

# Preconceptions of Principles Students\*

Douglas Bice  
Middle Georgia State College  
douglas.bice@mga.edu

Elisabeth S. Curtis  
Dartmouth College  
Elisabeth.S.Curtis@dartmouth.edu

Wayne Geerling  
Penn State University  
wag11@psu.edu

William L. Goffe  
Penn State University  
bill.goffe@psu.edu

Adam Hoffer  
University of Wisconsin-La Crosse  
ahoffer@uwlax.edu

Solina Lindahl  
California Polytechnic State University  
smlindah@calpoly.edu

Mark Maier  
Glendale Community College  
mmaier@glendale.edu

Brian Peterson  
Central College  
petersonbj@central.edu

Wendy Stock  
Montana State University  
wstock@montana.edu

December, 2014

## Abstract

Evidence suggests that principles of economics students are not retaining much of what they learn. Cognitive science suggests a possible explanation—that instruction does not take into account student preconceptions. This topic is rarely studied by economic educators and this paper is the first broad investigation. It surveys the preconceptions of 1,800 principles of economics students at eight U.S. institutions that range from a community college to the Ivy League. Several potentially surprising preconceptions were found.

## 1 Introduction

A possibly overlooked problem in economic education is what appears to be limited learning in economics classrooms.<sup>a</sup> One piece of evidence is [Walstad and Allgood \(1999\)](#), which contains two sources. First, they describe a Gallup poll of 300 college seniors who were asked 15 very basic economic questions. Topics included how economic growth is measured, what constitutes fiscal policy, who conducts monetary policy, and the impact of a rise in the value of the dollar. Approximately one-third of the seniors had not taken an economics course and they answered 48% of the questions correctly. The remaining two-thirds, who had taken an economics course, answered 62% correctly. [Walstad and Allgood \(1999\)](#) also look at data from the “Major Field Test of Business,” which is an exit assessment of business majors; a sizeable component covers economics. Of course, several economics courses are required for most business majors. The authors obtained scores on the economics portion of the MFTB for all students in one calendar year. The authors note,

In our review of the test, half the questions are definitions, and the other half are analytical. The analytical ones require use of supply and demand in microeconomics, or aggregate supply and demand in macroeconomics, but the analysis is only at the Principles level.

---

\*For very able research assistance we would like to thank Matthew Abbate, Julia Dalzell, Ezra Goldstein, Akshay Sankaran, Marc Stephenson, and Amanda Young. For past discussions and comments on this topic we are indebted to Dirk Mateer, William A. McEachern, KimMarie McGoldrick, and Scott Simkins. All remaining errors are ours.

<sup>a</sup>This discussion parallels [Goffe \(2012\)](#).

The mean score was 41%. Along with the results of the Gallup survey this suggest that many students are not retaining much economic knowledge from their courses.

National evidence on the amount of learning that occurs during the semester of instruction comes from the norming process of the “Test of Understanding of College Economics,” (TUCE) [Walstad et al. \(2007\)](#). More than 3,000 students took both the microeconomic and macroeconomic versions at more than three dozen institutions; it was given at both the start (“pre”) and end of the semester (“post”). Each version has 30 questions. The gains between the pre and post TUCE were modest: on the micro version, the mean number of questions answered correctly grew by 3.38 questions (9.39 to 12.77) and on the macro by 4.39 questions (9.80 to 14.19). Roughly speaking, these results and those of [Walstad and Allgood \(1999\)](#) tell the same story—learning seems limited in economics classrooms.

One can argue that these results should concern economists. After all, many teach and for a large share it is their primary obligation. That concern aside, what might explain these results?

One possibility comes from cognitive science. [Brown et al. \(2014\)](#), which summarizes much of what is known about learning notes that “Learning always builds on a store of prior knowledge. We interpret and remember events by building connections to what we already know.” One specific theory of learning, which dominates STEM disciplines, is “constructivism” and it places great emphasis on knowledge that students bring to the classroom. [Hartle et al. \(2012\)](#) describes how it is the “primary learning theory underlying the AAAS ‘Vision and Change in Undergraduate Biology Education: A Call to Action.’”<sup>b</sup> They go on to describe how constructivism places a particularly large emphasis on prior knowledge:

If the students’ constructs are different from the teacher’s and the students do not realize it, or do not try to change them, no learning will take place regardless of how the lesson is taught. Only when the students realize that their prior knowledge is insufficient or inappropriate to understand something will the students become motivated to modify their constructs.

