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NEW AND USED CARS AS CONSUMER ALTERNATIVES

by
Horst Sylvester

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Business Administration)
in The University of Michigan
1972

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CHAPTER I

INTRODUCTION AND STATEMENT OF THE ISSUE

Introduction

Economic theory has never been completely consistent in defining "competition." While classical economists viewed it as a force or process, neoclassical economists approached the issue from the point of view of a taxonomy of market structure, with perfect competition being the ideal organization. This dichotomy in approach has never been resolved, and it continues to be reflected in the current debate as to whether public policy should be predicated on behavioral aspects of competition or on structural benchmarks.[1/]

The automobile industry provides a useful case in which to examine the contrasting views of competition. Some economists[2/] maintain

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1/ Paul J. McNulty, "Economic Theory and the Meaning of Competition," Quarterly Journal of Economics, LXXXII (1968) 639-56. Also, Richard C. Bernhard, "Competition in Law and in Economics," Antitrust Bulletin, XII (Winter, 1967), 1099-1163. Also, Jesse W. Markham, "Structure Versus Conduct Criteria in Antitrust," in Antitrust Policy and Economic Welfare, ed. by Werner Sichel, Michigan Business Papers No. 56 (Ann Arbor, Mich.: "Bureau of Business Research, The University of Michigan, 1970), pp. 102-118.

2/ Joe S. Bain, Industrial Organization (2nd ed.; New York: John Wiley and Sons, Inc., 1968). Also, Robert F. Lanzillotti, "The Automobile Industry," in The Structure of American Industry, ed. by Walter Adams (3rd ed.; New York: MacMillan Co., 1961), pp. 311-354.

that the industry represents extremely limited competition. They support their view by citing the oligopolistic nature of the industry, a structural criterion which they quantify by citing the high concentration ratio that exists. Industry spokesmen[3/] contend that the industry presents a picture of effective competition in the behavioral sense. In their view, concentration ratios fail to show the breadth of the competitive challenge which firms face, the extent to which their behavior is controlled by the market, or the extent to which buyers have benefited as a result of the competition which firms face and resultant actions which they have taken.

If the manufacturers views are correct, it should follow that two primary forces explaining the behavior of firms in the industry are technology and consumer choice behavior. In other words, consumer perception of choice and alternatives is one important factor in determining firms' behavior and, thus, in defining the true nature and extent of competition in the automobile market. Such a definition is much more compatible with a marketing approach than a theoretical economic one, and it is highly relevant to the question of whether competition should be viewed from the standpoint of structure or performance for purposes of consumer welfare deliberations.

3/ General Motors Corporation, The Automobile Industry: A Case Study of Competition, prepared for the Subcommittee on Retailing, Distribution, and Marketing Practices and the Subcommittee on Monopoly of the Select Committee on Small Business of the U.S. Senate, Oct., 1968. (Phamphlet.)

This study will stress such a marketing oriented approach by undertaking a more thorough examination of dynamic buyer demand characteristics and the purchase process itself. This emphasis is manifested by the concern of the study for the fundamental element of consumer choice. As such, the approach highlights the need for measuring the nature and extent of alternatives which buyers consider in the purchase of automobiles.

There are a number of distinct modes of competition or categories of consumer alternatives which could serve as the focus for this approach. To attain the broadest scope, it would be possible to investigate buyer consideration of alternatives among discretionary expenditures. Such a study would concentrate on car versus non-car alternatives, a configuration which the literature of economics refers to as interindustry competition.

This view could also be applied strictly to the question of alternatives considered among new automobiles. In this case, we would be dealing with inter-and intrafirm competition. The logic of this application was argued in a paper by Root and Sylvester.[4/]

4/ H. Paul Root and Horst Sylvester, "Competition and Consumer Alternatives in the Automobile Industry," Working Paper No. 26, Bureau of Business Research, Graduate School of Business Administration, University of Michigan, Ann Arbor, Michigan, 1971.

Finally, it is possible to apply this market oriented approach to defining the nature and extent of competition in the automobile market to the specific case of new versus used cars. This is the case which has been selected for complete investigation in the dissertation.

There are a number of reasons why the issue of competition between new and used cars deserves closer examination and why it has been singled out as the area for study. First, it represents a subject which has been largely ignored in the research and literature on the demand for automobiles. Whether this omission is a result of the belief that such competition is minimal or because the general preoccupation of demand analysts is with new car demand is not apparent. However, the fact remains that the gap is there, especially in the area of empirical research.

Another reason why this subject has been selected lies in the fact that competition between new and used cars may have a bearing on the use of concentration ratios as measures of industry competition. This study, then, will provide an input to this area of debate between economists and industry spokesmen.

A third reason for the selection of this element of competition for further study is the belief that there are potential strategy implications for manufacturers and dealers in the results. Such implications may be quite specific in areas such as manufacturers' product and promotion policies and the extent of dealers' integration of the new

and used car operations. More generally, it seems that manufacturers' and dealers' evaluations of competitive strategies must be based on some knowledge of consumer behavior.

Finally, there is a potential theoretical contribution which this study can make to the field of marketing both in the sense of correcting past oversimplifications and in moving closer to a sounder basis for market segmentation. It is my belief that this area represents a case in which buyer behavior does not always correspond well with analysts' views of buyer behavior. In past work on market segmentation, some researchers have concluded that new and used car buyers are sharply delineated on the basis of various predictors, most of them socio-economic and demographic variables. The work of these researchers has been based exclusively on what may be termed an ex post view, i.e., using only the final purchase behavior of the buyer with respect to whether a new or used car was selected. Such a view ultimately hides differentials in the behavior processes which led to a final selection. In this regard, my work has two significant features. First, it is possible that by isolating those who view new and used as alternatives into a separate market segment, the predictive power of the variables segmenting those who "considered and bought new only" from those who "considered and bought used only" can be strengthened in future segmentation studies. Second, by stressing segmentation on the basis of differences in the purchase decision process, we are getting closer

to a more theoretical basis of market segmentation, namely segmentation on the basis of differences in buyer responses to seller initiated variables.

Previous Studies

As noted previously, it can be argued that manufacturers are well aware of the possibility of competition between new and used cars. General Motors Corporation, in speaking to the issue of measuring competition in the industry, contends:

> The sellers of new cars are subjected to further competitive pressure from the presence of used cars in highly active markets. This requires continuing product improvements by new car manufacturers and effectively limits new car prices....
>
> The availability of used cars increases the range of product choice for the customer and influences the entire structure of car prices. There is a substantial area of price overlap between new and used cars....
>
> While every used car is not an acceptable alternative to the purchase of every new car, nevertheless, the competitive interaction between new and used cars is continuing and pervasive. This interaction is an important part of the business that has generally been ignored in "concentration" measures which purport to show a direct relationship between number of suppliers and competition. 5/

5/ General Motors Corporation, The Automobile Industry: A Case Study, p. 11.

While this view stresses the belief that behavior of firms in the industry is formulated primarily as a response to consumers' choice processes, it offers nothing in the way of empirical proof that buyers consider the new and used products viable alternatives. Such a conceptualization on the buyer's part is the keystone to the definition of competition offered by this study, and it is my contention that empirical evidence for its existence has not been forthcoming from past analytical work.

The question of the interface between the new and used car markets has been discussed by a number of analysts. The fact remains, however, that very little work has been directly concerned with the issue of competition between new and used cars. What little has been done has come rather indirectly from studies with different objectives. Consequently, we have a fairly limited body of knowledge about this question--especially knowledge which is anchored on an empirical base.

It is easiest to categorize past research on the question of competition between new and used cars into two separate areas. These may be titled economic studies and marketing studies. This separation is not intended to imply an independence between these areas; the marketing studies are, after all, a specific type of economic demand analysis. Instead, the categorization is based primarily on the differing objectives of the analysts involved.

In this Chapter, I include under economic studies those in which the dominant interest of the researchers is the prediction of the overall level of demand for automobiles, either for a given year or over

time. Marketing studies include those in which researchers have taken a more microanalytical view and have as their major objective the segmentation of the market or prediction of automobile purchases by individual spending units.

Economic studies

A number of very thorough analyses of demand for automobiles have been made by various researchers. While each analyst had a somewhat unique approach, it is possible to make generalizations about certain basic approaches which they employed.[6/] One avenue of investigation employed by Roos and von Szeliski,[7/] Chow,[8/] Suits,[9/] and Houthakker and Taylor,[10/] uses aggregative economic time series to

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6/ The discussion which follows is based primarily on the work of David S. Huang, A Microanalytic Model of Automobile Purchase, Research Monograph No. 29 (Austin, Texas: Bureau of Business Research, University of Texas, 1964), pp. 2-9.

7/ C.F. Roos and Victor von Szeliski, "Factors Governing Changes in Domestic Automobile Demand," in The Dynamics of Automobile Demand, papers compiled by General Motors Corporation, Detroit, Michigan, 1939, pp. 21-90.

8/ G.C. Chow, "Statistical Demand Functions for Automobiles and Their Use for Forecasting," in The Demand for Durable Goods, ed. by Arnold C. Harberger (Chicago: University of Chicago Press, 1960), pp. 148-78.

9/ Daniel B. Suits, "The Demand for New Automobiles in the United States 1926-56," Review of Economics and Statistics, XL No. 3 (August 1958), 273-80.

10/ Hendrick S. Houthakker and Lester D. Taylor, Consumer Demand in the United States (2nd ed.; Cambridge, Mass.: Harvard University Press, 1970).

predict aggregative stock demand for automobiles or demand for new purchases. Other studies, frequently referred to as population analyses, postulate that the long-run trend of automobile output may be studied via examination of the automobile population itself, especially of the structural parameters of stock growth rate and useful life.[11/]

It is not my intent to explore the predictive accuracy of the analytical approaches used in the studies referred to above. What is of interest is what they add to our understanding of the competition between new and used cars and, on this subject, they offer little. I do not mean to imply that because the great majority of these studies involve the estimation of demand for new cars, the used car market is not discussed. On the contrary--used cars are included in all these analyses. Donald Moore, in citing the study made of demand by Roos and von Szeliski in 1938, indicated that of 28 nonprice variables influencing the demand for new cars, 7 relate to the used car market. In his words, "the number, age, price, condition, maintenance cost, scrapping rate, and dealer evaluation of the used cars in existence will affect the number of new car sales possible at a given price."[12/]

11/ Hans Brems, "Long Run Automobile Demand," Journal of Marketing, XX, No. 4 (April 1956), 379-84.

12/ Donald A. Moore, "The Automobile Industry," in The Structure of American Industry, ed. by Walter Adams (rev. ed.; New York: MacMillan Co., 1954), p. 309.

One reason these studies do not meet our purposes is that they approach the used car market as if it were a facilitating market. That is, the used car market is viewed as an organized market which functions in a way that makes the new car market more viable. From this standpoint, used car prices are significant only to the extent that they relate to trade-ins on new car purchases; the purchase of a used car is treated as a short-run stock adjustment; and the possibility of continuing competitive interplay between new and used cars is not treated as a central point of discussion.

