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## Book Reviews

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*Mathematical Economics.* By R. G. D. Allen. St. Martin's Press. New York. 768 pages. 1956. \$10

**M**ONSIEUR,  $(a+b^n)/n=x$ , *donc Dieu existe; repondez!*" (Sir ( . . . ), then God exists; is this not true!) With these words the mathematician Euler is said to have routed the philosopher and atheist Diderot from the court of Catherine the Great, much disconcerted. Allen's clarity of exposition and thought, already amply demonstrated in his earlier *Mathematical Analysis for Economists*, should, however, disconcert no one. Too many nonmathematical economists believe that mathematics is used in economics in much the same way Euler used it to demonstrate the existence of God; Allen's latest work should enlighten them.

According to the introduction, "The object of the text is to give a summary, and to some extent, a synthesis, of what mathematical economists have written on certain economic theories." In this aim the book succeeds amazingly well. The contents may be grouped roughly in accordance with the mathematical tools which are used. They are (1) differential and difference equations, and (2) the algebra of vectors and matrices.

The first nine chapters, slightly less than half the book, represent the results of applying the mathematical theories of differential and difference equations to economic problems, that is, they are concerned with economic dynamics. The elements of micro- and macro-dynamic economic theory are introduced via discussions of the cobweb model, the multiplier, and the acceleration principle. These discussions point up the need for using differential and difference equations, in general, and complex variables for the description of oscillatory movements.

The chapter on difference equations is perhaps the only reasonably complete elementary treatment of the subject in existence. Distributed lags are also treated, and several interesting improvements and modifications of earlier work are introduced. The latter is discussed more fully in an appendix using the algebra of operators.

With these tools, Allen proceeds to develop the fairly elaborate trade-cycle theories of Samuelson, Hicks, Goodwin, Kalecki, and Phillips. In a final chapter on dynamics, based on Tustin's *The Mechanism of Economic Systems*, he presents an extremely interesting account of the economic application of electrical engineering concepts. Of special interest are the use of electrical engineering diagrams to represent dynamic models and the engineer's concept of a transfer function to provide solutions to those models.

The remaining 11 chapters represent primarily the application of the algebra of vectors and matrices to economic problems. General equilibrium analysis, both of the Walrasian and of the Leontief (input-output) types, is taken up. The final sections of the chapter on Walrasian general equilibrium analysis show clearly the relation between general equilibrium theory and linear programming. It is interesting to note that the mathematics of both linear programming and the theory of games developed historically as a result of criticisms of the Walrasian system.

Since a good deal of vector and matrix algebra is needed, an excellent treatment of these subjects is then provided. The discussion is both brief and clear, and it covers almost all topics in the area which are of interest to economists. The concept of a convex set is introduced, and this leads to a discussion of the theory of games and linear programming.

The theory of games is treated for its mathematical rather than its economic content; as Allen himself points out, "The more general economic problems known as linear programming, or activity analysis, provide one of the main fields of economic application of the theory of games." Consequently, only 2-person zero-sum games are discussed, and the interesting subjects of many-person games and games in extensive form are left to one side. The mathematics of the simplex method is discussed in some detail in the chapter on linear programming.

The main thread of the economic development resumed in chapters on the allocation of resources and the theory of the firm. The theory of the firm is discussed both in marginal terms, following the "classical" pattern, and in terms of moderately large finite changes employing linear programming and activity analysis, with emphasis on the latter. The theory of consumer behavior is presented in "classical" terms, but an interesting approach through linear programming is briefly introduced. The book concludes with a chapter on problems of aggregation, based almost entirely on Theil's *Linear Aggregation of Economic Relations*.

Allen's book should be useful not only for dispelling the doubts many have about the use of mathematics in economics, but also for stimulating further developments. Though couched primarily in macroeconomic terms, the chapters on dynamics should be read by those seriously interested in price analysis: Static theory has played a useful role in the econometrics of demand, but full understanding of supply response will come only when

we are able to formulate our hypotheses in dynamic form. Those interested in the statistical estimation of simultaneous equations will benefit greatly from the chapters on vector and matrix algebra. Linear programming enthusiasts will find a sympathetic author and a full treatment of the subject.

The book is introductory, but it is not elementary. Although directed to the economist rather than to the mathematician, it requires a knowledge of mathematics through elementary differential and integral calculus (such as may be obtained from chapters I–XV of Allen's, *Mathematical Analysis for Economists*). It is best not to read this book in one's easy chair. It is a hard book, best read sitting in a hard chair, at a table, with paper and pencil close at hand. The text is copiously supplied with exercises. As these frequently present new developments, they form an integral part of the book.

Typographical errors are few and far between and the price per page is reasonable, rare qualities in a book of this sort and size.

