

NOBEL LECTURES

ECONOMIC  
SCIENCES



1969–1980

World Scientific

NOBEL LECTURES  
INCLUDING PRESENTATION SPEECHES  
AND LAUREATES' BIOGRAPHIES

# ECONOMIC SCIENCES

1969–1980

*The Sveriges Riksbank (Bank of Sweden) Prize  
in Economic Sciences in Memory of Alfred Nobel*

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**NOBEL LECTURES IN ECONOMIC SCIENCES (1969–1980)  
—THE SVERIGES RIKSBANK (BANK OF SWEDEN) PRIZE IN  
ECONOMIC SCIENCES IN MEMORY OF ALFRED NOBEL**

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## **PRIZE IN ECONOMIC SCIENCES IN MEMORY OF ALFRED NOBEL**

Sveriges Riksbank (Bank of Sweden) at their tercentenary in 1968 instituted an Alfred Nobel Memorial Prize in Economic Sciences and placed an annual amount at the disposal of the Nobel Foundation as basis for a prize to be awarded by the Royal Swedish Academy of Sciences. Nobel Prize rules will, *mutatis mutandis*, be followed regarding nomination of candidates, prize adjudication, prize award and prize presentation. The latter takes place on Nobel Day, December 10, each year. The prize amount will equal that of a Nobel Prize for the same year. Special Statutes and Regulations (valid from January 1, 1969) have been issued for this Alfred Nobel Memorial Prize in Economic Sciences.

## Foreword

Since 1901 the Nobel Foundation has published annually “Les Prix Nobel” with reports from the Nobel Award Ceremonies in Stockholm and Oslo as well as the biographies and Nobel lectures of the laureates. In order to make the lectures available to people with special interests in the different prize fields the Foundation gave Elsevier Publishing Company the right to publish in English the lectures for 1901–1970, which were published in 1964–1972 through the following volumes:

Physics 1901–1970	4 vols.
Chemistry 1901–1970	4 vols.
Physiology or Medicine 1901–1970	4 vols.
Literature 1901–1967	1 vol.
Peace 1901–1970	3 vols.

Elsevier decided later not to continue the Nobel project. It is therefore with great satisfaction that the Nobel Foundation has given World Scientific Publishing Company the right to bring the series up to date.

The Nobel Foundation is very pleased that the intellectual and spiritual message to the world laid down in the laureates’ lectures will, thanks to the efforts of World Scientific, reach new readers all over the world.

*Lars Gyllensten*  
Chairman of the Board

*Stig Ramel*  
Executive Director

Stockholm, June 1991

## Preface

In conjunction with its tercentenary celebrations in 1968, the Central Bank of Sweden (Sveriges Riksbank) decided to finance a new award, "the Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel". The award, established on the basis of an economic commitment by the bank in perpetuity, is given by the Royal Academy of Sciences according to the same principles and rules as the original Nobel Prizes.

This volume contains the Nobel Lectures, presentation speeches and biographies of the laureates from 1969 to 1980. The first award was given to Ragnar Frisch and Jan Tinbergen for their pioneering work in econometrics. The last prize reported in this volume, to Lawrence Klein in 1980, was also awarded for contributions to econometric model building. In between, awards have been given for pure (abstract) theory, such as the prizes to Paul Samuelson (1970), John Hicks and Kenneth Arrow (1972), and for the development of new analytical methods that may be used in both theory and applications, such as the awards to Wassily Leontief for input-output analysis (1973) and to Leonid Kantorovich and Tjalling Koopmans (1975) for their work on the theory of optimal allocation of resources. Theory-oriented prizes in specific areas of economic research have been awarded to Bertil Ohlin and James Meade (1977) for their analysis of international trade and capital movements, and to Herbert Simon (1978) for his research on the decision-making process within economic organizations.

Gunnar Myrdal and Friedrich von Hayek (1974) received the prize for their early work on macroeconomic theory as well as for their analysis of the interaction between economic, political and social phenomena.

Other prizes have been closer to the domain of economic history. Simon Kuznets (1971) was rewarded for his analysis of long-term economic development, and Milton Friedman (1976) for his analysis of the monetary history of the United States, as well as for clarifying the complexities of stabilization policy. Theodore Schultz and Arthur Lewis (1979) were rewarded for their research on issues concerning the long-term development of less developed countries.