Another real difficulty with these studies, from this point of view, is that they do not adequately cover buyer behavior, particularly the consumer's choice process. David Huang, in commenting of studies which employed aggregative economic time series, made the observation that "while investigators in these studies were interested in consumer behavior, it would seem likely that the aggregation problem thwarted their efforts to learn much about it."[13/] Since our approach to the definition of competition is contingent on an examination of the consumer choice process on a microanalytical basis, this shortcoming proves very serious.

In some studies there are statements which come closer to recognizing new and used cars as competitive alternatives, but their

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13/ Huang, A Microanalytic Model of Automobile Purchase, p. 2.

logic is fairly general and indirect. A frequent point of reference in demand studies is the volatility of the new car market relative to general economic conditions. While some of this might well be the manifestation of buyers' ability to defer demand for a durable good, it may also imply that some buyers substitute used cars for new cars. In 1938 S. L. Horner stated this proposition as follows:

> Thus, when national income turns down dealers usually have too many used cars in stock which have to be liquidated. The public buys used cars on balance, and consequently sharply decreases its purchases of new cars. And when national income turns up after a prolonged decline, consumers start selling used cars on balance, thus obtaining additional purchasing power for new cars.14/

The 1968 statement by General Motors makes the same point.15/ It cites the type of data found in Figure 1, noting specifically the effect of an uncertain economic outlook in 1958 and 1961 on new car sales and the ratio of used to new car sales. Once again, the implication is that some buyers are substituting used cars for new cars in the purchase decision.

This substitution is also noted in other demand studies, most notably that of M. J. Farrell.16/ In a unique departure from other

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14/ S. L. Horner, "Statement of the Problem," in The Dynamics of Automobile Demand, p. 36.

15/ General Motors Corporation, The Automobile Industry: A Case Study, p. 11.

16/ M. J. Farrell, "The Demand for Motor-Cars in the United States," Journal of the Royal Statistical Society (Series A), CXVII (1954), 171-201.

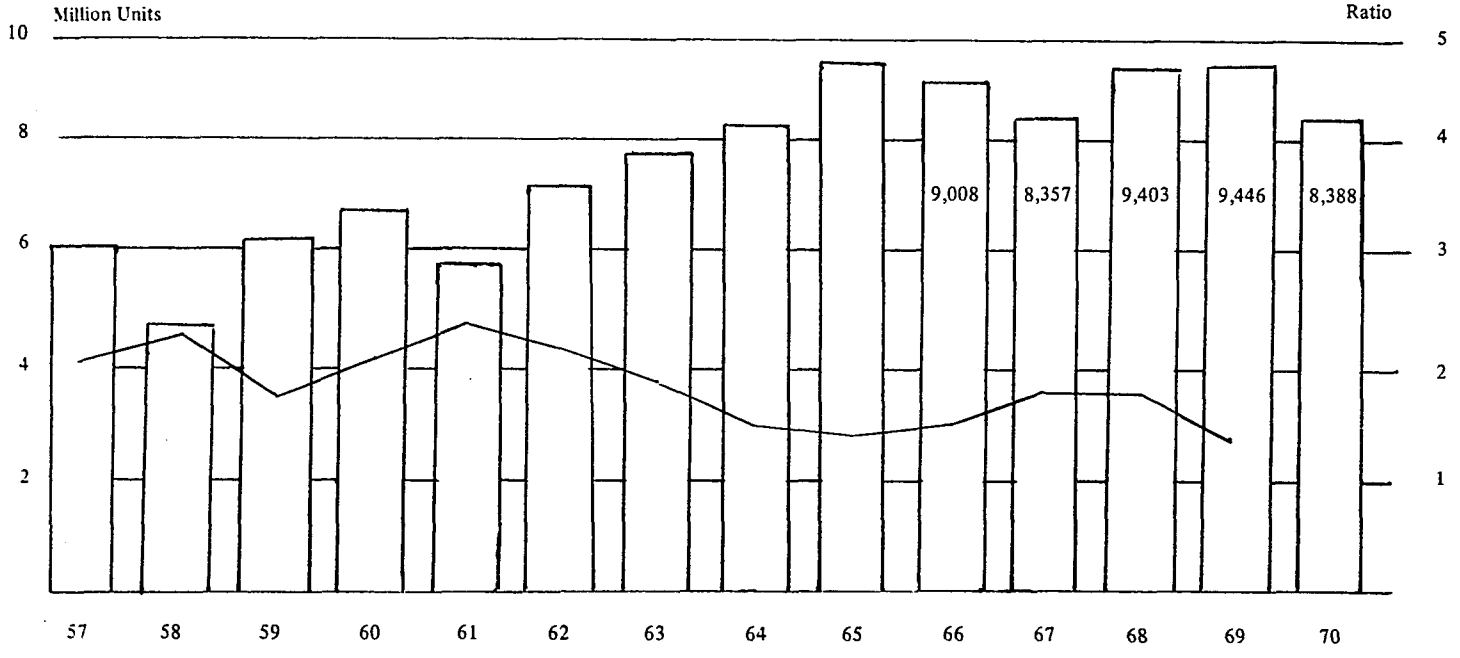


Fig. 1. Industry new car retail sales in the United States and ratio of used to new car sales, 1957-70. (Source: Automotive News 1971 Almanac and the University of Michigan Survey Research Center.)

demand analyses, Farrell stressed the fact that the market for automobiles is not homogeneous, but consists of a set of interrelated markets for a series of close substitutes. His submarkets are delineated by age groups of automobiles. In discussing the substitution of cars from different age groups in the market following World War II, he states:

> Fixing an unduly low price for new cars will also have the effect of forcing up the prices of used cars, for many people with quite low values of η will buy new cars, and the people they displace, having higher values of η will bid up the price of two-year-old cars above the equilibrium level, and so on.17/

The η which Farrell refers to is a continuous variable which is the product of an individual's income and a constant which represents his taste. That this taste factor is dynamic over time is recognized by Farrell in statements such as, "there was, in the immediate postwar period, a marked increase in the social acceptability of very old cars.... ."18/ Farrell also underscored the point that this taste factor included many elements such as family size, social class, and education.

Why are these contributions indirect and insufficient? Those studies which draw attention to the potential substitutability of used

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17/ Ibid., pp. 191-92.

18/ Ibid., p. 193.

cars for new under adverse economic conditions rarely discuss who these buyers are likely to be other than implying that they are in a group whose demand for new cars is highly income elastic. More importantly, in restricting substitution to periods of economic downturn, they ignore the possibility that there might be a significant number of buyers in this overlap group at all times and that disposable income is not the only major influential variable.

What I propose to do is elaborate on Farrell's η on a micro level. His conceptualization of the market is most useful. To some extent, this study is designed to investigate the effect of some of the components of the taste factor which he employs. Thus the study will involve a search for factors which might identify those individuals who sensitively consider the appeals of both new and used cars in their purchase decision. Additionally, this study will use cross-section analysis rather than Farrell's time series analysis.

Marketing studies

As noted previously, marketing studies are legitimately regarded as demand studies. They have been isolated here because they have objectives more limited than those of the economic studies referred to earlier and because they make more specific contributions to the issue of competition between new and used cars.

There have been a number of segmentation studies of the automobile market with a wide variety of goals. However, the common

thread which connects them to each other as well as differentiates them from aggregate demand studies is that their ultimate goal is to derive a conditional probability of purchase for specific economic units with certain well-defined characteristics.

Within this broad framework, we can see how many different types of studies are possible. While they all predict behavior, the nature and scope of the dependent and independent variables change considerably from study to study. De Janosi, in his doctoral dissertation, attempted to predict new car purchases using demographic , socioeconomic, and attitudinal variables.[19/] His results indicated that attitudinal variables have the strongest predictive power, the best variable for predicting actual purchase being the expressed intention of buying. Kreinen used socioeconomic variables such as liquid assets and income as well as attitudinal variables to attempt to define used car buyers.[20/] Peters, using demographic and socioeconomic variables, attempted to predict the behavior of economic units in terms of whether they would purchase no car, a used car, a compact car, an intermediate-

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19/ Peter E. de Janosi, "Factors Influencing the Demand for New Automobiles: A Cross Section Analysis" (unpublished Ph. D. dissertation, University of Michigan, 1956).

20/ Mordecai E. Kreinen, "Analysis of Used Car Purchases," Review of Economics and Statistics, XLI (November 1959), 419-25.

sized car, a medium-sized car, a large car, or a foreign economy car.[21/]

The type of segmentation study done by de Janosi, in which the ultimate segments are buyers or nonbuyers, perhaps has the closest relation to the economic studies referred to earlier. Again, the primary difference is that de Janosi offers a demand forecast for specific economic units rather than for the aggregate market. The type of segmentation study done by Peters is more commonly associated with this type of research. For this reason, I will rely on it heavily in my discussion.

The market segmentation which Peters refers to--that is, segmenting the market into groups of buyers of different product offerings--is considered highly significant in the automobile market. It may be used to explain the rationale of manufacturers' decisions regarding product policy. It may also be advanced as the logic underlying the ability of buyers to cope with the proliferation of makes and models on the market. When used as a guide to product policies, it allows manufacturers to assume that the heterogeneous market is composed of homogeneous subgroups. Each subgroup or segment is assumed to have a relatively distinct demand function in terms of the weights

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21/ William H. Peters, "Variation in Consumer Buying Behavior: An Analytical Study of Automobile Purchases," (unpublished Ph. D. dissertation, University of Michigan, 1968).

it assigns to product attributes, such functions being determined by a combination of factors relating to the characteristics of buyers and other circumstances such as income, age, attitudes, need for information, number of cars owned, and so on.

Using this logic to attempt to explain buyer choice behavior is also fairly straightforward. Given that an individual has assigned certain weights to product attributes when he begins the purchase process, he is frequently able to rule out entire classes of automobiles from consideration very early in the decision process. This exclusion may result from his experience, his image of the product, or some combination of such factors. In any event, rather than being faced with a choice among new and used cars covering the total array of makes and models, the buyer is able to isolate a relatively small number of cars on which he gathers information and from which he makes his final choice. This coping behavior can be considered highly rational in light of the efficient matching of purchase behavior with the buyer's demand function and the decrease in search time and activity which it entails.[22/]

Such logic was illustrated and questioned in the paper by Root and Sylvester.[23/] In that work, the discussion was directed at the

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22/ For a more theoretical discussion of such behavior, see John A. Howard and Jagdish N. Sheth, The Theory of Buyer Behavior (New York: John Wiley and Sons, Inc., 1969), pp. 24-28.

23/ Root and Sylvester, "Competition and Consumer Alternatives," pp. 7-13.

question of whether buyers, in fact, limit their alternatives to a single class of new cars in making a decision to purchase a new car. Reference was made to General Motors data which indicated that this relatively simplistic view of buyer choice was not the case.[24/] Specific criticism was directed at two major faults of existing buyer surveys which were used to attempt to answer this question. First, the product classes employed in survey analyses were not always consistent over various studies or well defined in terms of specific product attributes. Second, the concept of buyers' consideration was not adequately defined in these surveys in terms of whether it was in internal activity only or also involved overt action. It was concluded that new data would be required in order to test the extent of competition between new cars in different product classes. We must also argue the same point in considering competition between new and used cars. First, however, I will examine some of the results of segmentation studies in order to show the need for and nature of the new empirical data required.

