Book Reviews

A Theory of the Consumption Function. National Bureau of Economic Research, No. 63, General Series. Milton Friedman. Princeton University Press, Princeton, 1957. xvi + 243 pp. $4.75.

Milton Friedman's hypothesis, formulated and, to his own satisfaction at least, demonstrated in *A Theory of the Consumption Function* is twofold: (i) consumption is a function of "permanent" income; and (ii) the ratio of the two does not depend on the *level* of income.

In an opening discussion devoted to pure theory, Friedman essentially sets up a utility function of present against future consumption, specifies (implicitly) that all permanent income is spent over the relevant time period, presumably the lifetime of the individual, and defines permanent income as that amount of receipts the consuming of which leaves wealth intact. Under these conditions, the two major reasons for not spending all receipts in a given period are the desire to straighten out the consumption stream to correspond more closely to the level of permanent income and the desire to earn interest on savings. With an uncertain future, the individual, in making provision against the future, will also tend to vary the fraction of income spent on consumption in accordance with the amount of wealth he owns relative to his income. Friedman goes on to *assume* that the marginal rates of substitution of present against future consumption are homogenous, of degree zero in their ratio—that is, the level of consumption or income has nothing to do with the saving rate. Similarly he assumes that the distribution of individuals by their ability to earn interest, their wealth-income ratios, and their utility functions is independent of their distribution by income. The combination of these two assumptions, the second of which is particularly dubious, yields the proposition that aggregate consumption is a fraction of permanent income which does not vary with the level of income.

The remainder of the book is devoted to demonstrating how two basic sets of empirical data are consistent with the permanent-income hypothesis. Cross-sectional budget studies consistently show a marginal propensity to consume less than the average propensity—that is, an income elasticity of less than one. Yet, over time, the average propensity to consume has been fairly stable. If transitory or temporary income constitutes a larger proportion of measured income among high-income than among low-income groups, then budget studies will show an income elasticity of less than one, even though consumption is a constant fraction of *permanent* income. At the same time, since this fraction is constant, the less-than-one income elasticity of consumption shown in budget studies will not result in a secular change in the average propensity to consume.

Similarly, in aggregate time-series data the permanent-income hypothesis will account for the fact that consumption reacts in a damped way to cyclical changes in income. Since such changes are considered to be in part transitory, and not permanent, consumption adjustments are smaller than income changes. Friedman calculates an aggregate consumption function to fit the time-series data (using a weighted average of past incomes, with weights declining backward in time.)

Friedman's work is indeed a notable contribution to the theory of consumption. His brilliant and subtle exploitation of the data to bolster his hypothesis at many points borders on sheer genius. However, in my judgment the permanent-income hypothesis must be accepted merely as an additional factor shaping consumption behavior. The claim that it is a hypothesis which explains all the major features of consumer behavior must be rejected for a number of reasons.

(1) There is in the book far too much indiscriminate hacking about with Occam's razor (to borrow a phrase of D. H. Robertson). On a number of occasions the reader is urged to accept the hypothesis on the grounds that it is the simplest single explanation of so many empirical facts. Indeed, in this field, any attempt to explain complex human behavior by a simple explanation is automatically suspect.

(2) Aside from some interesting speculations in the first section of chapter III, Friedman finds it quite impossible to formulate an operational definition of permanent income. That consumers do distinguish between windfall changes in income and changes expected to be more permanent is indeed a fruitful intuitional conclusion but hardly a solid enough base on which to build the superstructure which Friedman has erected.

(3) There is no proof whatsoever, in the pure theory section, of the assertion that the fraction of income consumed is independent of the level of income. And any number of hypotheses—for example, positive correlation in budget arrays between wealth-income ratios and income and a stable aggregate wealth-income ratio over time—would account for the failure of consumption to rise secularly at a slower ratio than income. Consequently, Friedman's bold conclusions about savings-income relationships in underdeveloped countries are not warranted either by his theoretical structure or his data.

(4) Friedman's structures against "Keynesian" cyclical analysis are also overdone. At best he merely shows that consumption has a damped response to cyclical changes in income. And indeed his own aggregate function errs in the opposite direction. It sails right through four of the eight consumption downturns since 1905—unlike Dusenberry's function, which catches seven of the eight declines.

(5) Finally, Friedman appears to have proved too much. For if consumption changes only with permanent income, is it not logical that it varies only with permanent changes in real wealth? And if so, one of the major weapons of the "Chicago" quantity theorists against the theory of underemployment equilibrium is seriously weakened. For depression price cuts which raise real wealth balances will surely be regarded, in part at least, as "transitory."

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The Stars above Us. Or the conquest of superstition. Ernst Zinner. Translated by W. H. Johnston. Scribner's, New York, 1957. xiv + 141 pp. Illus. $3.

A dean of historians of astronomy, out of his vast erudition, has brought forth a trivial pamphlet of questionable value, which does not do him justice. This slim volume is not intended as a history of astronomy, nor is it meant to refute astrologers or instruct in modern astron-

omy, although it touches all these subjects. However, the volume is not unworthy of a quick perusal. The author speaks with authority on a number of subjects of interest to an average citizen who, feeling the impact of science, wants to learn something about past attitudes toward science; in spite of its choppy style and structure, this book furnishes a pleasant way to gain such knowledge.