Thus, one possible explanation of poor learning by economics students is that instructors do not take into account their students’ prior knowledge. Of course, experienced instructors might implicitly address prior knowledge, but it likely on an ad hoc basis. There does not seem to be a study of multiple preconceptions across different institutions—this paper is an attempt to fill that gap. As described in detail in [Goffe \(2012\)](#) many other disciplines, including psychology, physics, biology, and chemistry, have undertaken such formal studies and have incorporated the findings into instruction in attempts to improve learning.

## 2 Questionnaire Development

The questionnaires developed here (one each for microeconomics and macroeconomics) include both “factual” preconceptions and beliefs in economic fallacies. The former can in principle be answered by looking at data; an example is the long-run growth rate of the economy or the current rate of inflation. Economic fallacies, such as does international trade harms a country, often take an economic model to address.<sup>c</sup> The questions used here are based on the teaching experiences of the authors, [Goffe \(2012\)](#) (which used some of these questions in a survey at a single institution), [Wood \(2006\)](#), [Madariaga \(2005\)](#), and [Caplan \(2007a\)](#). The last argues that the general public has several categories of biases on economic topics; many of his ideas come from [SAEE \(1996\)](#). With the phrasing from [Caplan \(2007b\)](#), they are

1. “anti-market bias:” “a tendency to underestimate the economic benefits of the market mechanism”
2. “anti-foreign bias:” “a tendency to underestimate the economic benefits of interaction with foreigners”
3. “make-work bias:” “a tendency to underestimate the economic benefits of conserving labor”

---

<sup>b</sup>That is, the American Association for the Advancement of Science (AAAS), along with many professional societies in biology (not mentioned in this quote) are calling for a wholesale reform of how biology is taught. They are advocating a move away from lecture to more interactive teaching methods to increase student learning.

<sup>c</sup>This distinction is made in [Goffe \(2012\)](#).

4. “pessimistic bias:” “a tendency to overestimate the severity of economic problems and underestimate the (recent) past, present, and future performance of the economy.

It is worth noting that it can be difficult to develop these questions as experts in a subject may have a difficult time remembering how novices think about that subject. [Wieman \(2007\)](#) put it this way:

In a recent science education example ... we saw students express disbelief that anyone could hold a certain misconception, yet we had seen those same students actually express this very misconception themselves, just a few months earlier!

Thus, it should not be surprising that several of the questions came from chance comments from students or even a suspicion of a preconception by one of the authors.

The questions were developed to minimize priming. Thus, where possible, free response questions were used; examples include questions on the current rate of unemployment, inflation, and who controls fiscal policy. Multiple choice answers were used when the possible range of answers covered all reasonable possibilities, such as the impact of international trade on the U.S.

### 3 Questionnaire Administration

The microeconomic questionnaire was administered at the start of either the Fall of 2013 or Spring of 2014 in principles of microeconomics courses at the following eight institutions: Middle Georgia State College, Dartmouth College, Penn State University, University of Wisconsin-La Crosse, California Polytechnic State University, Glendale Community College, Central College, and Montana State University. The macroeconomic questionnaire was given at the same time in macroeconomic principles classes in all of the above institutions with the exception of Middle Georgia State College and Dartmouth College. While the institutions were not selected to be a representative sample of U.S. colleges and institutions, they do vary widely: from a community college to the Ivy League with substantial variation in between. They vary geographically as well: from Southern California to Montana to Georgia to New Hampshire and points in between. In the results reported below, 1,139 students took the microeconomic questionnaire and 726 took the macroeconomic one. At Penn State students took subsets of the questionnaire to reduce class time. As these sections had 350 or more students there was still a large sample for each question.

### 4 Macroeconomic Questionnaire Results

The following paragraphs contain the questionnaire as the students saw it. Student responses are in red text. Note that “I don’t know” and blank responses were tabulated; the latter likely gives an indication of student uncertainty on that question. All reported answers, means, medians, and standard deviations are averaged across the values from each institution so that institutions with more students (like Penn State) do not unduly influence the results.