Thus, during its first decade, the prize in Economic Sciences covered a broad field, including pure theory, methodology (new tools of analysis) as well as empirical analysis of short and long-term economic developments.

*Assar Lindbeck*  
Editor

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## Economic Sciences 1969

**RAGNAR FRISCH and JAN TINBERGEN**

*“for having developed and applied dynamic models for the  
analysis of economic processes”*



## THE PRIZE FOR ECONOMIC SCIENCE, IN MEMORY OF ALFRED NOBEL

Speech by Professor ERIK LUNDBERG of the Royal Academy of Sciences

Translation

Your Majesty, Your Royal Highnesses, Ladies and Gentlemen,

In the past forty years, economic science has developed increasingly in the direction of a mathematical specification and statistical quantification of economic contexts. Scientific analysis along these lines is used to explain such complicated economic processes as economic growth, cyclical fluctuations, and reallocations of economic resources for different purposes. In economic life there is an elusive mixture of relatively systematic inter-relations, for which one can find a more or less regular repetitive pattern, and historically unique events and disruptions. To the layman, it may seem somewhat reckless to seek, without support from experiment, for laws of development within these extremely complicated processes of economic change, and to apply for this purpose the techniques of mathematical and statistical analysis. However, the attempts of economists to construct mathematical models relating to strategic economic relations, and then to specify these quantitatively with the help of statistical analysis of time series, have in fact proved successful. It is precisely this line of economic research, mathematical economics and econometrics, that has characterised the development of this discipline in recent decades. It is therefore only natural that when the Bank of Sweden's prize in economic science, dedicated to the memory of Alfred Nobel, is awarded for the first time, it should be to the two pioneers in this field of research: Ragnar Frisch of Norway, and Jan Tinbergen of Holland.

Since the late twenties, Professor Frisch and Professor Tinbergen have been working along essentially the same lines. Their aim has been to lend economic theory mathematical stringency, and to render it in a form that permits empirical quantification and a statistical testing of hypotheses. One essential object has been to get away from the vague, more "literary" type of economics. The arbitrary "naming" of causes of cyclical fluctuations, for instance, and the concentration upon certain simple chains of causal connection, has given way in the work of both Frisch and Tinbergen to mathematical systems that state the mutual relationships between economic variables.

Let me take as an example Professor Frisch's pioneer work in the early thirties, involving a dynamic formulation of the theory of cycles. He demonstrated how a dynamic system with difference and differential equations for investments, and consumption expenditure, with certain monetary restrictions, produced a damped wave movement with wavelengths of 4 and 8 years. By exposing the system to random disruptions, he could demonstrate also how these wave movements became permanent and uneven in a rather realistic manner. Frisch was before his time in the building of mathematical models, and

he has many successors. The same is true of his contribution to methods for the statistical testing of hypotheses.

Professor Tinbergen was concerned primarily to confront dynamic economic theory with statistical application. His great pioneer work in this field is an econometric study of cyclical fluctuations in the United States. An important aim in this impressive investigation was to test the explanatory value of the existing flora of business cycle theories by trying to specify quantitatively the importance of different factors. Tinbergen built up an econometric system involving some 50 equations, and determined reaction coefficients and "leads and lags" with the help of statistical analysis. Several of his conclusions excited great attention, and are still the subject of debate. Professor Tinbergen's pioneer work in econometrics has been of major importance for subsequent methodological development.

It has been natural for both Professor Frisch and Professor Tinbergen, with the support of macroeconomic analysis, to construct theories for stabilization policy and long-term economic planning. Both our laureates have made fundamental analysis of the theoretical basis of rational decision-making in the field of economic policy. By the end of the thirties, Frisch was presenting new ideas on a detailed system of national accounts (*økosirksystem*) for the entire national economy, as a support for the rational planning of economic policy in Norway. The structure of the Swedish national accounts and national budget since the mid forties stems largely from Professor Frisch's pioneer work at the Sosial-Økonomisk Institutt in Oslo. Professor Tinbergen, with the support of theories previously put forward by Frisch, has developed a simplified system for economic policy that has been applied in Holland. Tinbergen lets the economic policy of the state function within a model of the economic system with a number of variables and an identical number of equations. Within the framework of a determinate system, the state must as a rule have as many means of economic policy as the number of aims. As head of the Central Planning Bureau in the Hague, Professor Tinbergen and his co-workers have constructed an econometric model for forecasting and planning economic policy in Holland.