Unfortunately, the book has lost much accuracy and almost all citation of references in the translation. The 125 pages of text are divided into 14 chapters (most of which have numerous subdivisions): "The Sun's Teaching"; "The Host of the Stars" (*sic*) (the German title is *"Das Heer der Sterne"*); "The Dance of the Stars" (which deals with beliefs concerning the moon and the planets and was properly entitled *"Der Reigen der Gestirne"*); "Comets and Portents"; and so on. Some passages bear a strong resemblance to passages Zinner has published elsewhere. Moreover, he has used some of the illustrations before. But gathering together these bits of knowledge to make a new whole is worth while, and the illustrations are delightful and lend much charm.

In the German edition the bibliography is much fuller, each item is numbered, and references by item number and page are frequent in the text. This is not true of the English edition. In both, the bibliography contains many inaccuracies—names misspelled or misabbreviated. This is strange when one reflects that Zinner is the author of an invaluable tool—a bibliography of German astronomical literature during the Renaissance. And why are the title and date of the German edition (*Sternglaube und Sternforschung,* Alber, Freiburg und München, 1953) nowhere stated?

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The Vertebrate Visual System. Its origin, structure, and function and its manifestations in disease, with an analysis of its role in the life of animals and in the origin of man. Preceded by a historical review of investigations of the eye, and of the visual pathways and centers of the brain. Stephen Polyak. Heinrich Klüver, Ed. University of Chicago Press, Chicago, 1957. xviii + 1390 pp. Illus. $45.

I should say at once, since this book, more than most, is a highly personal document, that to my great regret my only contact with Stephen Polyak was a hasty handshake outside a waiting elevator. It was general knowledge that he had been dogged by illness through the last years of his life, and that throughout this period he labored ceaselessly to complete this book, the culmination of 30 years of work on the anatomy of the eye and the central nervous system. I gather that in all essentials he succeeded. At his death in 1955 the text, bibliography, and illustrations were complete. However, much remained to be done. That we have the book before us now, we owe largely to Heinrich Klüver's devoted editing. Subsidies from the Public Health Service and National Science Foundation have brought its cost down, within the reach of most libraries. Klüver arranged, corrected, indexed, and ordered, but apparently he subtracted nothing. The book is, in detail, as Polyak wanted it.

It is a very large work: 1390 pages (including 300 pages containing some 10,000 references) and 551 illustrations. Klüver tells us that the legends of the illustrations alone ran to 300 pages of typescript.

The book begins with a history of optics and investigations on the eye and its central nervous connections. Polyak had at his command a wide range of European tongues, ancient and modern, including Slavic, and he has much to say that is of interest in this realm. His historical review is distinguished particularly by its careful appraisal of early Arabic sources.

There follows a detailed examination of the anatomy and histology of the retina and the visual pathways, with particular reference to the primates, including man. This section of over 400 pages is Polyak's particular contribution —the compilation of his life's work. There is no doubt that workers in vision and general neurology will long remain in Polyak's debt for this material, and that, in its wealth of discriminating observation and its beautiful figures, it constitutes a monumental achievement.

There follows a relatively short section of 125 pages on the pathology of the retina and the visual pathways. This is in two parts—a general anatomical discussion and a second, clinical section which contains the description of 12 specific cases involving disturbances of visual field and discussing the underlying pathology.

The book ends with a section of about 300 pages on the origin and development of the vertebrate eye, the natural history and behavior of 11 specific animals, and the role of vision in the origin of man and civilization.

Stephen Polyak was a learned, skilful, resourceful anatomist, and all of us admire and are grateful for his contributions in this field and the devotion with which he pursued it. From his anatomical studies he drew inferences in physiology, paleontology, anthropology, and ethnology. In my opinion, all such excursions ended unhappily. It is possible to infer basic visual physiology from anatomy, as Max Schultze long ago showed, and our classic theory of evolution springs almost wholly from anatomical observations. But this is not where Polyak's gifts lay. The concluding chapter and the strange "Epilogue" have everything in them: a little concerning vision, some genuinely interesting observations in natural history, a great deal that is trivial, and much that is preposterous. I wish that this last section of the book had never been written, or, if written, not published, or, if published, not in a book on vision. It must have given trouble to Klüver, and it will give trouble to any reader aware of Polyak's gifts and accomplishments as a neuroanatomist.

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Solid State Physics. vol. 4. *Advances in Research and Application.* Frederick Seitz and David Turnbull, Eds. Academic Press, New York, 1957. xiv + 540 pp. Illus. $12.

As in earlier volumes of the series, the excellent articles in this new volume are on widely diverse topics. They are, however, uniformly well written and authoritative and will be very helpful to those wishing to become familiar with new fields. The first article is a comprehensive survey of known facts about ferroelectric and antiferroelectric crystals, by Werner Känzig. The author reviews the present status of theory and the known phenomena in both kinds of materials. Next, the theory of electron mobility in solids is discussed by Frank J. Blatt. The Boltzmann transport equation is used in the study of electric and thermal conductivity, thermoelectric effects, and the Hall effect. After treatment of the simplest possible models, more complicated cases are discussed, including models involving nonspherical energy surfaces and nonisotropic relaxation times.

The next article, by Truman P. Woodruff, is a short discussion of the orthogonalized plane wave method for obtaining electron wave functions in a crystal lattice. The method is carefully described, and its applications by the principal investigators in the field are discussed and compared. There follows a bibliography, by Robert S. Knox, of atomic wave functions. References are given to results for more than 100 atoms and ions, with brief descriptions of the calculations included. The final article discusses techniques of zone melting and crystal growing. This article, by W. G. Pfann, will be of great interest to those who wish to learn of recent advances in these arts.

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