Peters, among others, concludes that it is impossible to attain a high level of predictive accuracy in assigning conditional probabilities which indicate that individual economic units will purchase one new product class as opposed to others.[25/] This failure is not greatly

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24/ Ibid., pp. 8-9.

25/ Peters, "Variation in Consumer Buying Behavior," pp. 164-65.

relevant here. One attempt to explain it has centered on criticizing the use of individual rather than group data.[26] In other cases, the inability to predict behavior can always be blamed on the possibility that the wrong independent variables were used as predictors.[27] In other words, the fact that membership in segments is not predicted, although unfortunate from the point of view of marketing strategy, does not prove that the segments are not there. It may mean that we need new concepts of segmentation, since the present concept may be too simplistic for purposes of studying buyer behavior. The current concept of segmentation may be helpful for purposes of studying manufacturer behavior, since many manufacturers' policies as well as the work of some market analysts seem predicated on the existence of sharply delineated market subgroups. In spite of difficulties encountered in empirical studies, the remarks of Purnell Benson in 1963 still convey the thoughts of a great number of practitioners and analysts:

> Automobile companies have long recognized that the cars and models which they manufacture serve distinctive segments of the market. This product differentiation in the

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26/ Frank M. Bass, Douglas J. Tigert, and Ronald T. Lonsdale, "Market Segmentation: Group Versus Individual Behavior," Journal of Marketing Research, V (August 1968), 264-70.

27/ For a discussion of the relative levels of success in using various predictors, see Ronald E. Frank, "Market Segmentation Research: Findings and Implications," in Applications of the Sciences in Marketing Management, ed. by Frank Bass, Charles King, and Edgar Pessemier (New York: John Wiley and Sons, Inc., 1968), pp. 39-68.

> automobile industry has been on the basis of income levels necessary to purchase more powerful cars and upon the basis of usage....[28]

The two exceptions to the general inability of segmentation studies to achieve predictive accuracy have been cited by analysis such as Peters. He states:

> The two exceptions to the above answer are the used-car market and the no-car families. In both time periods the variables taken singly allow one to do a very fine job of distinguishing the no-car families from those who own automobiles. They do not do as complete a job with the used-car market but they do a good job of segmenting off this market in both time periods. [Emphasis added.][29]

In the same vein, Akers has found that income, education, and age are statistically significant predictor variables in differentiating buyers of new cars from buyers of used cars.[30]

De Janosi uses market experience as the overall, critical explanatory factor behind this phenomenon. In his view, buyers new to the market tend to purchase older used cars. They progress to newer

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28/ Purnell Benson, "Psychometric Procedures in the Analysis of Market Segmentation," Proceedings of the Forty-Sixth Annual Conference of the American Marketing Association (Chicago: American Marketing Association, June 1963), p. 63.

29/ Peters, "Variations in Consumer Buying Behavior," p. 165.

30/ Fred C. Akers, "Negro and White Automobile-Buying Behavior: New Evidence," Journal of Marketing Research, V (August 1968), 283-90.

used cars until, in their third or fourth purchase experience, they become part of the new car purchaser group.[31] Whether this implies that they have learned the reduced risks of buying a new car, that their financial position has improved, that they have experienced a change in life cycle, or some combination of factors, is not discussed in his work. His view is, however, generally consistent with the view shared by most analysts that car ownership status has a positive effect on new car purchases.[32]

This latter point has been discussed by Huang under the general heading of a "taste effect." In his words:

> How the taste affects the automobile purchase may be said to work roughly in the following way. An owner of a recent model car which was bought new may not look at the used-car market at all. His taste may be such that he prefers to trade only in the new-car market and frequently does so. However, there may be persons who do not wish to buy new cars even though they can afford them. Instead, they prefer to buy good used cars, possibly cars two or three years old, and they buy infrequently. It is possible, then, that the ownership of a car purchased new may be correlated with the purchase of a new car, and the ownership of a car purchased used may be correlated with the purchase of a used car. These aspects of person-to-person differences may be regarded as due to the differences in taste.[33]

31/ De Janosi, "Factors Influencing the Demand For New Automobiles," p. 25.

32/ Huang, A Microanalytic Model of Automobile Purchase, p. 9.

33/ Ibid., p. 46.

It is my belief that the results reported by Peters and Akers and the interpretations offered by de Janosi and Huang are not particularly germane to the discussion of the extent of competition between new and used cars when such competition is defined on the basis of buyers' perceptions and considerations. If the marketing studies definitively showed that a high conditional probability that a buyer would purchase either a new or used car accurately categorized buyers into groups considering only new or only used cars, then a lack of direct competition between the two products could be conceded. However, since the studies deal only with the ultimate choice made by a buyer rather than the totality of the behavior leading to that choice, these studies are not acceptable as indicative of a lack of competition as we have defined it.

The Need for Data

Obviously an individual, if he buys an automobile at all, will buy either a new or a used car. This ultimate choice is, however, only one facet of the total purchase decision process--that facet which represents the culmination or result of the buyer's search process, information seeking, trade-offs, and so on. Ultimate buyer choice is the dependent variable on which previous segmentation studies have been based. But this study, in attempting to measure the competition between new and used cars, seeks to determine the buyer's conceptualization of these two products during the purchase

decision process. Such an approach to segmentation is thus more consistent with the ideas presented by Dommermuth when he argues for a method of market delineation based on differences in buyers' search activities.[34/] Specifically, we are heeding the advice of George Brown, who states that "for the future, research on decision-making with respect to automobile purchasing should be directed toward the decision process rather than toward the outcome of the process."[35/]

The important market segments, then, are not groups of spending units with a specific conditional probability of purchasing a given type of product, but are rather groups of spending units which exhibit a particular pattern in considering product alternatives in the purchase decision. The most important question is whether or not a market segment of buyers exists who consider new and used cars as alternatives in the decision to purchase an automobile.

34/ William P. Dommermuth, "The Shopping Matrix and Marketing Strategy," Journal of Marketing Research, II (May 1965), 128-32.

35/ George H. Brown, "The Automobile Buying Decision within the Family," in Household Decision Making, Consumer Behavior, Vol. IV, ed. by Nelson Foote (New York: New York University Press, 1961), p. 198.

Questions included in the 1970 Survey of Consumer Finances[36/] were a first attempt in this study to explore the issue of competition between new and used cars defined in this manner. These questions concerned the alternatives considered by recent automobile purchasers (both new and used) and the alternatives to be considered by those who expected to purchase in the next twelve months (both new and used). Some of the data returned are presented in Tables 1 and 2, where spending units are categorized by income.

Table 1 indicates that approximately 20 per cent of recent buyers (105 of 513) looked at both new and used cars in their most recent purchase. Table 2 indicates that approximately 28 per cent of those who expected to buy (70 of 245) in the next twelve months would consider both new and used cars in their purchase decision. It can be noted that in each case the largest proportion of those considering both kinds of cars occurred in income classes in the $10,000-14,999 range.

36/ 1970 Survey of Consumer Finances (Ann Arbor, Michigan: Institute for Social Research, University of Michigan, 1970). The questions asked were:

(If car was bought new) "Did you also look at or shop for a late model used car as an alternative to the car you bought?"

(If car was bought used) "Did you also look at or shop for a new car as an alternative to the car you bought?"

(If intend to buy new) "Do you plan to also consider used cars before you buy?"

(If intend to buy used) "Do you plan to also consider new cars before you buy?"

These questions were placed on the Survey questionnaire as part of a research project by the Bureau of Business Research, The University of Michigan.

TABLE 1

Number of Recent Purchasers (by Income Class) Who Have Considered Various Alternatives in Buying a Car within the Last 12 Months

Alternatives	Total Family Income								
	Less than $3,000*	$3,000-4,999	$5,000-7,499	$7,500-9,999	$10,000 14,999	$15,000-19,999	$20,000 24,999	$25,000 or more	Totals
Bought new, only looked at new	1 (0.5)**	6 (3.3)	16 (8.7)	22 (12.0)	67 (36.6)	40 (21.9)	16 (8.7)	15 (8.2)	183 (100.0)
Bought used, only looked at used	14 (6.2)	23 (10.2)	50 (22.2)	40 (17.8)	49 (21.8)	36 (16.0)	5 (2.2)	8 (3.6)	225 (100.0)
Bought new, looked at used	1 (2.9)	2 (5.7)	2 (5.7)	4 (11.4)	16 (45.7)	6 (17.1)	3 (8.6)	1 (2.9)	35 (100.0)
Bought used, looked at new	7 (10.0)	3 (4.3)	11 (15.7)	9 (12.9)	20 (28.6)	14 (20.0)	3 (4.3)	3 (4.3)	70 (100.0)
Totals	23	34	79	75	152	96	27	27	513

* Including zero and negative.

** Numbers in parentheses represent the percentage of cases falling in each income category.

Source: 1970 Survey of Consumer Finances (Ann Arbor, Mich.: Institute for Social Research, University of Michigan).

TABLE 2

Number of Purchasers (by Income Class) Who are Expected to Consider Various Alternatives in Buying a Car within the Next 12 Months

Alternatives	Total Family Income								
	Less than $3,000*	$3,000-4,999	$5,000-7,499	$7,500-9,999	$10,000-14,999	$15,000-19,999	$20,000-24,999	$25,000 or more	Totals
Expected to consider new only	0	3	15	17	29	19	4	7	94
Expected to consider used only	8	11	13	15	15	15	1	3	81
Expected to consider both new and used	3	3	9	13	20	13	5	4	70
Totals	11	17	37	45	64	47	10	14	245

* Including zero and negative.

Source: 1970 Survey of Consumer Finances (Ann Arbor, Mich.: Institute for Social Research, University of Michigan).

These tables are presented primarily for illustrative purposes. Data such as these were collected in order to ascertain whether a behavioral market segment such as I have described is large enough to warrant further investigation. The data were not meant to provide the basis for subsequent analysis. To begin with, the concept of buyers' considerations was not adequately defined in the survey. Moreover, other necessary and pertinent information was not collected in the survey. Finally, since the survey sample included a large number of non-buyers, the ultimate size of some data cells is too small for detailed analysis. Thus, while this preliminary examination provides an impetus to our study, a more purposeful collection of data is still necessary.

Implications of the Study

A relevant question which can be raised here concerns the reasons why such a segment--one made up of individuals who view new and used cars as viable alternatives--would exist in the market. At this point, we are only able to offer educated guesses on this subject. It is possible that individuals in this group represent a critical factor in the body of opinion about manufacturers' style changes. Rather than accepting new styles as inherently important (as the buyer who considers only new cars might) or rejecting them as patently superficial (as the buyer who

considers only used cars might), perhaps this group takes a much more balanced view of style and performance.[37/]

In this same vein, a number of variables might be good predictors of membership in this market segment and also offer insights into the rationale of such buyer behavior. Perhaps economic constraints are of major importance. This was implied by the data in Figure 1, where changes in the general economic climate appeared to be associated with changes in the ratio of used car to new car sales. The concept of economic constraints really may be used to generate a host of specific predictor variables such as family income, the availability and use of credit for the automobile purchase, the existence of a car to be traded-in or sold, and so on.