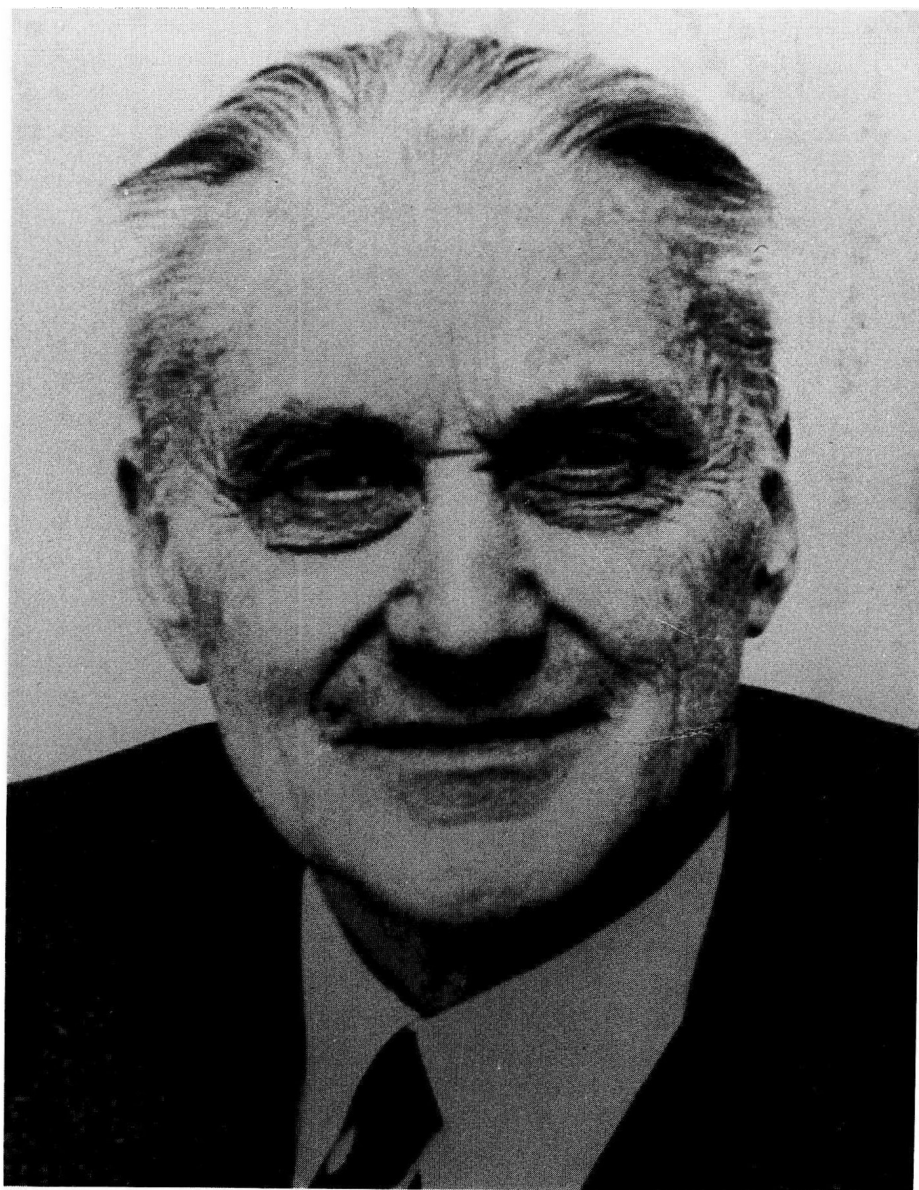
During the past ten years, both Professor Frisch and Professor Tinbergen have devoted themselves primarily to long-term economic policy and planning, with a view particularly to the problems of the developing countries. Both have served as advisers in different contexts. In the rapid development of methods for long-term planning, our two laureates have made major contributions. Professor Tinbergen, for instance, with regard to systems of priorities in investments, and the use of "shadow prices". Professor Frisch has developed decision models for economic planning, devising mathematical programming methods with a view to exploiting modern computer techniques.

