

Thinking like economists

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A Southwest flight at Boston's Logan Airport. Credit: Patrick Gillooly

What effect do low-cost airlines have on airfares overall? Do alcohol taxes reduce drunk-driving fatalities? Under what circumstances do food vendors rip off tourists in Manhattan?

Studying such economics problems is usually the province of professors or PhD students. But one Department of Economics course at MIT, [14.33](#), lets undergraduates spend a semester researching these kinds of issues, with the larger aim of getting them to hone their analytical skills. In the course, students — mostly MIT seniors — produce papers aiming to identify the most likely explanation for a particular phenomenon, rule out plausible-seeming but ultimately incidental causes, and assess the limits of their knowledge in a complex world.

“I try to get students to be skeptical,” says James Feyrer, who taught the class in fall 2010 as an MIT visiting professor from Dartmouth. The right explanation for an [economic](#) phenomenon, he notes, may not always match received wisdom. In the past, 14.33 has been taught by MIT economists such as Michael Greenstone and Sara Ellison; next fall, it will be taught by Heidi Williams, an incoming assistant professor in the department.

First, though, students must identify subjects that spark their curiosity and provide useful data. “We told the students, ‘Don’t pick a topic because you think we will like it,’” says Christopher Palmer, a PhD candidate in economics who served as a teaching assistant in the course last fall. “Think about what really interests you.”

Those mysterious airfares

Steven Wu is really interested in the phenomenon of airfare fluctuations, a subject that puzzles many — perhaps all — airline passengers. Wu, a senior in the economics department, started researching the issue through MIT's Undergraduate Research Opportunities Program, working with Ellison, who has often studied corporate pricing practices, and decided to use 14.33 to study the impact of Southwest Airlines’ recent entry into Boston’s Logan Airport. “The airline industry is a natural setting for studying competition with respect to uncertainty,” Wu says.

Wu’s findings suggest that the entry of low-cost carriers such as Southwest into major markets can have subtle and surprising price effects. Southwest began service from Boston to both Chicago and Baltimore/Washington in February 2009. In anticipation of Southwest’s arrival, larger airlines such as American, Delta and United — the “legacy” carriers — lowered their prices by 16 percent on competing routes in the third quarter of 2008. But after Southwest began its flights, those airlines hiked prices back up a bit; overall, their fares were still 14

percent lower than they had been originally, Wu found. In absolute terms, the comparable fares of the legacy carriers remained higher than those of Southwest.

The competing budget airlines, such as JetBlue, also dropped their fares before Southwest arrived, but then raised fares much more afterward, showing an overall increase of 6 percent, as Wu details in his paper, “Bringing the Southwest Effect to Boston: An Empirical Analysis of Airfares from Logan International Airport.” Why would low-cost carriers raise fares? “My guess is that discount carriers aren’t as threatened by Southwest as the legacy carriers,” says Wu; the budget airlines had more room to raise rates.

That airlines in general would lower fares before Southwest arrived, then raise them, suggests how strongly they depend on brand loyalty, Wu notes. The competing carriers seemingly received a good idea how many passengers would defect to Southwest soon after Southwest arrived, then felt confident that they could nudge prices higher after February 2009 while retaining the remaining passengers.

To be sure, Wu’s research is a work in progress. “I would like to look at more routes,” he says. This spring, Wu is evaluating fare data involving Southwest and its competitors from 1993-2010 on dozens of routes, for his senior thesis.

Alcohol taxes and hot-dog ripoffs

The fact that state tax policies differ from each other is a boon to economists, who can then study how people respond to a variety of financial incentives. For example, “states have a tremendous variation in how they tax alcohol,” notes Andy Wu, a senior in the economics department who is not related to Steven Wu. In his paper, “State-Level Alcohol Excise Taxes: Effects on Consumption and Traffic Fatalities,”

Wu scrutinized alcohol-tax policies and their apparent effects in all 50 states. Increases in alcohol taxes reduce consumption, although not greatly; a 1 percent increase in alcohol taxes leads to a decrease in hard-liquor consumption that is smaller than 1 percent, Wu notes.