Stage in the family life cycle could also be important when we consider that it includes demographic variables such as age of the head of household and number of children in the economic unit. Experience in purchasing automobiles, the idea suggested by de Janosi's continuum of buyer behavior, might be a critical factor. In the context of the economic demand studies cited earlier, perhaps

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37/ For a discussion of the possible effect of style consciousness on buyer choice behavior see Frederick Wiseman, "A Segmentation Analysis on Automobile Buyers During the New Model Year Transition Period," Journal of Marketing, XXXV (April 1971), 42-49.

buyers in this segment are in some "gray area" where the existing stock of automobiles may be raised to optimal by purchasing either a new or used car. This segment might also be delineated on the basis of whether the economic units are multiple car owners or not, the phenomenon of multiple car ownership becoming much more prevalent in todays market.

While we can only conjecture about the logic behind the existence of this market segment, we are on firmer ground in discussing the implications which its existence has for the automobile industry. To the extent that there is such a segment, there is support for manufacturers' contentions that concentration ratios do not adequately measure competition in the market. In providing an alternative to the buyer, the used car market would put pressure on manufacturers to style and price their new cars with careful attention to buyers' wants and needs. This would again help to establish the manufacturers' contention that the market is controlling rather than controlled.

The results of the study could have strategy implications for manufacturers and dealers and could also facilitate the social evaluation of strategies pursued by manufacturers. If buyers in this segment exhibited strong loyalty to certain makes and appeared to move through this buying phase on their way to

becoming "new car only" purchasers, perhaps manufacturers should become more interested in promoting sales of their used cars as a means of expanding future markets rather than promoting used cars merely to facilitate present sales. If these buyers are less oriented to style than buyers who consider only new cars, perhaps a manufacturer can compete more effectively by using a different promotion strategy for this group. Dealers might be able to compete more effectively by integrating their new and used operations to a greater extent, and thus better match buyers' concepts of alternatives. This latter point is a good illustration of the "performance" orientation of this view of competition.

Finally, there is a possibility that segmentation research of this nature can make a significant contribution to increasing the predictive power of independent variables in segmentation research which uses the ultimate buyer choice as the dependent variable. If, in fact, there is a sizeable group of buyers who seriously consider both new and used cars in the purchase decision, their presence in a sample of purchasers could product enough "noise" in the data to reduce the predictive power of independent variables in delineating new versus used car buyers. Thus, research of the type set forth here might well lead to the suggestion

that such a group should be dropped from a sample being used to predict market segment membership in terms of ultimate buyer choice.

CHAPTER II

THE HYPOTHESES TO BE TESTED AND THE VARIABLES EMPLOYED

This study is designed to test for the existence and size of a market segment of automobile buyers, such a segment being characterized by a specific type of buying behavior. It is also designed to investigate whether membership in this segment can be predicted on the basis of several independent variables. Finally, it attempts to discover whether membership in such a segment may be associated with other behavioral characteristics of buyers. In this context, stages of the study may be stated in the form of hypotheses as follow:

1. There exists a group of car buyers (i.e., a market segment) who consider both new and used cars in the automobile purchase decision.

2. Certain socioeconomic, demographic, usage, and ownership variables can be employed to successfully predict membership in this segment.

3. Buyers in this market segment consider a wider variety of makes, models, and

product classes than buyers who consider only new or only used cars in a single purchase decision.

4. Buyers in this market segment exhibit less make loyalty over multiple purchases (over time) than buyers who consider only new or only used cars.

These are the general and major hypotheses. We could recast them in terms of the objectives associated with each, that is:

Hypothesis 1: Measurement of segment size
Hypothesis 2: Prediction of membership in the segment
Hypothesis 3: Investigation of the breadth of alternatives considered
Hypothesis 4: Investigation of make loyalty

A discussion of the techniques used to test the hypotheses will be found in each of the specific chapters in which they are investigated. In addition, a further breakdown of these hypotheses into more specific elements is found in a discussion of dependent and independent variables.

Dependent Variables

The categorization of a variable as dependent or independent is, to some extent, dictated by which of the hypotheses we are dealing with. The first hypothesis concerns a problem of estimation. It represents the critical first step in testing the other hypotheses, since we must first ascertain whether or not we have a market segment which can be

subjected to further analysis. In this estimation problem, there are technically no dependent or independent variables involved.

In the case of the second hypothesis, the dependent variable is membership in the segment which considers both new and used cars in the purchase decision. In the last two cases, this membership becomes an independent variable used to predict other behavioral characteristics of these buyers, such characteristics (e.g., degree of make loyalty) now becoming the dependent variables.

Regardless of its classification, the variable of segment membership is fundamental to all phases of the study. For this reason, it is essential that it be carefully defined at the start via an explicit discussion of the problems associated with it. These problems are primarily those of definition, and will be resolved as follows:

Used car. While a definition appears obvious at first glance, more careful thought indicates that the definition of "used car" may well be a function of buyer perception and preference. There are a number of cases in which cars with no recorded mileage are left unsold over one, two, or more model years. In other cases, most notably those of dealer demonstration models, cars with relatively little mileage are sold at a discount by new car dealers. In both these situations, there is a legitimate question as to whether these automobiles should be classified as new or used. In the first situation, a buyer most concerned with mechanical performance might unhesitatingly

call a prior years model with zero mileage new; a style conscious buyer might classify it as used. In the second situation, the simple fact that the car has been driven by others prior to its purchase might lead to its classification as used.

Frederick Wiseman recently published the results of a segmentation study in which he investigated the behavior of buyers during the new model year transition period.[38/] His objective was to see if buyers could be segmented on the basis of their purchase of what he termed "new season cars" versus "new leftover cars." In his work, then, cars of prior model years with zero mileage were classified as new. In this study, cars with zero mileage will also be classified as new. In the case of demonstrator cars, buyers' perceptions of the car as new or used will be employed as the guideline for classification.

Consideration. Throughout the study, buyer consideration of alternatives is used as a means of measuring competition and as a behavioral basis for market segmentation. Obviously, all the findings of the research are contingent on establishing a meaningful definition of what "consideration" is.

It is possible to define consideration as an internal process. If we followed this approach, any individual who indicated that he thought of both new and used cars at any point in the purchase decision

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38/ Ibid.

process would qualify for inclusion in the market segment which we are attempting to measure. Such an approach might have two serious drawbacks:

1. In the author's opinion, it could tend to overstate the size of this market segment to the extent that its delineation would no longer be particularly useful for analytical or strategic purposes. Since the used car and new car markets are established, on-going markets, it seems likely that almost every buyer is at least aware of their existence. Such awareness may well be translated into the thought, however brief, that either market could be entered to satisfy the need for an automobile. Such a thought would not, however, be entirely consistent with the more dynamic definition of competition employed in this study in which a buyer's perception of alternatives is the critical factor. For the competition so defined to be meaningful, a buyer's perception should be that of seriously viewing a product as a viable alternative, not just recognizing its existence.

2. If we allowed an internal process as the operational definition of consideration, the risk of incorrect or biased respondent recall is increased. It seems safer to ask a respondent to remember whether or not some overt action took place than to inquire into a previous state of mind. Also, it would appear that the potential bias caused by suggesting consideration of used cars or new cars to the respondent would be greater if such consideration were defined as only an internal process.

These points run parallel to the reasoning of some other analysts of buyer behavior, and a summary of these arguments can be found in the work of George Katona and Eva Mueller involving a definition of buyer deliberation:

> Can deliberation be defined so that it is measurable? In a sense, deliberation is a reflective process. When we attempt to assess the quality or quantity of these reflections, we are concerned with a private experience. The question is: Is it possible to obtain from recent buyers a valid account of their own deliberation process? We believe that people are able to report whether or not they hesitated before they bought, whether or not they considered alternatives to the final choice, or how long they planned. We believe further that deliberation is more than just mulling it over. A deliberate buyer seeks information in stores, from printed matter, or from his friends. The chances are that he will discuss the purchase with his family. He investigates the price of the product, trying to get the best buy for his money. He has some knowledge of the attributes of the different types of goods that are being offered. Such activities as discussing the purchase or

> seeking information are not merely outward manifestations of deliberation. They are an integral part of it; for, without them, the reflective process would lack its essential raw materials. From the point of view of the investigator these activities are important because their presence or absence can be more easily ascertained than reflections. [Emphasis added.]39/

As noted, this author subscribes to the view that a definition of "consideration" which is based on overt buyer search behavior leads to a more operationally and analytically useful measurement of the market segment under examination. It should also be recognized, however, that there is much to be gained in obtaining an estimate of segment size based on respondents' perceptions.

One reason why such a measurement would be useful is that it would allow inclusion in the segment of those very experienced or knowledgeable buyers who have internalized the consideration process through extensive retention of information. While there is evidence to support the contention that even very experienced buyers engage in overt acts of information search when purchasing an automobile,40/

39/ George Katona and Eva Mueller, "A Study of Purchase Decisions," in Consumer Behavior: The Dynamics of Consumer Reaction, ed. by Lincoln H. Clark (New York: New York University Press, 1954), pp. 37-38.

40/ Peter D. Bennett and Robert M. Mandell, "Prepurchase Information Seeking Behavior of New Car Purchasers--The Learning Hypothesis," Journal of Marketing Research, VI (November 1969), 430-33.

the possibility remains that some of these individuals would be excluded if the more stringent definition of consideration was the only one employed.

A second reason why a broader concept of consideration would be useful lies in the strategic implications of the study. If, in comparing the measurements of segment size under varying definitions, it is ascertained that a substantial number of individuals claim to consider new and used cars without going through the manifestations of search behavior, this would raise questions as to the measurement of the effectiveness of various elements of manufacturers' and dealers' promotion mixes.

Finally, in taking various measures of the size of this market segment differentiated on the basis of the definition of "consideration" used, we have the opportunity to identify and analyze those individuals who consider but do not search in an effort to distinguish them from others. Here, an indirect contribution to testing elements of learning theory is possible.[41/]

What has been discussed in the preceding paragraphs is really an application of sensitivity analysis in which we are attempting to uncover the sensitivity of our measurement of segment size to changing definitions of "consideration." Such analysis can be carried further in light of the fact that different forms of overt behavior are possible,

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41/ For an example of the potential for such a contribution, see Ibid.

with some forms perhaps indicating a greater depth of buyer consideration than others. In this study, every attempt will be made to thoroughly investigate the impact of changing the behavioral criteria on the measurement of the segment size. As a basic framework in which to employ this sensitivity analysis, respondents will be asked to stipulate whether or not they considered both new and used cars and what steps they took in this consideration. After allowing the respondent to use unaided recall in describing these steps, he will be asked whether or not the following specific actions were undertaken:

a) Discussion with family
b) Discussion with friends
c) Dealer visits (or visits to private individuals)
d) Test drive
e) Price negotiation with sellers
f) Looking at advertising (in the used car case)

To provide further information on the strength of commitment to the two products as alternatives, respondents will be asked to indicate the general process and timing in which the range of product alternatives was narrowed.

