

**COWLES COMMISSION
FOR RESEARCH IN ECONOMICS**

**ANNUAL REPORT FOR THE YEAR
ENDING DECEMBER 31, 1936**

COLORADO SPRINGS · COLORADO

THE COWLES COMMISSION FOR RESEARCH IN ECONOMICS

THE Cowles Commission for Research in Economics was founded in 1932 as a not-for-profit corporation to conduct investigations into problems of current economic interest, with particular reference to the application of statistics and mathematics in the solution of these problems. Any activity which promises ultimately to further the unification of theoretical and factual studies in economics is within the sphere of interest of the Commission.

The personnel of the Commission includes Alfred Cowles 3rd, president; Charles F. Roos, director of research; Harold T. Davis, Edward N. Chapman, and Dickson H. Leavens, research associates; Forrest Danson, statistician; Herbert E. Jones and Gerhard Tintner, research fellows; Ragnar Frisch of the University of Norway, Oslo, research consultant. The Commission also employs several full-time secretaries and computers, approximately twelve part-time college student computers, and a number of graduate student assistants. Besides the ordinary computing machinery, the laboratory is equipped with Hollerith card-punching, sorting, and tabulating machines.

William F. C. Nelson, who had served as economist of the Cowles Commission and assistant editor of *Econometrica* since 1932, died in May, 1936.

The Advisory Council of the Commission is composed of Ragnar Frisch, University of Norway, Oslo, re-

search consultant for the Commission; Irving Fisher, Yale University; Arthur L. Bowley, London University; Wesley C. Mitchell, Columbia University; and Carl Snyder, for many years with the Federal Reserve Bank of New York.

The Commission is affiliated with the international Econometric Society of which Alfred Cowles 3rd is treasurer and Charles F. Roos secretary. The office of *Econometrica*, the journal of the Society, is located at the Cowles Commission. In 1936 the Commission continued its subvention of this journal. The editor is Ragnar Frisch, and the following members of the Commission have assisted in the publication: William F. C. Nelson as assistant editor until his death in May, Dickson H. Leavens as managing editor since October, Harold T. Davis as one of the associate editors, Charles F. Roos as a member of the advisory editorial board, and Alfred Cowles 3rd as business manager.

RESEARCH FELLOWSHIPS

THE Commission has recently established two Research Fellowships of \$1000 a year each. These will be awarded to promising young men, with the doctor's degree or equivalent experience, who have demonstrated ability to do constructive research in the field of economics and statistics. The purpose of the Fellowships is not so much to give the formal theoretical training which is best obtained at a large university, as to supply a familiarity with the problems which arise in connection with actual

statistical investigations. The Research Fellows are expected to acquire familiarity with various types of computing machinery and techniques, and in other ways to fit themselves for the supervision of extensive research projects.

For the year 1936-37 Cowles Commission Research Fellowships have been awarded to Herbert E. Jones and Gerhard Tintner. Mr. Jones is a graduate of Stanford University, A. B., 1926, and Degree in Engineering, 1928. He has written several papers on statistical and economic topics. He worked for four years as hydraulic engineer for the Federal Water Service Corporation in San Francisco and New York, taught mathematics in an extension course of the University of Colorado, and has taken graduate work at Colorado College.

Gerhard Tintner received his doctor's degree in Economics and Law at the University of Vienna in 1928, where he also studied statistics and mathematics. Following his graduation he wrote a book, *Prices in the Trade Cycle*, which was published in Vienna in 1935 by the Austrian Institute for Trade Cycle Research with which he was formerly connected. He also studied at the University of London. During 1934 and 1935 he held a Rockefeller fellowship, visiting the University of California and Harvard, Columbia, Chicago, and Stanford Universities; he also spent six months at Cambridge, England, and at the École Polytechnique in Paris. He has written articles on economic and statistical topics for Viennese economic journals, for *Econometrica*, and for the *Journal of Political Economy*.

COWLES COMMISSION MONOGRAPHS

A FUNCTION of the Commission is to issue, from time to time, various monographs of an economic-statistical or econometric nature without, however, assuming responsibility for theories or opinions expressed therein. Monograph No. 1 entitled *Dynamic Economics: Theoretical and Statistical Studies of Demand, Production, and Prices*, by Charles F. Roos, director of research for the Cowles Commission, was published in 1934 by the Principia Press of Bloomington, Indiana.

