

Students' decisions to major in math and science

What factors influence students' decisions to major in math and science? In their working paper titled "Math or Science? Using Longitudinal Expectations Data to Examine the Process of Choosing a College Major" (NBER Working Paper 16869, March 2011), Todd R. Stinebrickner and Ralph Stinebrickner examine the expectations that college students have and the decisions they make throughout the course of their bachelor's degree program.

The longitudinal study involved a survey of students enrolled at Berea College in Kentucky in 2000 and 2001 from enrollment through graduation. Majors were classified into a number of groups, and the students' reported their probability of choosing majors within specific groups, their expected GPA in each group, their expected future wages for each group, and their level of interest in each group. All these data then were viewed in light of the students' final choice of major.

The researchers found that, just before freshman year, more students expected to major in the math/science group of majors than in any other group. However, by the second semester of their junior year, the proportion of students who believed that they would most likely choose math/science declined by 45 percent. Ultimately, math/science was chosen less than any other group of majors. The data show that this shift correlated with students' perception that their GPA would decline if they majored in math/science. The researchers' results point to students' perceptions of future grade

performance and future income as the strongest factors in students' decision making process. Students' initial responses to survey questions regarding their GPA expectations for various groups of majors indicated that, on the whole, they expected the lowest GPA in math/science compared with the other six groups of majors. Students' expectations of their GPA in math/science decreased over time, while expectations for other groups of majors remained relatively unchanged throughout the course of the course of students' college careers.

As explained earlier, before starting classes their first year of college, for each group of majors, students were asked to assign a probability of choosing a major within that group. The average probability that students assigned to the group that they ultimately ended up choosing was 43 percent. Not surprisingly, students' level of confidence in their final choice increased throughout their tenure. In addition, across all groups of majors, the level of income that students expected to attain declined throughout their enrollment.

The researchers state that the data suggest that most students who chose not to pursue majors in math/science made that choice because their perceived ability in math/science weakened over time, not because the students were reluctant to put in the effort required to major in math/science.

Rational inattention

Why is it that you are more likely to immediately respond to an email from your boss but you may wait to respond to an email from an old friend? According to economist

Antonella Tutino, the answer is related to the concept of rational inattention. Every day we are faced with an overwhelming barrage of information and only a finite capacity with which to process it, so we must constantly decide what gets attention and what doesn't. In her article "Rational Inattention' Guides Overloaded Brains, Helps Economists Understand Market Behavior," from the Federal Reserve Bank of Dallas' *Economic Letter* (March 2011), Tutino explores the limitations on a person's ability to absorb information and translate it into decisions, and she relates this concept to an individual's perception of the economy.

The concept of rational inattention makes economic models more complex, but it helps economists to study economic expectations. Rational inattention models do not assume that the public's reaction to positive and negative shocks will be the same. Rational inattention models help to explain why some prices remain unchanged while others are volatile, and they provide a rationale for contractions occurring more quickly than expansions in the business cycle.

Tutino writes that information is "fully and freely available...[but] attention is a scarce resource and, as such, it must be budgeted wisely." Often this means prioritizing information, acting on information that has not been fully analyzed, and choosing to act on the information that maximizes productivity. People pay the most attention to the information that is the most useful to them. They tend to pay little attention to good economic news in times of stability, but they typically pay a lot of attention to macroeconomic

indicators during difficult economic times. An example of the budgeting of attention is the fact that a reduction in interest rates does not prompt people to run to the bank for a loan, but upon hearing news that their company is cutting worker pay, most workers would seek immediate clarification about their job situation. Probably because of risk aversion, people tend to react more strongly to a loss of wealth than to monetary gain.

Further, Tutino notes that,

because of information-processing constraints, people must limit the number of scenarios they evaluate. Brand-name products benefit from these constraints; they are well advertised, and one reason that people purchase them instead of less expensive, generic options is constraints on processing information about pricing. People usually have good experiences with brand-name products and lack incentive to explore their options, despite there usually being little difference between the

products and a disparity in price.

The author concludes that rational inattention as a concept can have significant implications for monetary policy and monetary policy instruments, which serve as stabilizing and signaling devices for the public. According to Tutino, understanding economic models of rational inattention and how it guides the public's economic expectations and reaction to change can help policymakers to more effectively communicate their strategies and goals to the public. □