Combining all the elements of this approach, one objective of the study is to yield firm results in terms of alternative measurements of segment size. It will then be possible to be completely clear when referring to this market segment in subsequent analysis. It is also anticipated that explicit recognition of varying definitional criteria will allow for specific replication of the study in the future, perhaps under different economic conditions or in specific geographic locations.

Hypotheses 3 and 4 treat membership in the market segment which considers new and used cars as the independent variable and other behavioral characteristics of the buyers as dependent variables. These dependent variables are:

1. Number of models considered
2. Number of makes considered
3. Number of product classes considered
4. Make loyalty

In this study, the following definitions will be used:

Make. Make refers to the trade name of the manufacturer or the manufacturer's operating operating division. For example, General Motors Corporation produces five makes, namely Chevrolet, Buick, Cadillac, Oldsmobile, and Pontiac. For a complete listing of makes, see Appendix A.

Model. Model refers to subclassifications within a make, generally the second "nameplate" on an automobile. As an example of how the term is used in this study, the Ford Division of the Ford Motor Co. has seven models: Ford/Galaxie/Custom/LTD; Fairlane/Torino; Falcon/Futura; Mustang/Grande/Boss; Thunderbird; Maverick; and Pinto. For a complete listing of all models employed in this study, see Appendix A.

Product class. The difficulties inherent in using product classes in this type of analysis were raised in the paper by Root and Sylvester.[42/]

42/ Root and Sylvester, "Competition and Consumer Alternatives," pp. 9-12.

In that discussion, the two major problems recognized were those of inconsistencies over various existing buyer surveys and the lack of a clear cut statement of the relevant product dimensions used in product classification. For purposes of this analysis, the former problem is not relevant, since original data will be collected. The latter problem is also minimized by the fact that we are primarily interested in comparing the behavioral characteristics of different market segments. Thus, while we recognize the fact that the underlying dimensions of product classifications remain somewhat blurred and thus may tend to make some aspects of analysis more difficult, the use of fairly standard categories such as compact, intermediate, etc. will suffice. For a complete listing of product classes employed in this study, see Appendix B.

Hypothesis 4 has make loyalty as the dependent variable. Although simplistic in approach, loyalty will be measured as a similarity in choice of make over the two most recent purchases. Such a procedure obviously raises questions as to the strength of such loyalty. However, it is used for ease of measurement and interpretation, as well as to avoid problems of insufficient size of data cells. Also, there is precedent in many buyer surveys to use such a measure.[43/]

43/ For example, see The Pittsburgh Press and Pittsburgh Post-Gazette, A Study of Automobile Purchases, (1968: No publication information given.) and Newsweek, 1967 Census of New Car Buyers (No publication information given.).

Independent Variables

Hypothesis 2 holds that certain socioeconomic, demographic, usage, and ownership variables can be employed as independent or predictor variables in delineating the market segment of individuals who consider both new and used cars in the purchase decision. While the potential number of such variables is large, a more restricted set will be employed in this study. In some cases, variables are included in order to test hypotheses specifically generated by other analysts. In other cases, they are the more "standard" variables found in previous segmentation studies. Finally, there are cases where the variables employed are relatively unique to this study. Under this latter circumstance, the study takes on more of the characteristics of exploratory research.

The independent variables used, along with the rationale for their inclusion, are as follow:

1. Income. The argument here is that higher income families are less financially constrained in their choice and thus will not consider used cars at all, while lower income units will consider used cars exclusively. This implies that those who consider both are in an intermediate income range.

2. Relative position of the spending unit within its income class. In his work on social classes, Richard Coleman introduced the concept of splitting a social class into its "overprivileged," "underprivileged," and "average" components based on relative income within such a class.[44/] William Peters adapted this concept in his segmentation study, using the relationship between a family's income and the median income of other families in the same occupational class. His results indicated that such a relative income measure did play a role in predicting ownership of various automobile classes.[45/] In this study we will use a simpler categorization, with the placement of a respondent in an overprivileged, underprivileged, or average classification based on his perception of his income relative to others in that income class. The hypothesis here is that "overprivileged" members of income classes consider only new cars.

44/ Richard P. Coleman, "The Significance of Social Stratification in Selling," in Marketing: A Maturing Discipline, ed. by Martin L. Bell (Chicago: American Marketing Association, 1961), pp. 171-84.

45/ Peters, "Variation in Consumer Buying Behavior," pp. 55-74.

3. Occupation of the head-of-household. Occupations can be scaled as to relative prestige.[46/] Do certain occupational groups have a greater need for status consistency represented by consideration of only new cars?

4. Age of respondent. It is possible that age reflects financial and experiential constraints. The hypothesis here is that younger people consider used cars only.

5. Education of head. Does increasing education lead people to consider only new cars?

6. Sex of respondent. It is possible that female buyers avoid consideration of used cars because of lesser familiarity with the technical evaluation of automobiles.

7. Number of adults in the economic unit. This variable may well be related to multiple car ownership. In its own right, it speaks to the question of differing needs and utilities of different households.

46/ James F. Engel, David T. Kollat, and Roger D. Blackwell, Consumer Behavior (New York: Holt, Rinehart and Winston, Inc., 1968), pp. 268-80.

8. Number of children under 18. Do families with children at home have different automobile needs than those who don't? Do these families view automobile purchases differently in terms of the new/used alternative?

9. Number of drivers in the family unit. This variable may be related to multiple car ownership. In addition, it speaks to the possibility of multiple purchase influences in the decision process and their impact on the number of alternatives considered.

10. Who normally drives this car. If the car was bought for primary use by a family member with certain needs and use characteristics, this might explain the choice of cars considered.

11. Primary usage of this car. Specific usage patterns, reflecting different needs and utilities, might explain differences in the alternatives considered.

12. Household trading cycle. The trading cycle could be a proxy variable for the feelings of buyers toward style changes. Does a buyer who purchases every one or two years consider only new cars? Does a longer purchase cycle broaden the number of alternatives considered?

13. Number of times previously in the automobile market (new and used). This variable is suggested by de Janosi's view of a continuum of buyer experience.[47/] The specific hypothesis is that buyers who consider both new and used cars are in an intermediate stage of market experience.

14. Number of automobiles owned in the household. Do those households shopping for a second or third (or more) car consider both new and used to a greater extent than single car households?

15. Average yearly mileage anticipated. Do buyers who intend to use their automobiles more heavily consider only new cars in the purchase decision?

47/ de Janosi, "Factors Influencing the Demand for New Automobiles," p. 25.

16. Month in which the purchase was made. There is a strong possibility that buyers can be differentiated on the basis of the timing of their purchase.[48/] Some market analysts have suggested that buyers in different time periods are differentiated on a number of factors. For example, the timing of the purchase may be a partial proxy variable for the importance of styling changes to the buyer. In a study of this type, there is a problem with the fact that the month of purchase represents only the timing of the culmination of the decision process; consideration may have taken place for an extensive period before this. Nevertheless, this variable seems acceptable from the point of view of exploratory research.

17. Disposal made on the purchase of this car. The availability of a car to be traded-in or sold may be related to buyers' market experience. More directly, it affects the level of the total cash outlay to be incurred in the purchase. The hypothesis regarding this latter point is that individuals who have a car to trade-in or sell will consider only new cars in the purchase decision.

48/ While this question is not generally discussed in the literature, it is raised by Wiseman (see Note 37).

18. Part or all of the purchase price borrowed or financed. This again relates to the dollar resources available to buyers in financing their purchase.

19. Existence of instalment debt payments. The hypothesis here is that people who are making payments on major durables are more inclined to consider used cars in the purchase decision.

In addition to the preceding variables, two attitudinal measures will be employed. These are:

20. Outlook on the financial situation of the economic unit. This variable speaks to the perceived ability of the spending unit to incur major outlays and also to the willingness to make such expenditures. The hypothesis is that more optimistic respondents considered only new cars in their most recent purchase.

21. Attitude toward the importance of styling and appearance in purchasing automobiles. It is expected that individuals who are highly sensitive to the styling and appearance attributes of the product would be inclined to consider only new cars. An attempt will be made to measure the relative importance of styling and appearance

via an index based on respondent reaction to a series of statements. While the resulting measure may be only a relatively crude indicator, it is hoped that it will be useful in differentiating buyers.

As noted, other independent variables could be included. However, it is the author's belief that if the market can be successfully segmented at all on the basis of differences in buyers' consideration of alternatives, some of the variables listed above should point in this direction. Another advantage in employing these variables is that in most cases, they are fairly easily determined. In this sense, they are superior for purposes of implementing a marketing strategy based on the existence of different market segments because members of such segments could be readily identified.

CHAPTER III

THE RESEARCH METHODOLOGY

The Sample

The data used in this study were collected from a sample of 401 households in which an automobile had been recently purchased. Recency was defined as the 13 month period preceding the interview, thus limiting the sample to households in which a purchase had been made at a point in time between November, 1970 through November, 1971.[49/] This limitation was imposed in order to avoid the problems of seasonal bias and inadequate recall by respondents.

While it would have been desirable to use a national probability sample, cost constraints ruled out such an approach. In light of these constraints, it was decided to restrict the survey to households located in selected metropolitan areas. Within this context, however, two fundamentally different sampling schemes were evaluated.

One approach to sampling which was considered involved the acquisition of lists of purchasers from the R.L. Polk Co. Within this

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49/ The question asked was: "Have you or any member of your household purchased a car within the past 12 months?"

framework, it was possible to stipulate the relevant purchase period (i.e., the previous thirteen months) and, within each geographic area chosen, draw the names of known purchasers from registration lists. Interviewers would then be dispatched to conduct the interviews with the sample of purchasers thus selected.

While this approach has many merits, a number of disadvantages led to its rejection. To begin with, it is costly. Every additional stipulation in terms of specification of geographic area and relevant purchase period increases costs, especially in view of the small sample required. It was also anticipated that traveling costs of interviewers would be quite high using this approach.

A more serious problem in the use of the Polk lists lies in the relative weakness of the data on used car purchasers relative to new car purchasers. It is obvious that the objectives of the study call for detailed data from both new and used car purchasers. Polk lists are generally registrations of new cars. While the company has recently begun keeping used car lists, such lists are not nearly as complete as the new car data.[50/] They are of varying quality in different geographic areas in terms of completeness. In no case do the lists on used car purchases cover more than the previous six months in time.

50/ This discussion is based on telephone conversations with representatives of the R. L. Polk Co.

The alternative sampling technique considered, and the one ultimately employed, is fundamentally a "cold canvass" approach. In this approach, interviewers did not start with a specified list of buyers. Instead, contacts were made on a door to door basis. A screening question was employed in order to identify households which fit the purchase criteria called for by the study (see footnote 49). The essential details of this sampling scheme are presented below.