And yet, increasing beer taxes by 1 percent leads to a decrease of one-half of 1 percent in alcohol-related traffic fatalities — no small gain, considering that 32 people die every day in America in those circumstances. However, Wu is still trying to analyze exactly why fatalities fall. In Alaska, for instance, fatalities dropped markedly after a 2003 alcohol-tax increase went into effect. But since those taxes helped fund drunk-driving prevention programs, it is not clear how much of the reduction in fatalities came from a decrease in alcohol purchases that happened strictly because of the tax increase, or if the educational programs played the key role.

As it happens, citizens in the state of Massachusetts just voted in November 2010 to reduce alcohol taxes, but the state's governor, Deval Patrick, intends to keep funding drunk-driving prevention programs. Wu, who plans to do graduate work in economics, says he would like to see what effect such educational programs may have even when lower alcohol taxes are in effect.

While Steven Wu and Andy Wu found their statistics sitting in large databases, MIT Sloan School of Management senior Spencer Williams found his on the streets of New York City, where he noticed that the prices for hot dogs and Poland Spring bottled water sold by Manhattan street vendors vary considerably — from \$1 to \$3 for hot dogs and from \$1 to \$2.50 for water — even though the products are identical.

“If you're using a traditional supply and demand model, this is not what you'd expect,” Williams says. So last fall he trekked through Manhattan, asking vendors for their (generally unlisted) prices, and checking the

results against multiple factors that could influence prices. His paper, “Ripping off Tourists,” finds one significant pattern: Vendors close to major sightseeing attractions charge more, since tired, hungry tourists will not seek better deals.

This finding, Williams writes, shows, “that equilibrium price dispersion can occur in markets for homogenous goods if consumers are heterogeneous in search costs.” Or, as Williams puts it, “In non-economics terms, if consumers differ based on how much time, knowledge and willingness to look at prices they have, variations will occur.” While many theoretical economics models assume perfect consumer knowledge within markets, and predict prices on that basis, Williams’ paper is another piece of evidence showing the nuances of real-world markets.

Seeing the 'fragility' of statistics

In these three papers, as was the case for all 26 students in 14.33 this year, a critical part of the research involved separating important causal factors from mere correlations. Airline prices can drop or rise as the economy falls and rebounds; for Steven Wu’s analysis to work, given the weakening economy in the second half of 2008, he had to check what happened to prices after Southwest entered Boston, which is where the unexpected price patterns occurred. “Most often, we can’t do controlled experiments,” Palmer says. “Students have to think about confounding factors.”

The students in 14.33 help each other with that; the class regularly divides into groups of about a half-dozen, who read the proposals and drafts of their fellow students, and students ask questions when final papers are presented. “We found that peer review was a fantastic way to raise the quality of papers,” Palmer says. And at times, faculty and teaching assistants will encourage a student to keep pursuing especially

promising topics after the term is over, with an eye toward eventual publication.

In principle, the lessons of working on research papers like those in 14.33 should apply to fields beyond academic economics. Indeed, Steven Wu is planning to work in finance next year, and Williams will attend law school.

“Hopefully doing a paper will show you the fragility of statistical analysis,” says Palmer, who himself is researching the effects of pro-suburbanization policies on urban Americans in postwar America. “In the future, some of these students will be sitting in a room, watching a PowerPoint presentation, asking questions about the validity of the statistics they’re seeing. Now they’re empowered to go out in the real world with analytical skills. That puts economics students at an advantage.”

Studying economics “is not primarily about mastering technical theory or learning the answers to solved problems, though of course students will do this along the way,” notes David Autor, professor of economics and associate department head at MIT. Instead, he states, the discipline is “a vibrant social science that uses a powerful theoretical and statistical toolkit to investigate cause-and-effect relationships in the real world — relationships between incentives, behavior and market outcomes. Whether the research question involves airline pricing power, [alcohol](#) taxes and traffic safety, or price gouging by hotdog vendors, the unifying theme of 14.33, and of MIT economics more generally, is the same: [students](#) should ask novel research questions, then roll up their sleeves and work to produce compelling, dispassionate answers.”

Feyrer summarizes the value of a course like 14.33 by referring to the case made by Hal Varian '69, chief economist at Google, in forecasting what kinds of job skills will become most useful in the future. Because

information technology has made it cheap to generate and collect data, Varian has argued, there is an increased need for graduates who are comfortable working with numbers.

“In an environment that produces all this data,” Feyrer observes, “the people who are really valuable are the people who can analyze it.”

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