Directions: This survey is used to collect the ideas that students bring to their economics classes. Please answer to the best of your ability; estimates are perfectly acceptable. There are two types of questions: ones where you write an answer (if you are completely unsure, please write “I don’t know”) and ones where you circle your answer from the list provided.

1. If you have studied economics previously, please circle as appropriate from the list below (you may circle more than one):
  - economics in high school 52.7%
  - microeconomics in college 30.6%
  - macroeconomics in college 9.6%
  - other course or courses economics in college 3.2%

2. Of those in the U.S. who are willing and able to work, what percent are not working? (This is the unemployment rate.)  
**Median: 8.8% Mean: 12.8% SD: 11.1% Blank: 2.2% I don't know: 14.3%**
3. At the federal level in Washington, who decides upon the nation's spending and taxes?  
**Congress: 41.0% President: 7.7% Congress and President: 4.4% Blank: 7.7% I don't know: 22.5%**
4. Since 1950, after adjusting for inflation, income per person in the U.S. has changed by what percent or factor?  
**Median: 18.3% Mean: 96.1% SD: 471.0% Blank: 7.3% I don't know: 49.4%**
5. Since 1950, the number of people working in the U.S. has changed by what percent?  
**Median: 24.6% Mean: 62.5% SD: 242.6% Blank: 6.7% I don't know: 47.2%**
6. Over the last 12 months, what percent have consumer prices risen by?  
**Median: 4.6% Median: 11.0% SD: 30.2% Blank: 7.3% I don't know: 40.8%**
7. Consider the typical middle class household. What kind of taxes do they pay and to whom do those taxes go? [Scored as type of taxes mentioned measuring their knowledge of the tax system.]  
**Median: 2.0% Mean: 2.5% SD: 2.6% Blank: 7.5% I don't know: 12.6%**
8. On average, do those earning incomes higher than the middle class, pay a larger or smaller share of their income in federal taxes than the middle class? Higher income households pay a \_\_\_ share.  
a. higher **62.2%** b. about the same **13.3%** c. smaller **19.1%** d. I don't know **3.8%** **Blank: 1.6%**
9. If you're under the age of 25, what is the chance of getting, more than 50% of the Social Security you've been promised? Please put this in percentage terms (Owould be that you certainly would).  
**Median: 14.6% Mean: 24.0% SD: 25.5% Blank: 5.0% I don't know: 22.3%**
10. Who is the United States' largest trading partner?  
**China: 77.0%, Canada: 3.6%, Other: 7.7%, Blank: 3.1% I don't know: 8.6%**
11. What determines the value of the currency in circulation in the US?  
**Federal Reserve: 5.5% Amount in circulation: 13.5% Gold: 5.2% Other: 41.9% Blank: 9.0%, I don't know: 24.6%**
12. Consider the following parts of federal spending: Social Security, National Defense, Medicare (health care for the retired), Medicaid (health care for the poor), NASA, Foreign aid, Education, and Interest on the national debt. Please estimate the percent of each in the federal budget. Note that this is not a complete list of federal spending, so your percent values should NOT sum to 100%.
  - Social Security:  
**Median: 12.5%, Mean: 15.7%, SD: 12.0%, Blank: 15.1%, I don't know: 9.0%**
  - National Defense:  
**Median: 21.7%, Mean: 25.6%, SD: 17.0%, Blank: 15.3%, I don't know: 9.4%**
  - Medicare (health care for the retired):  
**Median: 12.8%, Mean: 12.8%, SD: 11.1%, Blank: 16.0, I don't know: 9.1%**
  - Medicaid (health care for the poor):  
**Median: 12.1%, Mean: 12.1%, SD: 11.7%, Blank: 16.5%, I don't know: 9.1%**
  - NASA:  
**Median: 3.8%, Mean: 6.8%, SD: 9.6%, Blank: 15.5%, I don't know: 9.1%**
  - Foreign aid:  
**Median: 7.0%, Mean: 9.3%, SD: 9.1%, Blank: 17.6%, I don't know: 9.3%**
  - Education:  
**Median: 9.5%, Mean: 13.4%, SD: 12.4% Blank: 15.8%, I don't know: 9.1%**
  - Interest on the national debt:

6.6%, Mean: 11.1% SD: 12.2% Blank: 17.0%, I don't know: 10.1%

13. What is the probability (0 to 100%) of hyperinflation (U.S. prices rising more than 100% a year) in the next 4 years?  
Median: 25.0% Mean: 49.9% SD: 142.8% Blank: 8.9% I don't know: 21.9%
14. If current policies continue, what is the probability (0 to 100%) that the U.S. federal debt level will cause an economic crisis within the next 4 years?  
Median: 54.2% Mean: 53.8% SD: 31.7% Blank: 10.7% I don't know: 17.8%
15. If the US dollar were backed by gold, it would be better for the economy.  
a. Strongly agree 8.6% b. Agree 28.3% c. Neither agree nor disagree 25.1%  
d. Disagree 27.8% e. Strongly disagree 3.8% Blank: 6.1% I don't know: 0.2%
16. How and when does inflation (rising prices in the economy) hurt the average person?  
Real wages fall (many possible phrasings):  
38.2% Other: 33.5% Blank: 18.3% I don't know: 10.0%
17. An increase in federal government spending requires an increase in taxes.  
a. Strongly agree 10.1% b. Agree 46.8% c. Neither agree nor disagree 13.6%  
d. Disagree 19.0% e. Strongly disagree 2.7% Blank: 7.6% I don't know: 0.1%
18. Trade deficits are bad for the economy.  
a. Strongly agree 7.9% b. Agree 34.0% c. Neither agree nor disagree 33.3%  
d. Disagree 14.9% e. Strongly disagree 1.3% Blank: 8.3% I don't know: 0.3%
19. Natural resources are the key to economic growth.  
a. Strongly agree 15.6% b. Agree 40.5% c. Neither agree nor disagree 24.2%  
d. Disagree 11.8% e. Strongly disagree 0.7% Blank: 7.1% I don't know: 0.1%
20. We should have zero unemployment.  
a. Strongly agree 6.4% b. Agree 20.7% c. Neither agree nor disagree 17.6%  
d. Disagree 39.2% e. Strongly disagree 9.8% Blank: 6.3% I don't know: 0.1%

## 5 Microeconomic Questionnaire Results

Directions: This survey is used to collect the ideas that students bring to their economics classes. Please answer to the best of your ability; estimates are perfectly acceptable. There are two types of questions: ones where you write an answer (if you are completely unsure, please write "I don't know") and ones where you circle your answer from the list provided.

1. If you have studied economics previously, please circle as appropriate from the list below (you may circle more than one):  
economics in high school 52.6%  
microeconomics in college 2.6%  
macroeconomics in college 28.2%  
other course or courses economics in college 2.2%
2. Of the prices of goods and services that you buy, what percent are set or controlled by the government?  
Median: 27.2% Mean: 35.0% SD: 30.0% Blank: 1.1% I don't know: .1%