Fifteen metropolitan areas were selected by virtue of their geographic spread. These fifteen areas, along with their relative contribution to the total sample, are found in Table 3.

Within each of these cities, seven geographically distributed starting points were selected, none of which were in ghetto areas. In order to obtain the seven final starting points, each metropolitan area was gridded off into squares. The total number of grid squares in each metropolitan area was divided by fifteen and rounded to the nearest whole number. This resulting number represented the "skip factor."

A random number between one and ten was selected. This was the number of the square used to select the first starting point. The "skip factor" was added to this number in order to obtain the square number of the second starting point, added again to give the square number of the third starting point, and so on until there were fifteen square numbers. Each of these fifteen squares was divided further into a number of smaller squares, with random numbers being used

TABLE 3

Sample Composition By Metropolitan Area

	Number	Percentage of total sample (rounded)
Atlanta, Georgia	33	8.2
Cincinnati, Ohio	28	6.9
Cleveland, Ohio	36	8.9
Denver, Colorado	31	7.7
Houston, Texas	15	3.7
Los Angeles, California	19	4.7
Miami, Florida	30	7.5
New Orleans, Louisiana	18	4.5
Omaha, Nebraska	19	4.7
Philadelphia, Pennsylvania	18	4.5
Phoenix, Arizona	30	7.5
Portland, Maine	35	8.7
Rockford, Illinois	39	9.7
San Diego, California	18	4.5
Wichita, Kansas	32	7.9
Total	401	99.6

to select lines in the resulting smaller grids. The point of interaction of these lines was a starting point.

These fifteen starting points were sent to local supervisors of the field interviewing service, who indicated the starting points from which it was possible to obtain interviews. Based on the replies of the field interviewing staff, seven final starting points were selected which gave the best geographical dispersion.

Initially, ten contacts were made at each starting point. After these were completed, the ratio of completed interviews to contacts was calculated and used to estimate the number of additional contacts required to meet a quota of 500 completed interviews. This quota of contacts was then divided equally among starting points.

As noted above, the initial objective of the sampling scheme was to obtain a sample of 500 recent purchasers. This target figure was based on budgetary constraints operating within the context of the "cold canvass" approach employed in the data collecting. One key assumption behind this objective was that the purchase incidence rate in the sample of households contacted would approximate 28%.[51/]

51/ This estimate was based on data found in George Katona, Lewis Mandell, and Jay Schmiedeskamp, 1970 Survey of Consumer Finances (Ann Arbor, Mich.: Survey Research Center, Institute for Social Research, The University of Michigan, 1971), p. 56, Table 4-4.

Table 4 shows the number of contacts in which there were no qualified respondents and the number of completed interviews in each city. From these data is derived the purchase incidence rate for each city and for the sample as a whole. Since the actual purchase incidence rate in the sample was 12.7%,[52/] cost constraints limited the final sample to 401 households.

Given the nature of the study, it was most important that both new and used purchasers be represented in sufficient numbers to permit a complete analysis. With the sampling scheme employed, it was anticipated that the used car to new car ratio in the sample would approximate the used to new ratio prevalent in the national automobile market. The size and volatility of this latter ratio over time was indicated in Figure 1, page 12. The most recent estimation of the ratio was for 1969, at which point it was 1·38:1 and moving in a generally downward trend.[53/]

52/ The purchase incidence rate is calculated by dividing the number of completed interviews by the sum of completed interviews and no qualified respondents.

53/ The used car to new car sales ratio is not directly calculable from published figures because such figures exclude transactions which do not involve automobile dealers. The estimate presented here is drawn from Katona, Mandell, and Schmiedeskamp, 1970 Survey of Consumer Finances, p. 53, Table 4-1.

TABLE 4

Purchase Incidence Rates In The Sample

	No qualified respondents	Number of completed interviews	Purchase incidence rate (rounded)
Atlanta, Georgia	165	33	16.7
Cincinnati, Ohio	172	28	14.0
Cleveland, Ohio	174	36	17.1
Denver, Colorado	182	31	14.6
Houston, Texas	198	15	7.0
Los Angeles, California	194	19	8.9
Miami, Florida	171	30	14.9
New Orleans, Louisiana	190	18	8.7
Omaha, Nebraska	191	19	9.0
Philadelphia, Pennsylvania	196	18	8.4
Phoenix, Arizona	165	30	15.4
Portland, Maine	208	35	14.4
Rockford, Illinois	187	39	17.3
San Diego, California	185	18	8.9
Wichita, Kansas	187	32	14.6
Total	2,765	401	12.7

Table 5 shows the city by city breakdowns of the sample in terms of new and used purchasers. It should be noted that while there is sizable variation among the fifteen cities, the overall used to new ratio is 1.09:1, thus indicating a rea sonable fit with available national figures.

Since the data collected covered many facets of the purchase decision process, it was important that the correct respondent be interviewed. To this end, a screening question was placed at the earliest possible point in the questionnaire in order to ascertain which member of the household was the primary decision maker with respect to the automobile most recently purchased.[54/] Interviewers were instructed to conduct the interview with the individual designated as the primary decision maker. As a result, the data collection procedure yielded the profile of decision makers and respondents found in Tables 6 and 7.

Table 6 indicates that in the greatest number of cases, male heads of households were the primary decision makers. It also indicates that in many cases, joint influences on the purchase decision were prevalent. In the great majority of these latter cases, husbands and wives shared the decision as to which cars were to be considered for purchase. In these and other cases of joint decision making, either individual was allowed as a qualified respondent.

54/ The question asked was: "Which member or members of the household had the primary responsibility for deciding which makes of cars to consider before the car was purchased?"

TABLE 5

Sample Composition--New And Used Car Purchasers

	Purchased New	Purchased Used	Ratio of Used to New
Atlanta, Georgia	19	14	.74
Cincinnati, Ohio	13	15	1.15
Cleveland, Ohio	22	14	.64
Denver, Colorado	13	18	1.38
Houston, Texas	9	6	.66
Los Angeles, California	11	8	.73
Miami, Florida	21	9	.43
New Orleans, Louisiana	7	11	1.57
Omaha, Nebraska	10	9	.90
Philadelphia, Pennsylvania	13	5	.38
Phoenix, Arizona	20	10	.50
Portland, Maine	14	21	1.50
Rockford, Illinois	9	30	3.33
San Diego, California	1	17	17.00
Wichita, Kansas	10	22	2.20
Total	192	209	1.09

TABLE 6

Sample Composition By Primary Decision Maker

	Number	Percentage of total sample (rounded)
Male head of household	172	42.9
Wife of head	50	12.5
Joint decision	104	25.9
Female head of household	34	8.5
Son of head	28	6.9
Daughter of head	8	1.9
Other male in household	3	0.7
Other female in household	0	0.0
Not answered	2	0.5
Total	401	99.8

TABLE 7

Sample Composition By Respondent

	Number	Percentage of total sample (rounded)
Male head of household	194	48.4
Wife of head	128	31.9
Female head of household	30	7.5
Son of head	29	7.2
Daughter of head	12	2.9
Other male in household	3	0.7
Not answered	5	1.2
Total	401	99.8

Table 7 indicates the sample composition by respondent. Given the screening process employed in identifying the target of the interview, the results presented in Table 7 follow closely the profile presented in Table 6. Again, male heads of households were predominant in the role of respondent. The relatively large number of wives who served as respondents is explained by the fact that in many cases of joint decision making by husband and wife, the wife was more readily available to be interviewed.

In some cases, the primary decision maker was not available to be interviewed either at the time of the initial contact or in terms of future appointments. In almost all such cases, the interview was terminated. In a very few instances, however, it was clearly determined that another member of the household was qualified to serve as respondent. In this very small number of cases, such interviews are included in the data.

The Measuring Instrument

Data were obtained by means of a personal interview conducted with those individuals designated as primary decision makers for the car most recently purchased in the household. These interviews were conducted by trained interviewers using the structure and sequence of the questionnaires found in Appendices C and D. While there was a good deal of variation in the time span covered by each interview, the average length of each was approximately 45 minutes.

As indicated by the Appendices two separate questionnaires were employed, one administered to new car buyers (Appendix C) and the other to used car buyers (Appendix D). This was done simply for convenience, since it permitted interviewers to automatically skip irrelevant questions and, in general, conduct a more smoothly flowing interview. Table 8 illustrates the types of variations between the two questionnaires. A complete examination and comparison of the questionnaires makes it clear that there are no substantive differences in terms of question sequence or content. For this reason, subsequent discussion will be based on the premise that there is but one measuring instrument.

In designing the questionnaire, a great deal of time and effort was spent on achieving the proper sequence of questions. This preoccupation with careful sequencing was based on the desire to generate a flow of information in such a way as to help the respondent mentally reconstruct the purchase process. It was felt that such a careful reconstruction was absolutely necessary in order to obtain meaningful data.

One means of improving the flow of the questionnaire was by pretesting it. An early version of the questionnaire was administered to twenty recent automobile purchasers in the Chicago area. Using an analysis of those results in addition to discussions with the two interviewers involved, valuable insights were gained into possible improvements. Some of these improvements dealt with the content and phrasing of specific questions. However, the major contribution of the pretest phase was in the area of question sequence. By analyzing the pattern

TABLE 8

Selected Comparisons--Used Car Questionnaire Versus New Car Questionnaire

Questionnaire administered to used car buyers (Appendix D)		Questionnaire administered to new car buyers (Appendix C)	
Question number	Question	Question number	Question
7	"Did you buy the _____(YEAR MODEL AND MAKE OF SURVEY CAR) from a dealer or from a private individual?"	--	This question was not asked of new car buyers on the assumption that all new car purchases are made through dealers.
24a	"When you were making your decision about what car to buy, did you also consider other makes and models of used cars besides the _____(YEAR MODEL AND MAKE OF SURVEY CAR)?"	24a	"When you were making your decision about what car to buy, did you also consider other makes and models of new cars besides the _____(YEAR MODEL AND MAKE OF SURVEY CAR)?"
--	Not applicable to used car buyers.	25d	"Under what circumstances would you consider purchasing a used car?"
29	"Did you check newspapers for used car ads and listings?" (Asked of all used car buyers)	29	This question was asked only of new car buyers who had considered used cars as alternatives in the purchase decision.

of the interview and isolating those areas in which the information flow seemed interrupted, it was possible to change the sequence of the questions in order to better meet the objective of a full reconstruction of the purchase process.

The questionnaire may be divided into general sections or areas of major interest. The first section is primarily concerned with objective information with respect to the automobile most recently purchased. Table 9 illustrates the nature of the questions found in this section of the questionnaire.

While the major purpose of the questions in the first section of the questionnaire was to gather objective data on the car purchased, these also served to aid the respondents in the reconstruction of the purchase process. By probing for details about the car purchased, these questions set the stage for the second section of the questionnaire, a section which was designed to yield information on the prepurchase decision process used by the respondents. This information consisted of factors such as deliberation time, the consideration of alternatives, information sources utilized, and search patterns followed. Representative questions from this section of the questionnaire are found in Table 10.

