Two of the important economic aspects associated with demand-actuated transportation systems (DATS) are the methods of pricing the service (and the attendant implications for operating revenues) and the methods of evaluating the desirability (from an economic point of view) of introducing DATS in a particular situation. The following summary groups the contributions of the various discussants under these 2 broad areas that are in fact closely interrelated because of the effect the method of pricing has on factors such as total revenue and distribution of benefit.

ALTERNATIVE VIEWS OF PRICING

As an introduction to the problems of pricing of a transportation service, it may be useful to review some of the well-known pricing schemes employed by public utilities. These may be grouped roughly as uniform pricing, two-part tariffs, and block tariffs.

A uniform tariff is a single price method where the same price applies to all individuals, to all quantities purchased by a given individual, and at all points in time; no intertemporal price discrimination is employed.

The first step away from the uniform scheme is a two-part tariff that consists of a fixed-charge portion (perhaps per month) and a uniform variable portion that must be paid for each unit of the commodity consumed. A gas tariff consisting of a monthly charge for being hooked up plus a uniform rate per 100 cubic feet of gas consumed is an example.

A yet more refined pricing scheme is the block tariff that in the form of zone-to-zone fare schedules appears to have received wider usage in the transportation field. Basically, a block tariff consists of uniform prices that apply to a specified quantity of the service consumed. For example, one might pay one rate for the first 100 kilowatt-hours, a second (usually lower) rate for the next "block" of kilowatt-hours, and then the rate may be still lower for a block further on. There are, of course, alternative ways of interpreting a block tariff to the one given here.

DATS Demand Studies

As with any production and marketing problem, one is confronted with the problem of estimating the demand for DATS. This information then becomes the raw material for the evaluation of pricing plans, investment policy, and scheduling requirements. DATS typically will share the demand characteristic of intertemporal peaking that is so crucial in areas such as electricity supply.

Discussion has brought out 3 aspects of work on demand studies: the "new product" problem, a maximum willingness to pay approach, and the defects of data gathered from survey questionnaires. With respect to the new product problem, which is common to all areas of marketing, little can be said except that DATS suffers from an acute form of the malady. For commodities that potentially have very close substitutes, information
on demand for these can be useful; but in the case of a markedly different service such as DATS, one is literally without a satisfactory reference point from current market data.

To offset the data deficiency, 2 approaches have been discussed in connection with DATS. The first concentrates on estimating the maximum, or at least an upper bound, on the willingness to pay as reflected by alternative modes of transportation. If one assumes that some transport service will be used and the only question is which one, then the alternative cost approach can be useful. Some of the suggested reference points for costing include taxi fares, fixed-route bus fares, cost of owning a second automobile, and parking fees. An integral part of the alternative cost method is the valuation of time component that is essential to provide comparability among modes.

The principal defect of the alternative cost method is that, although it can be applied to both core and noncore transportation, it ignores the amount of off-peak use to which DATS can be put and is of prime usefulness in evaluation of trunk-line and connecting service to core areas during peak periods.

As an alternative to indirect estimates of the demand schedule, one can use surveys or questionnaires or both. Although the principal benefit from a survey seems to be confined to preferences as to characteristics of the service and the economic-demographic characteristics of potential users, relatively little seems to have been done with respect to pricing. Questions have been asked only about uniform prices and not necessarily for a range of values. At best one gets information—a priori, not revealed choice—on one or a few points on a hypothetical demand schedule under only a single type of pricing scheme.

The dubious nature of demand estimates from survey data suggests that a far preferable method would be to utilize revealed preference data developed during demonstration field tests. The primary drawback to experimentation with a variety of pricing schemes is likely to be the lack of automation that may cause most of the tasks to be performed manually.

A Marketing Viewpoint

In contrast to the emphasis on the monetary pricing schemes, a marketing approach centers attention on convenience, habit, and nonmonetary pricing aspects. The main contention seems to be that casual observation over a wide range of consumer products suggests a definite drift toward convenience-oriented rather than cost-minimizing consumption patterns. In addition, although the implied prices of "convenience" characteristics seem to be several times those of conventional products, they gain considerable market acceptance. Such observations would imply that the upper bounds to price gained through evaluation of alternative modes of travel are not really upper bounds at all if one can introduce convenience aspects that are simply not present in alternative methods. From a marketing viewpoint, the presence of noncomparable characteristics has the further desirable (?) property that other modes may not really be viewed by consumers as substitutes.

A second point is related to the habit portion of a consumer's purchasing decisions. Habit aspects could come about both with respect to habit of using (and, therefore, price-insensitive behavior) or through habit of paying a certain price. If one were considering what pricing scheme to introduce or at what level to set prices and the habit element was felt to be quite strong, one could begin with relatively low prices and gradually raise them over a period of a year or so to the level required for DATS to be self-supporting.