Marc Nerlove

*Agricultural Price Analysis. Fourth Edition.* By Geoffrey S. Shepherd. The Iowa State College Press, Ames, Iowa. 293 pages. 1957. \$5

TO EXPECT any one author to be free of the shortcomings of his profession is to ask too much. Admitting that any economist who undertakes to write a text thereby presumes a certain authority for himself, he nevertheless cannot be free of all the limitations imposed by the contemporary state of knowledge. The weakness of this edition of Professor Shepherd's text is chiefly a reflection of certain general inadequacies of price analysis. Its points of strength reflect not only the author's own competence but also the recent considerable advance in the field to which he too has contributed.

For all our piecemeal wisdom on how the price system works, it is extremely difficult to put together a unified, systematized "agricultural price analysis." In all their 34 years of activity, neither the former BAE nor the present AMS ever produced a comprehensive bulletin on the pricemaking mechanism.

In relying on consumers' disposable income and a supply variable as the basic forces by which to explain prices, Shepherd conforms to the orthodox line. Consumer income is a highly significant eco-

nomie value when aggregate employment and income are in transition between prosperity and depression. It is much less meaningful during prolonged high employment, as the postwar decade has demonstrated so emphatically. (The economics of growth is a more appropriate concept then.) Yet in a new edition dated 1957 and intended to include "some substantial changes," the author not only disregards the lessons of recent experience but retains a BAE exhibit relating farm product prices and income to disposable income in 1924–41 that worked fairly well for the data as plotted through 1951, but has been notably inadequate since.

Overtrust in consumer income as an omnibus price explainer appears also in the little distinction given to pricemaking for various farm products. In a brief subsection, Specific Changes in Demand, livestock prices are introduced into an equation explaining prices of corn, but further digressions by commodities are rare. Much more detail is needed to show how prices come to be as they are for products that have partial industrial outlet, such as soybeans, and to measure the impact

of foreign demand on export commodities. And surely in these latter days more is needed on the bearing of Government price-support programs to prices farmers receive.

Another deficiency in the text is a lack of attention to marketing margins as an influence on farmers' prices.

Yet these inadequacies and omissions are not singular, but universal. The regret is that in this new edition Professor Shepherd does not advance a stride farther ahead of his company.

And there are compensations too. Shepherd is meticulous in treating of shifts in supply-and-demand curves, and the problem of identification. His care almost becomes an obsession—and if one, it is justifiable. Laudable also is his emphasis on the effect of time span on curve shifting, and particularly on the various coefficients of elasticity obtained from analyses.

Many of us who employ graphic correlation technique concur in Shepherd's approval and in his claim of X-ray vision for it.

In connection with production response to price, Shepherd makes the sapient comment, seldom seen, that no normal response to price change can be hypothesized until it is known how the price change itself came about. A higher price that results from increased costs is hardly expansionary!

Other comments on the specifics of the text do not bear enumeration—some would be favorable, others unfavorable. In the latter category would fall the author's belaboring of parity prices for failing to do several things they were never intended to do, such as to measure incomes.

Finally, this reviewer, while joining with sympathy any move for calendar reform that would assure completion of all tasks by the winter solstice, nevertheless must regret that Shepherd's current revision of a basically good text is not more comprehensive. It is fine to see a new chapter devoted to simultaneous equations. Old chapters still carrying prewar tables need some simultaneity too. And adding a chapter on modernized parity prices is not the best corrective for the preceding chapter on parity (now "old" parity) that apparently has remained virtually undisturbed from previous editions.

Let's hope Professor Shepherd can soon find time for a fully reworked fifth edition. And on that, may this reviewer get in a cherished bit of advice. Many texts written by professors look as though they were meant as score for a pedagogue's classroom libretto. Any book ought to be independently readable, to stand on its own. This is true of classroom texts no less than any others.

Harold F. Breimyer

*Patterns of Farm Financial Structure.* By Donald C. Horton. Princeton University Press. 185 pages. 1957. \$4.50

**D**ONALD HORTON'S study of *Patterns of Farm Financial Structure* was undertaken as one of a series of investigations comprising the Agricultural Finance Project of the National Bureau of Economic Research. It will contribute to a basis for the capstone volume of the project, which is now in progress at the National Bureau under the tentative title of *Agricultural Credit Facilities in the United States*.

The purpose of Horton's study is to show how physical and economic features of farms are related to the way in which they are financed. The procedure is to show how various sources of capital and credit are drawn upon to meet the requirements of different sizes and types of farms. Asset and farm product characteristics are related to farm financial organization, and use and sources of credit are related to the economic character-

istics of agriculture. A summary chapter contributes materially in coordinating relationships developed in the book.