Questions in the third general area of the questionnaire dealt with broader issues of automobile ownership such as multiple ownership and ownership history. Included in this section was a series of scalars designed to indicate the relative importance of automobile styling to the respondents. Representative questions from this section are found in Table 11.

TABLE 9

Illustrative Questions--Information About Car Recently Purchased

"What is the make and year model of the car purchased most recently by you or someone in your household?"

"In what month and year was the_____(YEAR MODEL AND MAKE OF SURVEY CAR) purchased?"

"Was it a dealer demonstration model or an executive car?"

"What was the total asking price for this car before any trade-in?"

"When you bought the_____(YEAR MODEL AND MAKE OF SURVEY CAR), did you dispose of another car?"

"As you know, many car buyers finance all or part of their purchase. Did you borrow or finance part or all of the total price?"

"Who is the principal driver of this car?"

"What was the main reason for buying this car; in other words, what is it used for mostly?"

TABLE 10

Illustrative Questions--Prepurchasing Decision Process

"About how long before you actually purchased did you first start thinking about buying a car?"
"Did the wage-price freeze affect your choice of cars of the timing of your purchase in any way?"
"When you were making your decision about what car to buy, did you also consider new (used) cars?"
"Among the cars you considered, how did you get the information you needed to make up your mind about which one to buy?"
"Did you discuss this car with your friends?"
"Did you visit dealers or private individuals to look at this car?"
"Did you test drive this car?"
"When you first thought of buying a car, were you thinking mostly of a new car, a used car, or both equally?"

TABLE 11

Illustrative Questions--General Automobile Ownership

"In addition to the _____(YEAR MODEL AND MAKE OF SURVEY CAR), are there any other cars presently owned or leased by any members of your household?"

"What is the make, model, and model year of the other cars owned or leased in this household?"

"About how often does the head of your household buy a car?"

"Including your _____(YEAR MODEL AND MAKE OF SURVEY CAR), how many cars have you personally bought in your lifetime?"

"What was the last car you bought before the _____(YEAR MODEL AND MAKE OF SURVEY CAR)?"

The last portion of the questionnaire dealt with demographic characteristics of respondents and their households. This section also included two questions dealing with respondents' expectations and subjective estimates of financial position. Illustrative questions from this section are found in Table 12.

With a measuring instrument of this length and complexity, the possibility of respondent refusal to cooperate is increased. Table 13 shows the refusal rates for each of the fifteen metropolitan areas, such rates being calculated by dividing the number of refusals by the number of contacts made.

Most refusals took place after the screening questions had been asked, i.e., after a household had qualified for the interview. There were two major reasons for this. First, some of the respondents found the financial questions to be too personal and refused to continue with the interview after being asked some of these questions. In other cases if the decision maker was not at home at the time of initial contact with a household, the interviewers found it difficult to make and keep appointments with this person.

The fact that most of the recorded refusals took place after the screening questions might help explain the relatively low level of the purchase incidence rates reported earlier (See Table 4). However, one exception to this general rule occurred in Atlanta. In this case, two of the sampling clusters were in very high income areas. Here,

TABLE 12

Illustrative Question--Demographics

"What is the age and sex of the head of household?"

"From oldest to youngest, what is the age and sex of each of the other members of your household?"

"What was the last grade of school completed by the head of household?"

"Is the head of household working now, unemployed or laid-off, retired, or what?"

"What is his/her main occupation, that is, the kind of work he/she has been doing to earn a living?"

"(HAND RESPONDENT INCOME CARD) For classification purposes only, we need to know which category represents your total family income. Your answer will be completely confidential and will be combined with the answers of others who take part in this survey. Would you please tell me which letter of this card indicated how much income you and your family received from all sources during the year 1970, I mean before any taxes and deductions?"

TABLE 13

Sampling Refusal Rates

	Number of contacts	Refusals	Refusal rate (percentage)
Atlanta, Georgia	265	67	25.3
Cincinnati, Ohio	230	30	13.0
Cleveland, Ohio	234	24	10.2
Denver, Colorado	226	13	5.8
Houston, Texas	254	41	16.1
Los Angeles, California	230	17	7.4
Miami, Florida	216	15	6.9
New Orleans, Louisiana	226	18	7.9
Omaha, Nebraska	240	30	12.5
Philadelphia, Pennsylvania	242	28	11.6
Phoenix, Arizona	218	23	10.5
Portland, Maine	250	7	2.8
Rockford, Illinois	261	35	13.4
San Diego, California	212	9	4.2
Wichita, Kansas	231	12	5.2
Total	3,535	369	10.4

interviewers were frequently turned away by maids and guards before they got a chance to speak to potential respondents. In such cases, a refusal was recorded without any knowledge as to whether the household was qualified for inclusion in the sample. This phenomenon also tends to explain why Atlanta has the relatively high refusal rate reported in Table 13.

Summary

The preceding discussion was limited to two elements of the overall research methodology, namely the sample and the measuring instrument. In both cases, an effort was made to report both the final format of the methodology and the planning which preceded it. A discussion of the third element of research methodology, the analytical techniques employed, is deferred to the later chapters in which they are used.

CHAPTER IV

THE EMPIRICAL RESULTS: THE SIZE OF THE MARKET SEGMENT CONSIDERING BOTH NEW AND USED CARS

The Goal of this Chapter

The purpose of this chapter is to present the analysis relevant to the testing of the first hypothesis stated in Chapter II, namely that there exists a group of car buyers (i.e., a market segment) who consider both new and used cars in the automobile purchase decision. Apart from establishing the existence of such a market segment, the major thrust of the analysis deals with the measurement of its size. In this latter work, the segment is measured under different definitions of buyer consideration in an attempt to ascertain both the depth of the consideration process and the relevant segment which should be employed in the multivariate analysis found in Chapter V.

The Empirical Results

The broadest and most straightforward measure of segment size is obtained by simply asking respondents whether they had considered cars of the vintage[55/] other than the one they had purchased, i.e.,

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55/ The reader should note the concept of vintage as it is employed here and throughout the analysis. There are two vintages or classes of cars in the study--new cars and used cars. In later analysis, when reference is made to "same vintage," it means the same class (new or used) which the purchaser ultimately bought. "Other vintage" refers to the class (new or used) other than the one ultimately purchased.

asking new car buyers if they had considered used cars and used car buyers if they had considered new cars. Since no restrictions are placed on the meaning of consideration, such an approach is keyed completely to the respondents' own perceptions of what is entailed in the act or process of consideration. Also, given the lack of such restrictions, such an approach would yield the measure of segment size which is the largest of all possible measures.

Table 14 shows the results of this approach. As indicated there, 17.2% of the respondents said that they had considered both new car and used car alternatives in their most recent purchase decisions.

Table 15 shows the breakdown of this segment in terms of the vintage ultimately purchased. It can be seen that the great majority of purchasers in this segment ultimately purchased used cars. While the overall used car to new car purchase ratio in the sample was 1·09:1, Table 15 shows the used to new ratio in the segment of interest to be 2·63:1.

While the measurement of segment size presented in Table 14 may well be the most relevant for our purposes, the use of respondents' perceptions which it entails poses potential problems which should be recognized. The lack of any specified behavioral criteria in the definition of consideration could mean that widely disparate behavioral patterns are being lumped into a single category. This is especially relevant in that practitioners of marketing strategy might well feel

TABLE 14

Consideration of New and Used Cars Using
Individuals' Perceptions of Consideration

	Number	Percentage of total sample
Bought new, considered only new	173	43.1
Bought used, considered only used	159	39.7
Considered both new and used	69	17.2
Total	401	100.0

TABLE 15

Ultimate Purchase of Those Considering Both New and Used Cars

	Number	Percentage
Considered both, bought new	19	27.5
Considered both, bought used	50	72.5
Total	69	100.0

the need to define this market segment along the lines of some overt buyer behavior characteristics, something which cannot be done on the basis of the data in Table 14.

The problem in general is that the data in Table 14 could be very misleading by overstating the size of the market segment. This would be true if we could ascertain that some individuals included in the market segment via the general approach of Table 14 were not engaging in "serious" or "true" consideration of the other vintage alternative.

To investigate the possibility that some individuals should be dropped from the market segment because of a lack of "true consideration," various tests and analyses may be performed. While these alternative analyses differ in approach and content, they share the common goal of providing us with signals as to whether the consideration of the other vintage alternative was artificial or superficial.

In some cases these tests are quire general and subjective. This is true when we look for behavioral patterns which lead us to question the depth and extent of consideration for the other vintage alternative. It is also true in cases where we arbitrarily stipulate behavioral criteria as necessary tests of consideration, observing the shrinkage in the size of our relevant market segment when these criteria are not met.

A more objective approach is also employed, wherein the strength of the consideration process for the other vintage alternative is measured on the basis of the consideration processes for the car purchased and a same vintage alternative. Thus, this approach has a different point

of departure, namely the attempt to objectively establish just what is entailed in the concept of serious consideration.

The various analytical treatments are described below. It should be remembered that the starting point for all of them is that measurement of the segment size obtained by asking respondents the most general question as to whether they considered both new and used cars in the purchase decision, that is, the segment isolated in Table 14.

General versus specific consideration

One of the potential measurement problems cited in Chapter II was predicated on the belief that since both the new and used car markets were established, ongoing markets, buyers would be at least aware of their existence. Such awareness could be translated into the thought, however brief, that either of these markets could be entered to satisfy the need for an automobile.

By this logic, it would be quite possible for a buyer to consider a vintage (i.e., new cars; used cars) in general or as a class. It might be argued that thinking of a vintage alternative "in general" indicates a very surface level of consideration which is not operationally useful to marketing strategists. Such a view would lead us to delete from our market segment those respondents who exhibited consideration of the alternative vintage on a general basis only.

Table 16 indicates the impact which such a criterion would have on our measurement of segment size. Using as a basis those instances

TABLE 16

Consideration of Other Vintage Alternative--General Versus Specific Consideration

	Considered other vintage alternative	Considered other vintage alternative in general*	Percentage: Column 2 of Column 1
Bought new	19	5	26.3
Bought used	50	0	--
Total number of cases	69	5	7.2

* Based on respondents' inability to cite a specific make of other vintage alternative.

in which respondents who claimed to have considered the alternative vintage did not name a specific make of alternative vintage car, five cases were isolated where consideration could be defined as general or weak. As Table 16 shows, all of these cases involved purchasers who ultimately bought new cars. Using this criterion, the size of the market segment of interest would be reduced to 64, or 15.9% of the total sample.

Second choice of those considering both vintages

In the interviews conducted, respondents were asked to indicate the car they would have purchased if their first choice had been unavailable.[56/] Table 17 indicates the vintage of the second choice for those individuals in the market segment in which both vintages were considered.

While there is no hard and fast analytical test which can be applied to these data, they are useful in an indirect way. We might anticipate that if the consideration of the alternative vintage was generally very shallow, almost all respondents would have chosen the same vintage in both their purchase and their second choice. The fact that 42.6% of the respondents chose the alternative vintage as their second choice seems to support the view that substantial serious consideration of both vintages is occurring.

