**Sherwin Rosen**
*University of Chicago*

# Comments on "A Price Theoretic Approach to the Specification and Estimation of the Sales-Advertising Function"

Verma's paper (this issue) is a very interesting analysis of the value of advertising for producing information for consumers. The methods employed follow the household production function approach to demand theory, wherein decision-making units (households) are viewed as combining time inputs and market goods to produce unobserved, latent commodities that ultimately create value or utility. The demand for observed goods is derived from the demand for unobserved latent commodities and is constrained by the production technology relating time and goods with commodities and by consumer income and time constraints. Verma's substantial contribution is to add information as another factor in the latent commodity production function. Here commodities are produced by market goods, time inputs, and information. Information is itself not freely provided but is also produced by expenditures of goods and time. Moreover, the productivity of goods and time in producing information is conditioned by the exogenous amount of advertising to which consumer units are exposed, and advertising is, at the household level of analysis, produced by firms rather than consumers. Advertising plays the role of an exogenous shift variable in the household's production functions for information and hence ultimately for commodities.

The outcome of the analysis is that advertising variables are arguments of the consumer's demand functions for market goods, in addition to the usual price and income variables. At this general level, the demand functions do not appear much different than if an analyst asserted that advertising merely alters consumers' preferences directly. However, there are two substantive differences between Verma's advertising-as-information model and the advertising-as-utility-altering view which has been espoused by others.

The first difference is normative. When advertising is viewed as providing information, greater amounts of it have the potential for

*Journal of Business*, 1980, vol. 53, no. 3, pt. 2)

0021-9398/80/5332-0015$01.50

actually making people better off. The reason is that greater amounts of information created by more advertising actually expand the consumption possibilities of the latent commodities for each consumer. Advertising increases the endowment of a productive factor and hence makes purchased inputs of goods and time more productive in generating ultimate commodities. In this sense more advertising has the effect of increasing the consumer's wealth or income, other things being equal. This is readily seen if the behavioral relationships are substituted into the underlying utility function. Then the indirect utility function has advertising levels as arguments as well as price and income variables. More advertising of a good cannot decrease utility and must increase it if the advertised good is actually purchased by the consumer. What this means is that the consumer is prepared to sacrifice some income or is willing to pay higher prices for advertised goods. These potential sacrifices at the margin reflect the demand price for additional advertising and provide a basis for cost-benefit analysis of advertising. Clearly the normative consequences of this are vastly different from the position one is led to if advertising directly and capriciously alters underlying preferences.

Second, there may be substantial differences in the observational consequences of two specifications, as Verma emphasizes. The model presented gives very precise channels through which advertising affects product-demand functions. Substituting the production technology and time constraints directly into the underlying utility function for latent commodities induces a preference ordering on market commodities and time inputs, which have advertising levels as shift variables. In this sense advertising shifts the utility function, too. Notice, however, that the precise manner in which preferences for market goods and time inputs are shifted is restricted by the underlying information and other technology. These restrictions imply corresponding restrictions on the data that are capable of refutation (see eq. [9] in the text and the discussion in sec. IV of Verma, this issue) and hence provide a conceptual basis for econometric tests.

Since I am largely in agreement with Verma's approach to this problem, and since his arguments are so carefully qualified, it is difficult for me to criticize the paper. Nevertheless, three points seem worth making.

First, some obvious questions arise about the power of the restrictions that the model imposes on the data. These restrictions are most unambiguous when the underlying model contains no joint production of commodities, as Verma points out. When joint production is present, the restrictions become so weak that it may not be feasible to test them with available data and techniques. To put this issue in a different way, the proposed tests require maintained assumptions about unobservable production relationships (such as no joint production) which

cannot themselves be directly verified. A related point is that the analysis assumes that all goods are actually purchased by the consumer. Yet in many product classes where advertising is important, consumers tend to specialize their purchases on distinct types of items and do not buy most of the goods that are available. It is known in general that one cannot treat market data as if it were generated by consistent preferences of a "representative consumer," and while doing so may not lead to serious errors, one cannot rule out that possibility in advance.

Second, further work in this area will have to examine the nature of information technology more carefully. In this work information is treated as simply another economic good in the system, comparable to, say, shoes (which make walking easier), and there are costs and benefits of acquiring different amounts of it. Surely that is an acceptable simplification at the microlevel of analysis pursued in the paper. Yet, even so, it does not give very many guidelines for the econometric specification. Are the information variables in household production functions in terms of stocks or flows? More important, is it the current flow of advertising or the stock of messages previously received that affects the demands for goods, a problem that Verma recognizes in his preliminary empirical work, where only data on current flows are used?

In extending the analysis to the market level it is clear that information cannot be treated merely as an additional good in the economic system. Perhaps the revolutionary consequences of imperfections in information on economic organization are only now beginning to be understood and studied. It is known that the notion of competitive markets for information require a much different analytical framework than analysis of markets for other goods. For advertising one difficulty arises because there appears to be no satisfactory way in which to untie the market for information about a product and the market for the product itself. This itself would be of little consequence if the information available on one product did not technically interact with production sets of the other producers. Yet in the model at hand this interaction is represented by the fact that the advertising of other producers as well as its own advertising affects the demand for any given good. In this sense information is a joint factor of production for both consumers and producers, a situation that is much different than that for other goods and services in the economy.

This leads directly into the final point. If advertising affects the demands confronting each producer, the optimal level of advertising for one firm cannot be independent of the amount of advertising undertaken by other firms. This is precisely the point where competitive markets for advertising in analogy with other markets breaks down. Evidently, strategic considerations in the production of adver-

tising may play an important role in determining the supply of it. Hence it is by no means clear that, though advertising is informative and creates social value for consumers, the socially optimum amount or type will be provided. The obvious analogy with congestion problems suggests that the individual firm will not correctly internalize the negative externality of its own advertising on other firms' product demands, and hence there may be excessive advertising. Evidently the complete answer to normative questions such as these depends on the precise technology of information and the role of advertising in it. Yet the considerations of supply introduce some additional complexities into the positive empirical analysis of the relation between advertising and sales in demand, using aggregate data as in the work mentioned in Verma's paper. The basic problem is that the supply of advertising messages may not be independent of the demand structure in the whole market, since each producer attempts to maximize profits against the entire structure of consumer demands and the perceived behavior of other firms. This is not a standard simultaneous equations problem, because the two sides of the market do not neatly separate with only intervening market prices connecting them. Not only price but the structures of demand functions are constraints in each supplier's decision. Hence the price and advertising effects actually estimated may be contaminated by supply as well as the demand effects so usefully laid out in Verma's paper.