derives a statistically consistent model of general application which he then uses to estimate the extent of economies of scale in trucking operations. His estimations indicate the existence of slight economies of scale; thus large trucking operations may be marginally more efficient than small ones. Although these results have significant implications for merger policies and the utilization of private trucking operations, Warner lets the reader infer them.

The Cabot and Hurter paper is theoretical rather than empirical and is concerned with the development of techniques to analyze and solve linear programming problems involving the optimal scheduling of transport equipment. The primal of the problems determines the optimal equipment scheduling under different constraints with regard to the permitted route and equipment utilization, initial location of equipment, the relevant time horizon, etc. The dual of the problems determines the economic rent of the equipment and thus provides a means of determining the effect on the costs of the entire schedule of an additional available vehicle, an increased supply at a given warehouse, etc. The specific extensions of the model include a common carrier who is limited in his routings and commodities carried, a shipper who has the option of using private and common carriage, and the optimal initial distribution of equipment when the shipper's horizon extends over several periods. Although their analysis was limited to the formal presentation of the linear programming problem and its application in some numerical examples, it was highly suggestive and pointed the way for its application to actual problems. To this end, Cabot and Hurter provide two alternative computation methods: one based on dynamic programming and the other on the decomposition principle of linear programming to simplify the computational complexity.

Burstein and Egan are directly concerned with the question of why a firm would use its own private trucking fleet when professionals are available to do the job. Their not entirely startling conclusion is that freight rates determined by official fiat are likely to be so insensitive to costs of a specific shipment or trip that private shadow prices will be able to reflect their costs more accurately (although still imperfectly). They show this by means of a case study of the private trucking operations of a large commercial grocer. Using standard regression techniques, they estimate variable costs from data supplied by the firm. The fixed costs are crudely, if laboriously, calculated to derive specific shipment costs. A comparison of these costs with specific shipment rates indicates that the spread is sufficiently great to warrant a firm using its own fleet, particularly on the longer hauls. An interesting conclusion of the study is that if the restrictions on back-haul were eased, private trucking would be even more extensively used.

Although this book should be of primary interest to those concerned with aspects of transport costs, it deserves attention from all those who are concerned with the more general problems of costing, scheduling, and an interesting and imaginative treatment of certain econometric and linear programming problems.

Boston College A. F. FRIEDLAENDER

Cours d'Automatique Théorique. R. PALLU DE LA BARRIÈRE. Paris: Dunod. 1966. 404 pp. 68 F.

THIS IS THE seventeenth volume in Dunod's university mathematics collection which is under the direction of Henri Hierche. The book is based upon Professor Barrière's lectures on *d'automatique théorique* at the Faculty of Science at Caen. From the contents of the book, it seems that the best translation into English of "*d'automatique théorique*" is "systems analysis."

I doubt, however, that there is any book in the English language much like this one.

The book contains a unified treatment of a wide range of mathematical topics that are important to economists, systems analysts, operation researchers, and control theorists. Chapter I is a concise survey of the basic mathematics that is necessary for the subsequent chapters. Harmonic analysis (including the theories of the Fourier and Laplace transforms) is treated as an application of the theory of distributions (as recently introduced by L. Schwartz). Three chapters (Elements of Probability Calculus, Markov Chains, and Stationary Stochastic Processes of the Second Order) are devoted to probability theory. In the chapter on stochastic processes, the Poisson process is developed in terms of the basic tools of distribution theory.

In four chapters, the author applies the mathematical formalism in analyzing the problem of the linear servomechanism. Sections on filtering and prediction, the Wiener-Hopf equation, and discrete stochastic processes are included.

The remainder of the book is devoted to an exposition of a variety of theories and techniques of optimization. The chapter on convex sets includes the important theorems about separating hyperplanes and asymptotic cones. Although the Kuhn-Tucker Theorem is presented in an appendix, I found no reference to the generalization of the theorem to quasiconcave functions due to Arrow and Enthoven. The chapter on linear programming includes the development of the simplex method, while the chapter on dynamic programming is merely an exposition of Bellman's principle of optimality. There are separate chapters on control of Markovian systems, control under the minimum time objective, and the maximum principle of Pontryagin. In the chapter on the maximum principle the necessary Euler equations (in Hamiltonian form) are developed in generality. On the other hand, I was able to find a discussion of the important transversality conditions (boundary conditions) only for the simplest cases.

Although the first chapter contains a concise survey of the required mathematics, the exposition in the following chapters will probably prove to be very difficult for anyone who has not studied "analysis" on at least the advanced undergraduate level. The author is to be congratulated for writing a book that covers such a wide area while maintaining the standards of rigor and elegance we have come to expect of French mathematicians.

Massachusetts Institute of Technology KARL SHELL

Essays in Economics: Theories and Theorising. BY WASSILY LEONTIEF. New York and London: Oxford University Press. 1966. 247 pp. $6.00.

THIS IS A collection of twenty papers, published over the course of more than thirty years, long and short, wide and narrow, covering a variety of topics.

It includes the famous article on "implicit theorising" which pilories the method of argument that consists of arriving at a conclusion by using definitions which entail it. Leontief regarded this as a characteristic vice of Cambridge economics in the thirties. It was, rather, all pervasive in the neoclassical orthodoxy in which we had been brought up; just because we were struggling to get free from it, we formulated it sharply enough to give the game away. (For my part, by the time that this essay was published I had already accepted the point that Leontief was making.)

Contrarywise, the neo-neoclassical school, now dominant in the United States, smothers all argument in such a thick fog of implicit theorising that no one can see what it is. To take an example at random, it does not give Professor Solow a moment's pause to set up a production function in labour and the effective stock of capital, so that the capital–output ratio is constant