Professor Frisch (not present because of illness), Professor Tinbergen,

You have both been pioneers in the development of economics into a mathematically specified and quantitatively determined science. Your contributions

in creating a rational foundation for economic policy and planning with the help of well-developed theory and statistical analysis have involved a major scientific breakthrough. You are both, at present, intensively occupied with continued research, designed above all to assist the poor countries of the world.

It is a great honour for me to convey to you the congratulations of the Royal Swedish Academy of Sciences, and to ask you, Professor Tinbergen, to accept from the hand of His Majesty the King the 1969 Prize in Economic Science, dedicated to the memory of Alfred Nobel.



*Ragnar Frisch*

## RAGNAR ANTON KITTEL FRISCH

I was born in Oslo 3 March 1895 as son of the gold- and silversmith Anton Frisch and his wife Ragna Fredrikke Kittilsen, who has had a great impact on my general outlook and view on life.

I was first married in 1920 to Marie Smedal. We had an only child, Ragna, who was married Hasnaoui. She has a daughter, Nadia, who, of course, in the view of her grandfather, is the most superb granddaughter in the whole world. My first wife died in 1952. In 1953 I married Astrid Johannessen whom I had known from childhood. She had passed her university degree in languages in the Oslo University 1921. She is a daughter of the businessman and shipowner (from the time of the sailing ships) I. M. Johannessen and his wife Julie Caspersen. They had been intimate friends of my parents for many years. Ever since our marriage Astrid has been my unfailing companion and has sustained me devotedly in all the ups and downs of life.

My father's gold- and silverwork firm in Oslo was established by my grandfather in 1856. Gold and silver has been a tradition in our family ever since the years around 1630 when King Christian IV of Denmark—Norway asked the Electoral Prince of Saxony to send him a team of mining specialists from Freiberg in Saxony (that had a Mining Academy) to the newly discovered silver deposits at Kongsberg, Norway. We can trace our ancestry fairly exactly back to that time.

When I was planning my future it was more or less taken for granted that I should follow the gold and silver tradition. For that purpose I started as an apprentice in the work shop of the famous Oslo firm David Andersen, and at the end of the apprenticeship in 1920 I completed my handicraftsman's probation work as a goldsmith.

After the beginning of my apprenticeship my mother got a strong feeling that the trade would not be satisfactory for me in the long run. She insisted that at the same time as I completed my apprenticeship I should take up a university study. We perused the catalogue of the Oslo University and found that economics was the *shortest* and *easiest* study. So therefore economics it became. That is the way it happened. Later on the study of economics in the Oslo University has proceeded by leaps and bounds in



the direction of a more advanced and time-consuming study. (Some people seem to think that somehow I have been instrumental in this development).

I passed my university degree in economics in Oslo 1919. About a year later I went abroad to study economics and mathematics in earnest. I visited France, Germany, Great Britain, the United States and Italy. During my stay of nearly three years in France I got so familiar with the conditions there, that ever since when I get to visit France I somehow feel that I have "come home again". I passed my Ph. D. on a mathematical statistical subject in The Oslo University in 1926. In 1925 I was appointed assistant professor, in 1928 associate professor and in 1931 full professor in Oslo. I became director of research of the newly established Economic Institute in The Oslo University.

In addition to these facts I shall not have much to say about my scientific career. I am invited member of a great number of learned societies in different countries, and have several doctorates honoris causa.

Of my scientific awards before the 1969 prize in economic science in memory of Alfred Nobel, I must mention the big Antonio Feltrinelli prize awarded to me in 1961 by the Accademia Nazionale dei Lincei, the old and famous Italian society of which Galileo Galilei was one of the first members.

When I think of the long list of problems of which I have in vain tried to find the solution, and think of the honours that have nevertheless been bestowed upon me, I understand with deep thankfulness to Whom all this is due: To the Lord Who has steered my steps over the years, and Who has been my refuge in the superior matters which no science can ever reach.

My hobbies have been outdoor life, including mountain climbing on a modest scale. But above all it has been bee-keeping and queen-rearing in which I have been engaged for 57 years with emphasis on a genetic and statistical study with a view to improving the quality of the bee. If somebody asked me if I find this occupation pleasant and entertaining, I am not sure I could honestly say yes. It is more in the nature of an obsession which I shall never be able to get rid of.

Addendum: Ragnar Frisch died in 1973.