

McFadden's mark on the world

Nobel Prize winner's modeling touches the economic pulse of society

By Diane Ainsworth
PUBLIC AFFAIRS

The cityscape is the great engine of American prosperity and culture, a vast sprawl of shiny downtowns, convention centers, glistening skyscrapers, acres of concrete and faux marble. Many economists would point to the tentacles of a freeway interchange, the power grids fashioned to problems of weather and light, the patchwork of housing developments dotting the landscape and say, "That's got the mark of Dan McFadden on it."

From coast to coast, McFadden's discrete-choice modeling — which allows economists to determine how people make discrete choices given a set of alternatives — has shaped the regulatory policies of so many municipal services that it's difficult to separate the theory from the resulting legislation.

"Dan's work was the theoretical breakthrough that decision-makers needed to address public policy," said economist George Cluff, a lecturer in the Haas School of Business and one of McFadden's many colleagues in the field of micro-econometrics, which focuses on the economic analysis of decision-making among large groups of people, such as employees of a business, the elderly or the poor. "His discrete-choice modeling has found its way into regulatory and social policies in energy, telecommunications, education, housing

and a lot of other industries."

"He really brought the Econometrics Laboratory to Berkeley, and elevated the economics department's standing nationwide, because the lab is among the most powerful computational facilities in the country for analyzing large data sets," said Grace Katagiri, who oversees the lab's daily operations. "The lab is completely online now to make it easier for researchers to gather large data samples and crunch the numbers."

McFadden, Berkeley economist and winner of this year's Nobel Prize in economics, has seen his model of decision-making applied to everything from predicting voting behavior to finding markets for new commodities.

The 63-year-old scholar traces the genesis of his Nobel Prize-winning work to the 1970s, when he was closely associated with the Institute of Transportation Studies. During that time, he was asked to conduct a Bay Area Rapid Transit impact study to predict how heavily Bay Area commuters would use the city's area's BART railway. "I had the luxury of being able to verify my survey results later, after BART was running," he commented during Nobel Prize week, and found that his economic modeling had predicted ridership fairly accurately.

McFadden's trailblazing research has had a lasting effect

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Will they or won't they? Nobel Laureate Daniel McFadden, an economics professor in the College of Letters and Science, conducted research that gauged whether riders would use the BART system before it was built. Based on current usage, McFadden's predictions were right.

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on scores of public policy issues since then, Cluff said, and can be seen "wherever you look" in studies of electricity usage, consumer preferences, buying habits, attitudes toward clean air initiatives and willingness to use alternative modes of transportation, to name just a few.

Transportation and public utilities

At the macro level, McFadden's work has been used to study user preferences and set regulatory policies governing public services, water usage, electricity and telecommunications.

In addition to his accurate forecast of how much BART would be used after the railway's inception, McFadden authored a study of the California Department of Highways in the 1970s, called "Revealed Preferences of a Government," according to Lee Friedman, a Berkeley professor of public policy. The discrete-modeling technique he employed to explain the routing decisions of the agency proved that it had acted in good faith, rather than caving to political pressure, and had built a highway connecting two surrounding areas based on the net social benefit predicted through benefit-cost comparisons of alternative routes.

"Political pressures did matter some, but not by as much as had been commonly thought," Friedman said.

Determining what kinds of cars people would buy and how much they would drive was the focal point of a late 1970s state Energy Commission report based on McFadden's economic-statistical modeling, said Kenneth Train, an adjunct professor of economics who chairs the campus Center for Regulatory Policy. The study was adapted by the U.S. Department of Energy to determine what factors — such as vehicle size, cost and fuel efficiency — influenced people's choices of cars, and was used to formulate policies in the early 1980s that favored owners of more fuel efficient cars.

"There was no economic statistical



Daniel McFadden

procedure for doing this kind of analysis before McFadden's work was introduced," said Train, who studies competition and regulatory mechanisms in fields such as public utilities and telecommunications. "He was the first to combine economic behavior — how people make decisions — with statistical methods of analysis."

Consumer pricing behavior

Economists are able to study consumer pricing behavior and find out why people will choose one brand of cereal over another — say, Cheerios over sugar-frosted flakes — using McFadden's discrete-choice modeling.

Assistant Professor of Economics Aviv Nevo, on sabbatical this year at Northwestern University, has done just that. Much of his research measures the market power in the ready-to-eat cereal industry.

"I analyze the way people purchase products, the demand function, as a way to determine how they purchase products, such as the brand of cereal they choose," Nevo said. "Using Dan's discrete-

choice modeling, I've been able to show that cereal manufacturers are able to charge high prices for their products because consumers are willing to pay that much. Data based on how consumers make choices about what cereals to buy supports that conclusion, which may seem obvious, but really hasn't been proven empirically until recently."

The selection of new household appliances, such as refrigerators, home cooling and heating systems and swimming pool heaters, is another example of McFadden's work, said Paul Ruud, a Berkeley economist who uses econometric methods for regulatory procedures and litigation. The studies all share a common characteristic: consumers are making some sort of decision about a choice among distinct alternatives.

New research on spending habits of elderly

In recent years, McFadden has turned his attention to other demographic and public policy issues affecting the elderly. Currently he is running four independent but related surveys on older people's choices in housing, telephone and long-distance service providers and retirement spending.

Although these surveys are still preliminary, he says he is finding some interesting trends.

In a survey of health and retirement, McFadden is looking at older people's perceptions of health and life expectancy to find out if that influences their current spending habits or those they may adopt in the future. He's finding that people in their 60s who are approaching retirement are fairly realistic about their financial horizons and their yearly spending habits. At 70, however, they become unrealistic and begin to hoard their money.

"People may be too optimistic about how long they will live, especially as they get older," he said. "Rather than spending what they have, they tend to sit on their assets when they get into their 70s."