The 1980 Nobel Memorial Prize in Economics

The "father of econometrics" is awarded the prize for creation of models used in charting the future course of the economy

A former Carter adviser who was once hounded out of the country because of a youthful flirtation with communism has been awarded the 1980 Nobel Memorial Prize for Economic Sciences. Lawrence R. Klein of the University of Pennsylvania's Wharton School of Business, who is commonly known as the "father of econometrics," was cited for the creation of economic models and their application to the analysis of economic fluctuations and economic policies. His econometric models are now widely used in charting the future course of the economy and predicting its response to perturbations such as increased oil costs, inflation, high interest rates, and the like.

Virtually all economic forecasters today use some variant of models developed originally by Klein. These models involve numerous identities, such as "the gross national product is equal to the sum of its defined parts: consumption plus gross capital formation plus government expenditures." In addition to these identities, there is a complex set of interlocking equations that have been estimated by empirical analysis of past relationships among economic variables. They are not differential equations, as would be common in other sciences, but difference equations operating in discrete time, generally in 3-month increments. They are also stochastic; that is, they do not hold exactly, but are subject to residual error, and the coefficients in them have to be estimated from the sample data of the past. One such equation, for example, might specify that the future level of consumption is a definable function of changes in the level of disposable income of consumers, which in turn would depend on levels of national output, taxation, and other factors.

A simple econometric model of a developing country might have as few as 30 equations to represent its economy. Klein's quarterly Wharton model of the United States has more than 1000 such equations, while the annual Wharton model, which forecasts conditions to the year 2000, has more than 2000 equations that must be solved simultaneously. Other models are of comparable size.

The equations and, thus, the models, "are not, alas, 100 percent accurate," says Nobel laureate Paul Samuelson of the Massachusetts Institute of Technology, "but they are better than chance, and they are better than naïve models, which use momentum and extrapolation to, say, guess tomorrow's value from what today's is. Of a dozen such models that I know, moreover, eleven out of twelve, including Klein's, also put in judgment at the last stage. In other words, there are add-ons to the intercept coefficients of the regressions. Of course, the goal of science would be something that is reproducible, so that the assistant to Michelangelo could be almost as good as Michelangelo, but that isn't the case with the models. I think part of the success of the Wharton model is due to Klein's judgment. When he was engaged in other matters, and not as intimately involved with the model as he was originally, and as he has since again become, it seemed to me it was wandering away a little in its batting average."

The field of econometrics was actually begun in the 1930's by Dutch economist Jan Tinbergen, who shared the first economics Nobel in 1961 with Ragnar Frisch of Norway. Tinbergen aimed primarily at the analysis of business conditions and price movements, and his models had only a very limited success before he switched his areas of interest. When Klein began working with econometrics in the 1940's, he wanted to make an instrument for forecasting the development of business fluctuations and for studying the effects of economic-political measures. To do so, he compressed the then-revolutionary theories of John Maynard Keynes into a system of equations and turned to a different statistical technique for solving the equations. "While he was not the first to build the models," says Jerry Adams of the University of Pennsylvania, "he was the first to take them and transform them into useful tools."

A crude model constructed by Klein in 1946 contradicted widespread predictions that the postwar economy would fall into another depression. The standard view at the time was that there would be as many as 6 million unemployed people in this country. Klein's model, however, indicated that there was a large pent-up demand for consumer goods among the civilian population and a large amount of cash available to returning soldiers, suggesting that the economy would thrive. That proved to be the case. A slightly more developed model later correctly predicted that there would be only a modest recession following the Korean War, while many other economists were again predicting depression.

While he was at the University of Michigan in the mid-1950's, Klein and his first graduate student, Arthur J. Goldberger, who is now at the University of Wisconsin, developed the first of what proved to be the current generation of econometric models. Most such models are much larger and more complex than those developed by Tinbergen, but this one actually had fewer equations, reminisces Goldberger. Perhaps this simplicity reflected the fact that all the work of estimating the equations and computing the results had to be performed laboriously by hand. Nonetheless, the Michigan model is considered the first to be used on a regular basis for business forecasting. Klein subsequently collaborated in the construction of similar models for other countries, including Canada and the United Kingdom.

In the 1960's, by then a professor at Penn, he became the leader of a cooperative program known as the "Brookings-SSRC Project," whose goal was to construct a detailed econometric model and use it to forecast the short-term development of the American economy. "It was a huge model," says Adams, "but it never was as useful as it might have been because it just never hung together too well. Too many cooks spoiled the broth." Finally, Klein took the best things that had come out of that project and used them for the construction of the annual Wharton model and, in a simplified version, for the quarterly Wharton model. Both of these have a very good reputation for their analysis of business conditions. The models were for many years operated by Wharton Economic Forecasting Associates, a university unit founded and chaired by Klein. Last year, however, the models were sold to Zipf Publishing Corporation;

Klein continues as a consultant to the company.

