, the discovery of random walks in our data pose a particular opportunity to students since random walks often falsely appear to contain statistically significant relationships, meaning their example demonstrates the important lesson that not all apparent economic relationships really are meaningful. This sort of cautiousness with data is critical for students to learn, so as to avoid the error of jumping to hasty conclusions about relationships between macroeconomic variables or between stock market movements and political events.

The traditional presentation of the money supply could use some revision in more ways than just its treatment of the velocity of money. Its presentation of money creation could also benefit from including statistics relating the size of the monetary base to the size of the money supply. The standard explanation of the size of the money supply claims that, as a consequence of fractional reserve banking, the process of lending, spending, and relending money in the monetary base causes it to grow into the overall monetary supply, yielding a money multiplier of the reciprocal of the reserve ratio. Some textbooks, including Colander’s, acknowledge that more complex

\(^1\) Performing a Dickey-Fuller test on the data yields only a p-value of .583, which is insufficient to reject the hypothesis that money velocity over time is a random walk.
money multipliers may be appropriate.

While this method is a good starting point for discussion of the money supply, presenting the data and observed relationship between the money supply and monetary base would greatly improve the curriculum by affording opportunities to consider complications in this system as well as the complexities of the financial system. Plotting M1 and the Monetary Base together, for example, demonstrate a correlation between the two which, as might be expected, becomes more complex in recent years (fig 12). This complexity can be further teased out by regressing the differenced monetary base on the differenced monetary supply. This approach yields, as expected, a statistically significant relationship between the two variables, but unfortunately one that only explains about eight percent of the variation in money supply differences through monetary base differences. The conclusions from this model might help to impress upon students the importance of the complexities of the financial system in determining money, perhaps opening up space for discussion of the recent financial crisis and the importance of business and consumer expectations in money markets.

[Insert figure 12 near here.]

CONCLUDING REMARKS: REFLECTING MODERN ECONOMICS

While each of the above examples represents a possible way to use data and statistics to better clarify the reality and nuances of a particular economic subject, the overall theme is one of shifting in the direction of making principles of economics reflect the discipline as it is today.
Economics is moving in a direction where the use of statistics and empirical data will only increase and, while students need not understand the details of the econometrics employed in state of the art models, they should be introduced to this general approach to economics. Textbooks should reflect not only the ideas of economists but also the methods employed by them to think about and test those ideas.

An additional benefit to strengthening the empirical foundations of textbook content is that it allows textbooks to introduce students to some of the key issues facing modern economics. Arguments such as the Lucas Critique can be easily illustrated to students with a few well thought-out examples and yet can also call into question the validity and overall usefulness of econometric modeling. This sort of curriculum demands that students more carefully consider the relationships underlying macroeconomic trends while also provoking debate about the proper methodologies for economists to employ. Even the debate between Keynes and Hayek can arguably be distilled to a question of where an economist should draw the line with respect to the utility of macroeconomic models – whether or not our models capture the true long term behavior of the economy or just short term noise and trends that change too much overtime to be useful. Being able to introduce students to such issues and debates using approachable graphical arguments would be of serious benefit to their understanding not only of basic economics, but also to their understanding of the economic debates that make up such an important part of politics today.

The opportunity cost of not including additional data and statistics based arguments within principles of economics textbooks also has grown large enough that publishers and educators
should consider revising texts to include them. Since such subjects as the Phillips Curve, rational expectations, the velocity of money, and Okun's Law already are, in some form or other, covered within textbooks, there is little additional cost to including a data driven analysis of them and their assumptions. Done artfully, such an analysis would be of serious aid to students both in the process of learning principles of economics and in their effort to understand the state of modern economics and key debates in it.
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FIGURES

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![The Phillips Curve: 1955-1971, USA](image)

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![The Phillips Curve: 1974-1984, USA](image)
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