Monograph No. 2, entitled *NRA Economic Planning*, by Charles F. Roos, was in press at the end of the year for publication in February, 1937 by the Principia Press. The author served as principal economist and director of research on policy matters of the National Recovery Administration from July, 1933 to September, 1934. His intimate experience with the organization and personnel, combined with his theoretical training in the fields of economics, statistics, accounting, and engineering, have fitted him in an exceptional way to write on the NRA with a critical scientific attitude, aided by familiarity with actual conditions.

The book first traces the factors which had their part in the development of NIRA, the drafting and passage of the Act, and the personnel and organization of the National Recovery Administration. Later chapters discuss the

background of issues involving hours of work, wages, collective bargaining, costs, prices, fair trade practices, effects on small business men, and the whole problem of economic planning. Solutions attempted by the NRA are described, the reasons for adopting them given, and the degree of their success appraised. Many fundamental policy memoranda are reproduced in part or in full.

In each chapter an attempt is made to outline the rapidly changing decisions and the reasons therefor. A further aim is to provide more complete statistical data as an aid in the analysis of the general economic and social objectives and accomplishments of the NRA. Finally, an endeavor is made to appraise constructively this great undertaking. Thus, in the light of this experience, is attempted an answer to the important question: What can we expect from economic planning?

Monograph No. 3, on common stock indexes, mentioned in last year's report, will be published during 1937. This volume will contain new monthly indexes of (1) stock prices, (2) stock prices adjusted for reinvestment of dividends, (3) dividend payments, and (4) yields; and annual indexes of (5) earnings and (6) earnings-price ratios. All proper adjustments have been made for stock rights, stock dividends, and other changes in capital structure. These indexes have been computed for 68 industry groups. They include all stocks in which transactions on the New York Stock Exchange have been reported during the years 1871-1917; for subsequent years they are based on the Standard

Statistics indexes which include over 90 per cent of the total value of common stocks listed on the New York Stock Exchange, as well as other leading issues.

Considerable progress has been made on the companion volume in which the movements of stock prices, as shown by the new Cowles Commission indexes, will be analyzed. Differences in yields for various groups will be considered. Trends will be investigated and an attempt made to determine the factors which influence them. Relative variability for prices in different groups and the evidence as to cyclical and seasonal variation will be thoroughly considered by means of a variety of techniques. Finally, an attempt will be made, in the light of statistical evidence, to appraise various theories of stock price action.

STAFF PUBLICATIONS AND PAPERS

THE Commission, in addition to its own Monographs, encourages the publication of the individual work of its staff.

The textbook, *Elements of Statistics*, 424 pp., by Harold T. Davis and William F. C. Nelson, published in July, 1935 by the Principia Press of Bloomington, Indiana, has, during the last year, been adopted as a text by a number of colleges and universities in the United States and abroad.

In October, 1936 a mathematical treatise, *The Theory of Linear Operators*, by Harold T. Davis, 628 pp., was published by the Principia Press.

During 1936 the following papers by staff members were published or presented at scientific meetings, in addition to papers presented at St. Louis in January, 1936, which were listed in the report for 1935:

1. "Evidence of Structure in Common Stock Prices," by Alfred Cowles 3rd, presented August 7 at the Cowles Commission Research Conference.
2. "Some a Posteriori Probability Considerations of Stock Market Action," by Alfred Cowles 3rd and Herbert E. Jones, presented December 29 at the Chicago meeting of the Econometric Society.
3. "Annual Survey of Statistical Techniques: The Correlation and Analysis of Time Series — Part II," by Charles F. Roos, *Econometrica*, Vol. 4, October 1936, pp. 368-381.
4. "Some Economic Effects of Wage Regulation on Interstate Trade," by Charles F. Roos, presented July 25 at the Cowles Commission Research Conference.
5. "A General Invariant Criterion of Fit for Lines, Planes, and Functions Expandable in Series, Where all Variates are Subject to Error," by Charles F. Roos, presented in preliminary form August 5 at the Cowles Commission Research Conference, and in final form December 28 at the meeting of the American Statistical Association and the Institute of Mathematical Statistics.
6. "New Indexes of Stock Prices and Yields and their Relation to Some Theories of Capital and Saving," by

Charles F. Roos, presented December 28 at the Chicago meeting of the Econometric Society.