3. What percent of workers earn the minimum wage?  
**Median: 33.9% Mean: 37.7% SD: 21.7% Blank: 4.5% I don't know 22.2%**
4. Consider the average U.S. corporation. What are their profits as a percent of sales?  
**Median: 34.4% Mean: 39.5% SD: 33.5% Blank: 9.1% I don't know: 34.0%**
5. Overall, does trade with foreign countries aid or harm the U.S.?  
a. Aids **31.0%** b. Mostly aids **49.0%** c. Neither aids or harms **7.7%**  
d. Mostly harms **9.2%** e. Harms **1.9%** Blank: **1.1%** I don't know: **0.1%**
6. The U.S. government makes substantial payments to many farmers. If these payments weren't made, there would be a shortage of food.  
a. Strongly agree **15.3%** b. Agree **46.5%** c. Neither agree nor disagree **14.4%**  
d. Disagree **18.4%** e. Strongly disagree **4.4%** Blank: **0.9%** I don't know: **0.1%**
7. Pro-business policies are the same as pro-market policies.  
a. Strongly agree **0.7%** b. Agree **14.7%** c. Neither agree nor disagree **27.4%**  
d. Disagree **49.4%** e. Strongly disagree **4.5%** Blank: **1.4%** I don't know: **1.8%**
8. In a market, the demand by consumers matters more than what firms supply.  
a. Strongly agree **12.3%** b. Agree **43.1%** c. Neither agree nor disagree **17.5%**  
d. Disagree **22.8%** e. Strongly disagree **3.8%** Blank: **0.4%** I don't know: **0.1%**
9. Producers of goods always charge the highest price possible.  
a. Strongly agree **4.9%** b. Agree **22.3%** c. Neither agree nor disagree **11.5%**  
d. Disagree **52.2%** e. Strongly disagree **8.3%** Blank: **0.6%** I don't know: **0.1%**
10. The only acceptable amount of pollution is no pollution.  
a. Strongly agree **6.4%** b. Agree **26.5%** c. Neither agree nor disagree **24.0%**  
d. Disagree **37.5%** e. Strongly disagree **3.6%** Blank: **1.9%** I don't know: **0.1%**
11. Firms in competitive markets set the price they charge consumers.  
a. Strongly agree **2.5%** b. Agree **40.8%** c. Neither agree nor disagree **16.4%**  
d. Disagree **32.6%** e. Strongly disagree **4.8%** Blank: **1.9%** I don't know: **0.1%**
12. Monopolists always make a profit.  
a. Strongly agree **14.8%** b. Agree **33.1%** c. Neither agree nor disagree **16.4%**  
d. Disagree **30.3%** e. Strongly disagree **2.4%** Blank: **2.6%** I don't know: **0.3%**
13. Charging different prices to different people is unfair and harmful.  
a. Strongly agree **17.2%** b. Agree **35.0%** c. Neither agree nor disagree **17.2%**  
d. Disagree **25.1%** e. Strongly disagree **3.3%** Blank: **2.1%** I don't know: **0.1%**
14. Outsourcing is bad for the economy.  
a. Strongly agree **5.4%** b. Agree **25.0%** c. Neither agree nor disagree **33.0%**  
d. Disagree **28.1%** e. Strongly disagree **4.6%** Blank: **3.2%** I don't know: **0.7%**
15. Trade between countries is best seen as countries competing with each other.  
a. Strongly agree **2.1%** b. Agree **18.2%** c. Neither agree nor disagree **18.2%**  
d. Disagree **50.4%** e. Strongly disagree **8.5%** Blank: **2.3%** I don't know: **0.3%**
16. Your friend just received a raise in income at work, which pushed him into the higher 28% tax bracket. He complains that he now will be paying 28% of all his income in taxes. Do you \_\_\_ with his analysis.  
a. Strongly agree **4.7%** b. Agree **23.8%** c. Neither agree nor disagree **23.6%**  
d. Disagree **27.4%** e. Strongly disagree **7.9%** Blank: **2.0%** I don't know: **5.0%**

17. On average, working men earn more in wages than working women. What is the leading cause of this 'gender pay gap?'  
 Sexism or discrimination: 31.7% Other: 34.1% Blank: 13.3% I don't know: 20.9%
18. Monopolists charge a higher price than consumers are willing to pay.  
 a. Strongly agree 8.7% b. Agree 33.1% c. Neither agree nor disagree 25.1%  
 d. Disagree 26.9% e. Strongly disagree 3.6% Blank: 2.4% I don't know: 0.2%

## 6 Discussion and Conclusion

Notable preconceptions were seen in this set of students. They include

- Only 4.4% know that the President and Congress jointly determine “the nation’s spending and taxes.”
- They believe that there has been little economic growth over the last two-thirds of a century with a median estimated increase in real income of 18.3% and a median estimate of employment growth of 24.6%.
- They are far too pessimistic on their probability of receiving Social Security with a median estimate of 14.6% that they will receive 50% or more of their promised benefits.
- Regarding the federal budget, foreign aid (median: 7.0%) and education (median: 9.5%) are greatly overestimated.
- A substantial number expect economic calamities over the next four years: hyperinflation (25.0% median) and a federal financial crisis (54.2% median).
- Increases in federal spending require an increase in taxes (56.9% agree or strongly agree).
- The government controls or sets a substantial percent of prices (27.2% median).
- A large fraction of workers earn the minimum wage (median: 33.9%).
- Corporate profits as a percent of sales are large (34.4% median).
- 59.8% agree or strongly agree that if payments were not made to farmers that there would be a shortage of food.
- 55.4% agree or strongly agree that “demand by consumers matters more than what firms supply.”
- 57.9% agree or strongly agree that monopolists always make a profit.
- 41.8% agree or strongly agree that “monopolists charge a higher price than consumers are willing to pay.”