Nonmonetary pricing aspects cover a wide gamut. Items such as the availability of reading material and coffee and the choice as to waiting times and transport time all fall under this heading. Snags occur when one attempts to obtain information on the association of these and other characteristics with alternative charges for the service. If adequate data were available, the implied willingness to pay for each of these characteristics could be unscrambled from the data.
Other Alternatives

Most of the discussion has centered around DATS rather than alternative transport systems. A notable exception was the mention of a study by SRI on a "public car," which is a proposal based on a local rent-a-car plan for an urban area with designated pickup and drop-off points for the vehicles.

An integral part of the pricing scheme employed for any commodity is the method of billing. For DATS, automation may be feasible both for billing and scheduling uses. The use of even a small computer makes almost any pricing scheme feasible computationally; this might be accomplished by user insertion of a plastic commutation card in a meter on boarding and departing from the vehicle.

ECONOMIC EVALUATION OF DATS

Before the evaluation and special problems of DATS are discussed, it seems worthwhile to recap the basic methods of evaluating investment projects, some, all, or even none of which may be applicable here. These methods can be grouped roughly as a present value approach, the cost-effectiveness method, and the cost-benefit analysis.

The most conventional of methods for evaluating the desirability of an investment is the present value approach. In its simplest form, this consists of specifying the outlays, both capital and operating, that will be needed at each point in time over the life of the investment and to the expected gross revenues at each point and then discounting these back to the present. Despite its apparent simplicity, it suffers several defects: (a) Costs and revenues are not known with deterministic accuracy; (b) the "life of an investment" is not a constant but is itself one of the economic variables of the problem; and (c) estimates are required of one or more interest rates or desired rates of return before one can determine the discount factors.

A second method that has gained a degree of popularity for government investment projects is the cost-benefit approach. In the special case where one had adequate demand estimates, this comes close to a consumer surplus approach. As one might expect, there is a stigma to be overcome when this method is employed because of the precarious nature of "benefits" and the methods one might use to estimate them. It is usually, but not always, the case that costs of a proposed project enjoy a higher degree of accuracy and currentness while benefits frequently accrue in the future, and it is by no means clear to whom they accrue. Dorfman in his report, Measuring Benefits of Government Investment, gives several examples of this approach.

The last technique is the result of a skeptical, if not condescending, attitude toward the cost-benefit approach and is frequently used in defense project analysis. The method is referred to as cost-effectiveness analysis. Instead of attempting to estimate the benefits associated with projects, the problem is phrased as a cost minimization one in which one seeks the least cost method of achieving specified objectives. This approach has been popularized by Hitch and McKean.

Although no specific details were available on overall evaluation procedure and profitability, 2 related issues were brought out: (a) concern over DATS as a labor intensive or, at least, fixed labor-capital ratio system and (b) municipal versus private ownership operated with or without subsidies.

DATS retains one of the chief operating characteristics of bus and taxi modes; the capital (carrying capacity) to labor (one driver) ratio is fixed. The major advantages claimed for DATS is a carrying capacity larger than a taxi and a retention of some of the personal service elements of a taxi through the avoidance of fixed routes. The chief criticisms appear to center around dispatching and the use of a high and fixed labor use in an environment where increasing labor cost is certain to be a chief factor. The dispatching factor is largely mitigated by use of an on-line computer; however, short of mechanically guided control, there is no clear answer to the labor cost argument. In addition, short of going to larger vehicles, there is no way to increase labor productivity; and, thus, wage increases imply rising real input cost per unit of output.
In the earlier pricing discussions, no mention was made of the type of ownership envisaged for DATS. Several alternatives can be mentioned: (a) municipal or (b) ownership by taxi or bus firms currently in the transport field, either with or without subsidies. When one considers pricing policies and the associated investment programs, one cannot divorce these from the nature of the entity operating DATS. It hardly seems realistic to think of a governmental unit operating DATS with the same objectives in mind that a private firm might employ. Pricing and investment policies for DATS in a community have both political and economic facets. It is quite conceivable that a governmental unit might run DATS at a loss to subsidize certain areas such as an urban ghetto or specifically seek to use DATS to provide greater employment opportunity within an area.

The basic issue revolves around what objectives are to be achieved by a transport system. If certain objectives, either political or social or both, are sought that conflict with the profitability requirements of a private firm, then either operation must be relinquished or a subsidy must be sought.

Subsidies to transportation modes is certainly not new. Such subsidies can take the form of special tax treatment of financial instruments or special depreciation and tax credit policies or simply direct cash subsidies for operation. What objectives a private firm may be compelled to pursue under the franchise umbrella of a municipality cannot be evaluated in purely economic terms. The only direct statement that can be made is that, if a firm operating under a franchise that creates monopoly powers is not able to find any pricing scheme such that total revenue at least covers total costs, then ipso facto the aggregate valuation placed on the service by the public does not exceed its total cost and it should not be provided. If such a pricing scheme does exist but for other reasons is not employed, there is little that can be said except that the pursuit of alternative policies have embedded in them some element of implied income distribution that lies outside the purview of economics.