Market Theorist Gets Nobel Nod

France's Maurice Allais won the Nobel Prize in economics for work in the 1940s and 1950s that laid the foundation for developing socially efficient operation of state-run businesses

IN THE 1930S, MAURICE ALLAIS visited America. There the Frenchman saw idled factories and unemployed workers created by the Depression, and the experience changed his life. Although trained as an engineer, Allais decided to turn his energies to economics.

"My motivation was an idea of being able to improve the conditions of life, to try to find a remedy to many of the problems facing the world," he told reporters recently. "That's what led me into economics. I saw it as a way of helping people."

With his engineering background, Allais taught himself economics and introduced a mathematical rigor into the French school of economics, which at that time was mostly nonquantitative. His most influential work, done in the 1940s and 1950s, dealt with market equilibrium and how best to allocate resources among consumers. He has done extensive research in a number of other fields, including capital and interest theory and how people evaluate risks when they make decisions.

Last week the 77-year-old Allais became the first Frenchman to win the Nobel Prize in economics since it was created in 1968.

Other economists generally applauded the choice. Although Allais did not publish in English until late in his career and so had relatively little influence among American and English economists, he is well known and respected. MIT's Paul Samuelson, who won the Nobel Prize himself in 1970, has said of Allais, "Had his earliest writings been in English, a generation of economic theory would have taken a different course." Milton Friedman of the Hoover Institution in Stanford, California, who won the Nobel Prize in 1976, called Allais a "highly original, independent thinker" who "derives very little of his work from the work of others."

The Royal Swedish Academy of Sciences, which made the selection, said Allais was chosen for the prize "for his pioneering contributions to the theory of markets and efficient utilization of resources." In particular, Allais concerned himself early in his career with how to achieve efficient markets. In economics, a situation is considered to be "efficient" if there is no way to change it so that one person becomes better off without making another person worse off. Or, to put it another way, a situation is inefficient if a way exists to make one person happier at no cost to anyone else, and that step has not been taken.

In his first major work, *A la Recherche d'une Discipline Economique* (1943), Allais proved mathematically that, under certain conditions, an economic system that allocates its resources via some pricing system would be efficient. Further, he showed that each such efficient market could be achieved through a system of equilibrium pricing. Economists compare Allais' book favorably with work being done at the same time by Samuelson and British economist John Hicks, both of whom later won Nobel Prizes.

Allais' work had more than theoretical importance. After World War II, France nationalized a number of industries, including electric utilities, railroads, and mining. Allais' research showed that even in state-run monopolies, resources can be allocated most efficiently through some type of pricing system rather than through direct regulation. As a simple example of this idea, an electric utility can charge different rates at different times, depending upon demand: high rates during peak load hours, and lower rates other times. This encourages customers to shift their electricity usage to off hours and thus minimizes the amount of waste, or underuse of capacity.

Wide World

Maurice Allais

Several of Allais' students applied his research to managing various state-run enterprises in France after the war. Marcel Boiteux, for example, directed the national electric company and instituted a system of pricing based on Allais' results.

In 1947, Allais published his second major work, *Economie et Intérêt*, which was a massive, original work on capital and interest. One of the best known results of the book is that in a stationary, no-growth economy, the optimum interest rate—the interest rate that maximizes real income—is 0%. The result was later generalized by Allais and others to the so-called "golden rule of accumulation": To maximize real income, the optimum rate of interest should equal the growth rate of the economy.

Allais' early contributions came despite being mostly cut off from the rest of the world during World War II. Samuelson tells the following story about Allais, who in 1944 was teaching at French National School of Mines. When the Allies liberated Paris, Sir John and Lady Hicks were the first economists in the city. They made their way to an attic where, once their eyes adjusted to the dark, they could see a group with miners' lamps on their heads listening to a lecturer at a board. The lecturer was Allais, and he was talking about whether the interest rate should be 0% in a stationary state. In the middle of a war, with very few resources, Allais had worked out an elaborate, modern theory of capital and interest.

Part of Allais' originality may stem from the fact that he was basically self taught in economics. He originally learned engineering at the elite Ecole Polytechnique, and when he moved to economics he studied turn-of-the-century European economists, such as Italian social scientist Vilfredo Pareto, and expanded upon their work. He has taught since 1944 at the Ecole Nationale Supérieure des Mines. Consistently in the 1940s and 1950s, he independently produced the same results that American and British economists were getting, and his work often was 10 or 15 years ahead of the

rest of the world.

For example, his 1947 book included an economic model that has come to be called the overlapping generations model. The idea is simple: In simulating an economy, one takes into account people's long-term outlooks by using a simple model consisting of two generations, young and old. At each step, the old generation dies, the young generation grows old, and a new young generation appears. The model got little notice, and more than a decade later Samuelson introduced the same idea independently.

Although one reason some of Allais' work was overlooked by other economists is that he wrote in French, another is that he wrote so much. He has been an extremely prolific writer, both in the size of his pieces—books run to 800 and 900 pages, articles are sometimes over 100—and in the different subjects he addresses. Perhaps a third reason is that he does not fit easily into any of the American or English schools of economics—he has always been a bit of a loner.