Lacking more adequate data, much of the study is based on 1940 United States Census data from a sample of 108 counties selected to give (1) the relative homogeneity of physical and economic characteristics of their component farms, and (2) a wide representation of different kinds of agriculture. Census data are supplemented by materials from lending agencies and special surveys—the latest that were available in the mid-1940's when the study was initiated. Census data such as those used in the study are gathered only in decennial censuses.

The book will be of value in basic research as a historical reference, and for the working hypotheses it suggests for creative thinking and

collection of data. Basic research and analysis such as this are always of value, but it is unfortunate that the findings of the study could not have been published a decade ago. The age of the data will be a deterrent to wide current interest and use.

A comprehensive and well-prepared introduction by R. J. Saulnier, director of the Financial Research Program of the National Bureau, currently the chairman of the President's Council of Economic Advisers, devotes attention to age of the data—and his discussion is pertinent. However, basic structural changes that have occurred in agriculture, and in sources of capital and credit since 1940, may call for modification in some of the findings as related to current conditions.

As indicated, the major source of data is United States census for 108 counties. Al-

though the counties are well distributed over the United States and selected for homogeneity of their farms, averages of this kind have limitations. Even in the most uniform county, farms differ greatly. Deductive analysis based upon data of this type, supplemented when necessary by estimation, has led to reasonable results; but do they provide a firm benchmark from which to orient one's thinking and judgment?

Such a pioneer study as this has usually to start with material that is available. This one provides considerable guidance for intelligent planning of data needed for future work, and it gives information on basic relationships in the 1940's that can be followed up by later research. Work is needed in this field. The National Bureau and Donald Horton deserve to be commended for this initial undertaking.

*Aaron G. Nelson*

*Immigrants and Their Children, 1850-1950.* By E. P. Hutchinson. John Wiley & Sons, Inc., New York. 392 pages. 1956. \$6.50

THE 1850 CENSUS was the first to provide information on the number of foreign-born in the United States. Information on native-born children with one or both parents of foreign birth became available beginning with the census of 1870.

As stated by the author, the objective of the monograph is to present an analysis of census data on immigration, and in addition to provide a survey and guide on immigrants and their native-born children in the population and labor force. In both of these directions the study makes a valuable contribution to the basic literature in the field.

In view of the fact that census data on immigrants, up to and including the census of 1920, were the subject of an earlier study, the discussion in the present monograph centers mostly on the period after that date. Of the 11 chapters in the monograph, the first is devoted to an analysis of the historical trend in the number of immigrants and their children from the date the census figures became available.

In this connection the author notes that the number of foreign-born in the United States reached a maximum of more than 14 million in the census of 1930. With the introduction of restrictive immigration laws after 1920 and a busi-

ness depression in the thirties the number of immigrants declined, and in 1950 the total figure of foreign-born in the United States was a little over 10 million. But foreign-born together with the native-born children of foreign or mixed parentage in 1950 represented as much as 25 percent of the total white population in the country. One of the most marked effects of the reduction in immigration is the aging of the foreign-born population. In 1920 the median age was 40 years; in 1950 it advanced to 56 years.

The second and third chapters of the monograph deal with the geographic distribution of foreign-born and native-born of foreign parentage covering the 1920-1950 period. The data of the study indicate that foreign-born, in both 1920 and 1950, were more urban than the total white population. At the end of that period a definite change was registered in the composition of foreign-born by national origin in favor of southern and eastern Europeans.

It is in the analysis of occupational data of immigrants and their children, presented in the remaining chapters of the monograph, that the most important contribution of the study is found. The previous monograph published in 1920 did not go into detailed consideration of this area. Anyone who has had experience in work-

ing with census data in tracing the historical trend for a definite series is well aware of the involved complications. The difficulty is due both to changes in classifications and to the inclusion or exclusion of certain data from one enumeration to another. The author of this monograph, through a painstaking process, succeeds quite well in bringing about a certain continuity in the occupational data. This enables him to produce a picture of occupational distribution of the immigrants and their children for every decade from 1870 to 1900, and a general analysis of changes in this area from 1920 to 1950.

From the occupational series it appears that all along the proportion of foreign-born in agriculture has been considerably lower than the proportion of the entire population. As with the total population of the country, there is found to have been a distinct movement of foreign-born workers, between 1910 and 1950, away from manual and unskilled labor and toward more skilled employment.

The last chapter of the monograph is devoted to a comprehensive summary and a recapitulation of the main findings. In addition, there are copious appendix notes concerned with an explanation and evaluation of census data beginning

with 1850. The appendix includes also detailed census data for foreign-born by country of birth and occupation by nativity for both males and females.