7. "Significance of Analysis of Variance of Time Series," by Harold T. Davis, presented August 7 at the Cowles Commission Research Conference.

8. "Significance Tests for Periodogram Analysis with Application to Prices of Common Stocks," by Harold T. Davis, presented August 8 at the Cowles Commission Research Conference.

9. "The Accumulation of the Precious Metals in India and China," by Dickson H. Leavens, presented July 15 at the Cowles Commission Research Conference.

10. "Silver at the Second Session of the Seventy-fourth Congress," by Dickson H. Leavens, *Finance and Commerce*, Shanghai, Vol. 28, July, 29 1936, pp. 125-127.

11. "The Silver Clause in China," by Dickson H. Leavens, *American Economic Review*, Vol. 26, December 1936, pp. 650-659.

12. "The Nature of Regression Functions in the Correlation Analysis of Time Series," by Herbert E. Jones, presented in preliminary form July 21 at the Cowles Commission Research Conference, and in final form December 28 at the Chicago meeting of the American Statistical Association and the Institute of Mathematical Statistics.

13. "A Note on Distribution of Income over Time," by Gerhard Tintner, *Econometrica*, Vol. 4, January, 1936, pp. 60-66.

14. "Internationale Konjunkturforschung" by Gerhard Tintner, *Der Oesterreichische Volkswirt*, Vol. 28, July 4, 1936, pp. 783-784.

15. "Expectations and Statistical Theory of Errors," by Gerhard Tintner, presented December 30 at the Chicago meeting of the Econometric Society.

THE 1936 RESEARCH CONFERENCE

THE Cowles Commission Second Annual Research Conference on Economics and Statistics was held at Colorado College, Colorado Springs, from July 6 to August 8, 1936.

Thirty-seven lectures were given by the following speakers: Alfred Cowles 3rd, Cowles Commission; Harold T. Davis, Indiana University; Edward L. Dodd, University of Texas; Irving Fisher, Yale University; R. A. Fisher, University of London; Corrado Gini, University of Rome; C. C. Grove, College of the City of New York; Harry Pelle Hartkemeier, University of Missouri; Anson Hayes, American Rolling Mills Company; Herbert E. Jones, Cowles Commission; Dickson H. Leavens, Cowles Commission; Alfred J. Lotka, Metropolitan Life Insurance Company; Joseph Mayer, formerly of Tufts College; Tord Palander, Rockefeller Fellow, Stockholm; Thomas H. Rawles, Colorado College; Charles F. Roos, Cowles Commission; Walter A. Shewhart, Bell Telephone Laboratories, Incor-

porated; Carl Snyder, for many years with the Federal Reserve Bank of New York; D. I. Vinogradoff, Westinghouse Electric and Manufacturing Company; and Elmer J. Working, University of Illinois. Over fifty out-of-town guests attended part or all of the sessions.

Abstracts of the papers presented have been published in *Colorado College Publication*, General Series, No. 208, 119 pp. Copies may be obtained from the Cowles Commission.

THE 1937 RESEARCH CONFERENCE

THE Cowles Commission Third Annual Research Conference on Economics and Statistics will be held at Colorado College, Colorado Springs, from June 28 to July 23, 1937, immediately following the Denver meeting of the American Association for the Advancement of Science. Among the speakers will be Louis H. Bean, United States Department of Agriculture; Theodore H. Brown, Harvard Business School; Harold T. Davis, Indiana University; Edward L. Dodd, University of Texas; Griffith C. Evans, University of California; Ragnar Frisch, University of Norway; Charles F. Roos, Cowles Commission; Joseph Schumpeter, Harvard University; J. Shohat, University of Pennsylvania; Carl Snyder, for many years with the Federal Reserve Bank of New York; S. S. Wilks, Princeton University; Elmer J. Working, University of Illinois; and Holbrook Working of

Stanford University. Several other speakers will be added to the foregoing list.

The aim of the Conference is to provide an opportunity for leaders in economics and statistics to discuss their problems in a more leisurely manner than is possible in the crowded sessions at the national meetings of the various learned societies. All serious scholars, including teachers, research workers, and graduate students, will be welcome at the Conference. There is no charge for attendance. Board and lodging for participants will be available in the dormitories of Colorado College at a rate of \$40 for the four-week session, or \$11 a week for those attending less than the full period. Further information may be obtained on application to the Cowles Commission.