Near the beginning of the last decade, Klein was an initiator and an active research leader in Project LINK, an effort to coordinate the econometric models of several countries. The goal is to be able to predict how political measures and business fluctuations in one country will affect the economies of the others. Project Link, says the Nobel citation, "has opened up a completely new line of development of great theoretical and practical value. It has also had a great influence in promoting the building of econometric models in those countries taking part in the project. This includes not only most of the OECD [Organization for Economic Cooperation and Development] countries, but also the socialist nations and some less developed countries."
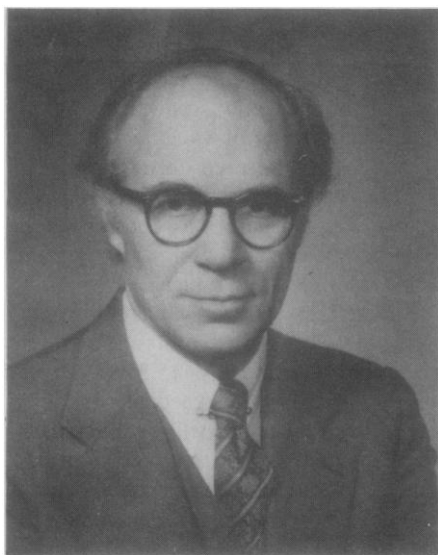
Lawrence Robert Klein was born 14 September 1920 in Omaha, Nebraska, the son of clerical workers for a wholesale grocery distributor. He credits the Great Depression as the single most important influence on his youth, an influence that later led to a brief membership in the Communist Party of the U.S.A. He was graduated from the University of California at Berkeley in 1942 and, just 2 years later, received the first economics Ph.D. awarded by MIT. "MIT has always been very proud of him," says Samuelson. "Not only did he receive our first Ph.D., but he did it in record time. A continuing joke is that the department has been going downhill ever since." His doctoral thesis, "The Keynesian Revolution," later became a successful book.

Klein did postdoctoral research at the University of Chicago, then joined the University of Michigan. He was denied tenure at Michigan, however, when the late Senator Joseph McCarthy revealed

that Klein had been a member of the Communist Party during his Chicago years. The infatuation with communism, not uncommon among intellectuals of that period, ended in 1947, Klein says, when he "got bored with it." Nonetheless, stung by the bitter episode at Michigan, Klein spent several years at Oxford University before returning to the United States in 1958 to join Penn, where he has remained ever since.

In the early 1960's, Klein took the pioneering step of making the Wharton model available to business corporations for forecasting. His success in this endeavor opened the door for other large-scale commercial forecasting models, such as those of Data Resources, Inc., founded by former Klein student Michael Evans, and Chase Econometrics, founded by Harvard economist Otto Eckstein.

In 1975, Klein was recruited as an economic adviser to the then relatively unknown Jimmy Carter, and he assembled a task force of economists to help. During the summer of 1975, the group educated Carter with a series of papers prepared under Klein's guidance. After the election, Klein rejected an official role in the Carter Administration. "I made it known to them from the beginning," he says, "that I was not a politician. I was a teacher. I am still a teacher." Klein has remained in close contact with Carter's current economic advisers, but has been in touch with Carter only intermittently. After the Nobel award was announced, Klein said that he had advised Carter in 1976 "to run a steady economic program," but that he did not think his advice had been followed.

"If you tried to conjure up the picture of the quiet university professor," says one of his colleagues at Penn, "you would come close to what he's like—an informal jacket, trousers, a not-always-elegant necktie, the standard uniform of academe." Adds Department of Economics chairman Irving Kravis, "He's a very quiet, low-key person, one of those remarkable people who seems never to be in a hurry, always to have plenty of time for everything. I've seen a student or colleague accost him in a hallway, and he stands there patiently discussing the issue that the person has raised without giving any sign of being in a hurry.

"I marvel sometimes at the way he accepts university assignments," continues Kravis. "Once or twice I've felt acutely embarrassed when I said I was too busy to do something and I found out later that he had been asked to do it and had agreed. I feel his time is more valuable than mine and he has a greater right

to refuse, but he accepts his responsibilities as a citizen of the university community. He has made very great contributions to the governance of the university, has chaired and been a member of many committees. He's not an aggressive person, but he comes through just by the sheer quantity and quality of his work."

Away from the campus, Klein has no discernible hobbies, but he takes pride in maintaining his house. He enjoys an occasional game of golf with his son, slips away to an occasional Phillies game, and he and his wife Sonia are regular attendees at the Philadelphia Symphony's concert series. His main passion, it seems, is his work.

"Klein is rather unworldly," adds Samuelson, "and he resisted for a long time becoming an instant millionaire, as biochemists now become and as others have become who have started commercial economic forecasting services using econometric models. . . . I would regard it as a tribute to him that he resisted this bandwagon effect." "Klein really was interested in using that organization [Wharton Economic Forecasting Associates] to advance the state of the art," says Kravis, "and not to make money." When the Wharton model was sold to Zipf last year, in fact, all the proceeds of the sale went to the university and to the economics research unit of the Department of Economics.

There is a touch of irony in the contributions Klein has made to a country which he once left because of McCarthyism. "He's put a very powerful and useful tool in the hands of the political leaders and civil servants of the United States and other countries," points out Kravis. "Sometimes the value of that tool is underestimated because there is a lot of publicity about how the macroeconomic models have missed the size of the gross domestic product, or the change in the gross domestic product in a quarter, or missed the great inflation in a particular quarter by some unpleasantly large margin. But I think that view overlooks the fact that the value of these models is not only in their point forecasts of the major aggregates, but also in their portrayal of the relationships that exist in the economy." Concludes Adams: "The question is only partially one of accuracy. The question is also, do we, as a result of using the model, understand the economy better? Do we, as a result of using the model, have a more consistent picture of what is going on in the world? And the answer is, undoubtedly, we do! So that we're much better in command of the world today than we ever were."—THOMAS H. MAUGH II