Although many of the findings and conclusions in this study of immigrants and their children have been brought out previously in some other general or specific study, this monograph stands out by virtue of its systematic historical analysis of primary data. In its treatment of the census data it makes also a distinct contribution to the methodology involved in this kind of analysis. The material in the monograph is well organized and presented, but its clarity is somewhat obscured by the necessity for careful scrutiny in a number of places to determine whether a particular statement in the discussion refers to foreign-born exclusively or to the foreign-born in combination with their native-born children.

Considering the fact that immigration has played such an important part in the development of this country, the subject matter of this study will be of interest to any student in the field of social studies. To researchers dealing with various historical aspects of population growth in the United States, this monograph will be of special significance.

David Rozma

*Baking in America. Volume I: Economic Development.* By William G. Panschar. *Volume II: Market Organization and Competition.* By Charles C. Slater. Northwestern University Press, Evanston, Ill. 1956. \$15

**H**OW MUCH COMPETITION is there in the baking industry, and what characteristics of the industry preserve the competitive features it has? What restrains the baker who would maximize his profits by singly or collusively manipulating prices or withholding from consumers some freedom of choice of bakery products and related services? Through two volumes of description and analysis, Panschar and Slater pursue these questions, using a well-diversified kit of methodologies and a wide variety of basic data. Their implicit hypothesis is that history, technology, costs, and institutions separately and through interaction have shaped the present market organization, and point the directions in which further change may be expected.

An economic history of baking constitutes volume I. Ancient and medieval times in the Old

World and the early days of America are reviewed briefly, but with stimulating insight into the economic factors at work. Most of the volume is devoted to the last century in America, during which the baking industry has gone through three economically significant stages. Between 1850 and 1890, it evolved from a handicraft trade to an industry with large-scale production and wholesale distribution. From 1900 to 1930, under the influence of a changing pattern of demand, dynamic technology, and changing corporate patterns, the baking industry became differentiated into several categories of kind and size. After 1930, the dominant economic characteristic of the industry was its adjustment to changing levels of general economic activity through depression, World War II, and the postwar boom.

Volume II considers in greater detail the differ-

entiation of marketing functions among the different types of bakers who make up the industry, and the complex structure of services, costs, and prices through which a balance is achieved. Nearly half of the volume is concerned with the economic organization of the industry. This section of the work appears to draw too little on what had been covered in volume I, and for that reason it is unduly long. The redundancy is most evident in chapters on patterns of consumption, shopping habits, and the distribution of bakery products.

Chapters on the economics of bakery production, wages and labor relations, costs of bakery production and distribution, and the organization of bakery companies create a detailed economic picture of the industry which is subsequently utilized in analyzing the competitive process in the industry. Accounting records for 173 baking plants for a 3½-year period are a substantial basis for this section of the work. They are supplemented with a synthesis of costs for a more precise evaluation of economies of scale.

Competition in the baking industry is analyzed from the standpoint of price-and-profit-structures, the tactics used by bakers in the struggle for market position, reactions to external factors such as shifts in prices of materials or consumer demand, characteristics of entry into the baking business, and the impact of shifts in the organization of food distribution generally.

The treatise is completed with an appraisal of the economic processes of the baking industry. Slater asks whether the industry is in fact competitive, and attempts a judgment based on whether coordination and control are provided primarily by forces of the market, rather than whether particular aspects of the industry's organization and behavior benefit consumers as much as they might do.

Noting that the organization of the industry does not match either of the two polar limits for

which economic theory can provide definite answers, Slater approaches his evaluation as a matter, not of factfinding, but of making judgments based on the evidence accumulated in the preceding chapters. In keeping with the complexity of structure and competitive activities, he expresses a cautious conclusion, "Altogether, the organization of the typical bakery market is favorable to competition."

He believes that hazards for a firm that holds prices out of line with a competitive level are too great. But he notes reservations with regard to small, relatively isolated markets, and to some inflexibility in adjustment of the industry to development of new products.

Volume I is enthralling reading for anyone with the slightest interest in economic history. It is skillfully written; its contents are of consistent economic significance; it provides a depth and perspective that help the reader to understand the current organization of the industry.

Volume II does not achieve the unusual literary quality of Volume I. Although in many respects well written, parts of volume II are redundant and repetitious. Some of the discussions of methodology appear superfluous for economists and not significant for lay readers. But these are minor faults—the scope and thoroughness of the study amply reward the reader.

The work was written, Slater states, because many leaders of the baking industry were concerned with the fundamental economic processes and the future potentials of their business. The authors also hope that it will acquaint junior executives, suppliers, labor leaders, and Government officials with the economic processes and behavior of the baking business. To such readers should be added any economists with a commodity or industry to analyze. They will find here a stimulating example of such work, a fruitful source of hypotheses, and a skillful utilization of economic data.

*Louis F. Herrmann*