In the mid-1950s, Allais turned to a study of money. In explaining inflation as a response to the growth in money supply, Allais introduced the concept of psychological time. In stable economies, people may take as much as 2 years to respond to an increase in the money supply by inflating prices, but in rapidly changing situations, such as in the case of hyperinflation, the time lag may be as short as a few days. Allais' idea is that even though the chronological time is different in the two cases, the psychological time is the same—psychologically, a year ago may seem like only yesterday when nothing has happened, and last week may seem like last year when things are changing rapidly. Thus a model should be built around psychological time rather than chronological time, he said.

A fourth area of Allais' studies is the analysis of how individuals evaluate risks and benefits in making decisions. It is in this area that many American economists know his work because of the familiarity of the so-called Allais Paradox (see box).

Although Allais never enjoyed a great following among English-speaking economists, his stature in French economics is unquestioned. He educated several generations of researchers and public managers who found ways to make French public enterprises more socially efficient by having less direct government regulation. Gerard Debreu, who studied with Allais in the late 1940s, built upon Allais' work for his own studies of efficient markets and won the Nobel Prize in 1983. Debreu, who describes himself as a "disciple" of Allais, said his mentor well deserves the prize. "I'm delighted he got it." ■ **ROBERT POOL**

The Allais Paradox

Maurice Allais is probably best known in the United States for the so-called Allais Paradox. Allais devised the paradox to disprove an axiom of decision-making behavior suggested by John von Neumann and Oscar Morgenstern, and the paradox illustrates an interesting, complicated aspect of how people evaluate risks and rewards when they make decisions.

In 1944, Von Neumann and Morgenstern proposed what seems to be an obvious rule for how rational decisions are made. Their so-called independence axiom states that a rational choice between two alternatives should depend only on how those two alternatives differ, not on any factor that is the same for both alternatives. Allais disagreed with this axiom and offered the following experiment to illustrate how it fails to predict decision-making behavior correctly.

Consider the following two situations. In the first situation, a person is asked to choose between two alternatives, A and B. If he chooses A, he receives $1 million. If he chooses B, he has a 10% chance of getting $2.5 million, an 89% chance of getting $1 million, and a 1% chance of getting nothing. Most people will choose A because it is a sure thing, although B is "rationally" the better choice because it maximizes the average payout. (Given 100 such choices, a person consistently choosing A will get approximately $100 million, while a person choosing B consistently will receive about $114 million.) This preference for A is a well-understood, predictable phenomenon—people assign much less value to the extra $1.5 million they get 10% of the time than to the $1 million they lose 1% of the time.

The second situation is also a choice between two alternatives. Alternative A means the person will have an 11% chance of getting $1 million and an 89% chance of getting nothing. If he chooses B, the person has a 10% chance of getting $2.5 million, and a 90% chance of getting nothing. In this case, most people will choose B because they do not see much difference between an 11% chance and a 10% chance, but they do see a big difference between $1 million and $2.5 million. B is also the "rational" choice in the sense that in 100 repetitions of this game, choice A results in approximately $11 million while B can be expected to give a $25 million payoff.

However, the independence axiom implies that if a person chooses A over B in the first situation, he should also choose A over B in the second, and vice versa.

To see why this is so, Robin Dawes of the Carnegie Mellon University psychology department suggests the following version. Suppose the payoff in each situation is determined by drawing a ball blindfold from a jar of 100 colored balls: 89 red, 10 blue, and 1 black. In the first situation, choice A means the person gets $1 million whether he draws a red ball, a blue ball, or a black ball. Choice B gives: red, $1 million; blue, $2.5 million; black, nothing.

In the second situation, the payoffs are slightly different. Choice A gives: red, nothing; blue, $1 million; black, $1 million. Choice B gives: red, nothing; blue, $2.5 million; black, nothing.

The two situations thus offer identical choices, with one exception: In the first situation, a person gets $1 million whenever he draws a red ball, no matter whether he chooses A or B. In the second situation, a person gets nothing when he draws a red ball, no matter whether he chooses A or B. Thus in both situations the results of drawing a red ball are the same no matter how a person chooses between A and B. Because this is so, the independence axiom implies that the choice between A and B depends only on what happens when the person draws a blue or black ball. It should not depend on the consequences of drawing a red ball.

But the Allais Paradox contradicts the prediction of the axiom. In the first situation most people would go with A over B, while in the second most would go with B over A. The only difference between A and B in the two situations, however, is what happens when a person draws a red ball. This means people are taking into account more than just how the two alternatives differ; they are also considering the consequences of drawing a red ball, something that is the same no matter which choice they make. Conclusion: In this case, the independence axiom does not hold.

"For many years, Allais has been a minority of one on this [the falseness of the independence axiom]," said Harvard's Andreu Mas'colell. If other economists and decision theorists eventually scrap the indepedence axiom, it will be thanks mostly to Maurice Allais. ■ **R.P.**