Perhaps the preconception that most agrees with “economic thinking” is that 80.0% feel that trade with foreign countries aids or mostly aids the U.S. while 30.4% agree or strongly agree that “outsourcing is bad for the economy.”

There is some support for the views [Caplan \(2007a\)](#). There is some anti-market bias (many work at the minimum wage and there would be shortages of food but for government payments to farmers) and the pessimistic bias (the high perceived risk of financial catastrophes and the likelihood of Social Security bankruptcy). However, less support was found for the anti-foreign bias with large support for international trade. No questions here addressed the make-work bias.

It remains to be determined how many of these preconceptions are discussed in the typical economics class. That would likely be a good subject of future research.



## References

- Brown, Peter C, Henry L. Roediger III, and Mark A. McDaniel**, *Make It Stick: The Science of Successful Learning*, Harvard University Press, 2014. [2](#)
- Caplan, Bryan**, *The Myth of the Rational Voter: Why Democracies Choose Bad Policies*, Princeton University Press, 2007. [2](#), [7](#)
- , “The Myth of the Rational Voter: Why Democracies Choose Bad Policies,” Cato Institute, Policy Analysis no. 594, May 29 2007. <[http://www.cato.org/pub\\_display.php?pub\\_id=8262](http://www.cato.org/pub_display.php?pub_id=8262)>. [2](#)
- Goffe, William L.**, “Initial Misconceptions in a Macro Principles Class,” 2012. <<http://cook.rfe.org/Misconceptions.pdf>>. [1](#), [2](#)
- Hartle, R. Todd, Sandhya Baviskar, and Rosemary Smith**, “A Field Guide to Constructivism in the College Science Classroom: Four Essential Criteria and a Guide to Their Usage,” *Bioscene: Journal of College Biology Teaching*, 2012, 38 (2), 31–35. <[http://www.acube.org/files/7513/6692/2474/Bioscene\\_December\\_2012\\_FINAL.pdf](http://www.acube.org/files/7513/6692/2474/Bioscene_December_2012_FINAL.pdf)>. [2](#)
- Madariaga, Bruce**, *Economics For Life: 101 Lessons You Can Use Every Day!*, Houghton Mifflin, 2005. [2](#)
- SAEE, The Washington Post/Harvard University/Kaiser Foundation**, “Survey of Americans and Economists on the Economy,” October 1996. <<http://www.kff.org/kaiserpolls/1199-econgen.cfm>>. [2](#)
- Walstad, William B. and Sam Allgood**, “What Do College Seniors Know about Economics?,” *The American Economic Review*, May 1999, 89 (2), 350–354. <<http://www.jstor.org/stable/117134>>. [1](#), [2](#)
- , **Michael W. Watts, and Ken Rebeck**, *Test of Understanding in College Economics: Examiner’s Manual*, fourth ed., National Council On Economic Education, 2007. [2](#)
- Wieman, Carl**, “APS News—The Back Page. The “Curse of Knowledge” or Why Intuition About Teaching Often Fails,” *American Physical Society News*, 2007, 16 (10). <[http://www.cwsei.ubc.ca/resources/files/Wieman\\_APS\\_News\\_Back\\_Page\\_with\\_refs\\_Nov\\_2007.pdf](http://www.cwsei.ubc.ca/resources/files/Wieman_APS_News_Back_Page_with_refs_Nov_2007.pdf)>. [3](#)
- Wood, Geoffrey E.**, “Fifty Economic Fallacies Exposed,” *SSRN eLibrary*, 2006. <<http://ssrn.com/paper=676634>>. [2](#)