56/ The question asked was: "Imagine for a moment that the car which you purchased was not available; what car do you think you would have chosen instead?"

TABLE 17

Second Choice of Those Considering Both New and Used Cars

	Number choosing same vintage as second choice	Number choosing other vintage as second choice	Percentage choosing same vintage as second choice	Percentage choosing other vintage as second choice
Bought new	8	5	61.5	38.5
Bought used	19	15	55.9	44.1
Total number of respondents	27	20	57.4	42.6

Consideration sequence

Another useful approach for which there is no hard and fast analytical test lies in investigating the sequence of consideration when both vintages were reportedly considered. Respondents were asked a series of questions designed to reconstruct the decision process, one objective being to ascertain which vintage was considered first. Table 18 relates the responses to these questions to the vintage actually purchased. It shows that in 14.1% of the cases, respondents started the purchase decision process by first considering the alternative vintage to the one ultimately purchased. In 54.7% of the cases, respondents claimed to have started the purchase decision process considering both vintages simultaneously. Summing these cases, we find 68.8% of the respondents having the alternative vintage to the one purchased in their "considered set" at the beginning of the purchase process, a figure which again lends itself to subjectively supporting the premise that serious consideration of the alternative vintage did occur.

Duration of the purchase decision process

If we seriously suspected those individuals reporting consideration of both new and used cars as being generally guilty of surface consideration, we might expect them to have a shorter purchase decision time compared to those who considered only one vintage. Table 19 shows the distribution of the duration of the purchase decision process for individuals in the segment and those outside it. As the

TABLE 18

Consideration Sequence When Both New and Used Cars Were Considered

	Number considering same vintage initially	Number considering other vintage initially	Number considering both simultaneously	Percentage considering same vintage initially	Percentage considering other vintage initially	Percentage considering both simultaneously
Bought new	4	5	9	22.2	27.8	50.0
Bought used	16	4	26	34.8	8.7	56.5
Total number of respondents	20	9	35	31.2	14.1	54.7

TABLE 19

Length of Time Between First Thought of Purchase and Acquisition of Automobile
(in per cent)

	Less than 1 week	1-4 weeks	1-3 months	3-6 months	6 months to one year	Over one year	Total
Did not consider both vintages (332)*	16.6	25.9	25.9	14.5	9.6	7.5	100.0
Considered both new and used (69)*	15.9	20.3	30.4	18.8	2.9	11.6	99.9

Chi square = 6.104
degrees of freedom = 5
No significant difference at the .05 level

* Numbers in parentheses are the number of respondents in each category.

chi square analysis indicates, we would accept the hypothesis that no significant difference exists between the distributions. Examination of the data would seem to indicate that any difference between the distributions tends in the direction of the members of the segment considering both vintages spending more time in the purchase decision process. While this would again tend to bolster our confidence in the belief that the consideration reported by these individuals was serious consideration, the real problem is that we cannot ascertain whether serious consideration was actually occurring over this time span or which automobile was being considered. While a greater duration time allows for deeper consideration of alternatives, there is no guarantee that this is how the time was used. Therefore, we have again failed to definitely isolate evidence concerning the depth of the consideration process for the other vintage alternative.

Overt information search

In Chapter II, five specific factors were suggested as indicative of buyer search behavior and, thus, consideration. They were:

Discussion with family
Discussion with friends
Visit to dealer or private individual
Test drive
Price negotiation

It is now possible to measure the effect on segment size of restricting the definition of consideration. By requiring these search processes as necessary conditions for inclusion in the segment, we have established

concrete, albeit subjective criteria for excluding respondents from the market segment under investigation.

Using this approach, the impact on segment size would be that shown in Table 20. Great care should be taken in the interpretation of Table 20, because the analysis is confounded by the existence of a high non-response rate. The logic behind the approach is quite simple. Each individual who claimed to have considered both vintages was to be asked if he had undertaken each step or element of the search process for the first other vintage car which he had mentioned. By arbitrarily insisting that "true consideration" without each of these steps was impossible, negative responders were to be dropped from inclusion in the market segment. The remaining respondents (i.e., positive responders) would then represent the adjusted size of the market segment, and this adjusted total could then be related to sample size to determine the adjusted percentage of the sample which these cases represent.

As noted previously, non-response on these questions was high. We can immediately explain five of the cases of non-response by referring to Table 16, where we found five cases in which respondents were unable to cite a specific make of other vintage alternative. In these cases, questions pertaining to information search processes would have been irrelevant. The other cases of non-response must be attributed to respondent fatigue and/or interviewer error. The former explanation has potential validity here when we consider that respondents had already been subjected to this series of questions for

TABLE 20

Stipulated Search Processes Undertaken by Buyers Who Considered Both New and Used Cars on First Mentioned Other Vintage Alternative

	Number of non-response cases	Number of respondents answering "No"	Size of market segment as a percentage of the total sample when negative responders are dropped	Size of market segment as a percentage of the total sample when both negative responders and non-responders are dropped
Discussion with family	13	13	13.9	10.7
Discussion with friends	13	33	8.9	5.7
Visit to dealer or private individual	14	11	14.5	10.9
Test drive	27	21	11.9	5.2
Price negotiation	28	37	7.9	0.9

the car which they had purchased as well as for any same vintage alternatives which they had specifically mentioned.

One other note regarding non-response is relevant here. We see a buildup in the number of cases of non-response in the last two categories of Table 20, namely the factors of test drive and price negotiation. This increase is attributable to the fact that interviewers were instructed not to ask these questions if respondents answered in the negative on the question of dealer visit. Thus, negative responses to the question of visiting dealers or private individuals lead to non-response via inapplicability on the last two criteria.

The real problem with the non-response factor is that there is little basis on which to distribute it for our measurement purposes. At one extreme, we could interpret non-response as negative; this would call for dropping both non-respondents and negative respondents from the segment. The results of this interpretation are presented in the last column of Table 20. At the other extreme, non-response could be treated as positive, at least for the first three behavioral criteria. This would call for dropping from the market segment only those who responded negatively. The results of this interpretation are found in the third column of Table 20.[57/] What is probably the best interpretation is that the true results lie somewhere between these two extremes.

57/ In the case of the last two categories (test drive; price negotiation), we cannot really place a completely positive interpretation on non-response, since we know that at least some of the non-response is based on not visiting dealers and thus not test driving or negotiating on price.

Regardless of our treatment of non-response, Table 20 is still useful in identifying the potential shrinkage in the size of the market segment when the subjective stipulation of behavioral criteria of consideration is employed. The shrinkage is severe if we insist on "discussion with friends" and "price negotiation" as indices of true consideration. This is true to a lesser extent with the "test drive" criterion. The loss is minimal when we stipulate the necessity for "discussion with family" and "visit to dealer or private individual."

The approach presented in Table 20 really epitomizes the shortcomings of the subjective approach which has been followed to this point. While each of the analyses enumerated has a fundamental value and inherent logic, it also has certain flaws. First, there is almost no statistical analysis associated with them; we must be content with a general overview in each. Secondly, and most significantly, all these tests require a strong subjective input with respect to what we should insist is representative of true consideration. For example, it was possible to arbitrarily drop a buyer from our relevant market segment because he did not test drive the other vintage alternative, but only on the subjective grounds that we consider test drive to be a necessary element of serious consideration. What if, in fact, a large number of purchasers do not even test drive the car which they ultimately purchase? Knowing this might seriously reduce our willingness to use this behavioral criterion as indicative of serious consideration,

and hence our willingness to drop from the market segment those respondents who did not undertake the process.

What the next sections are designed to accomplish is to apply more objective tests to the analysis of the behavior of individuals in our relevant segment in order to ascertain whether or not we have any serious reservations about the depth of their consideration process. The major thrust of this approach lies in comparing their behavior in the consideration process undertaken for the other vintage alternative with the behavioral processes of:

1. Members of the entire sample in their search procedures for the car ultimately purchased.

2. The subsample of those indicating consideration of a same vintage alternative.

The overall emphasis, then, is to take a more objective view of what is important in the consideration process in order to effect a judgment as to the strength of the consideration undertaken for the other vintage alternative.

Information sources mentioned and comparisons of overt behavior

Before respondents were asked whether or not they had undertaken the five specific actions referred to earlier (i.e., family discussion; discussion with friends; visit to dealer or private individual; test drive; price negotiation), they were asked an open ended question regarding

information sources in general.[58] Table 21 indicates the relative frequency of mention of various information sources by all buyers as well as the relative frequencies assigned to individuals inside and outside our relevant market segment. Two rather interesting factors should be noted in examining this Table. First, we can note the similarity in the frequency distributions between those who considered both vintage alternatives and those who did not. While no statistical test of significance has been performed, it appears on the surface that both groups responded similarly. The other noteworthy factor in Table 21 is that there is no single information source mentioned with great regularity by a large proportion of buyers. We might express some surprise that only 12.9% of all buyers mentioned test drives as sources of product information or that only 18.5% mentioned dealer visits as important information sources. While non-response is again an influencing factor here, the fact remains that these percentages are quite low.[59]

58/ The question asked was: "Among the cars you considered, how did you get the information needed to make up your mind about which one to buy?"

59/ Non-response influences the relative percentages here because of the provision for multiple mentions. In cases where respondents made no second mention, this was treated as a valid data code. Thus, the base on which the percentages were calculated is inflated somewhat and may lead to a slight understatement of relative percentage size.

TABLE 21

Information Sources Mentioned
(by per cent)

	Test drive and experience with make	Dealer visits	Technical reports	Commercials	Talking to friends and relatives	Other
All buyers (680)*	12.9	18.5	2.5	6.9	10.4	2.9
Buyers considering only one vintage (568)*	13.4	18.0	2.5	7.0	10.6	2.8
Buyers considering both new and used (112)*	10.7	21.4	2.7	6.2	9.8	3.6

* Numbers in parentheses represent number of responses. Up to two mentions were recorded here, thus total mentions exceed the sample size of 401.

This phenomenon becomes even more interesting when we review the responses to questions asking respondents whether or not they had undertaken certain specifically enumerated steps in the purchase decision process with respect to the car ultimately purchased. Table 22 shows the profile of responses offered to these questions. We see, for instance, that 89.6% of the total sample visited dealers or private individuals in their search process. Comparing this to the 18.5% mention of dealer visits in Table 21, we are left with two plausible explanations for the variation. First, it is possible that people do not conceive of dealer visits as information seeking activity. This might explain the relatively low incidence of mention in Table 21. Secondly, we might attribute the differentials between Table 21 and Table 22 to the differences in question format. In this vein, it is possible that respondents simply did not think of dealer visits in answering the open ended question which led to Table 21 while they recalled such visits when asked about them specifically.

It is the type of data found in Table 22 which allows us to attempt the more objective approach to the question of whether consideration of the alternative vintage was "weak" or "legitimate." If we start with the assumption that individuals will expend more time and energy in considering the car which they ultimately purchased than any other car which they might have considered, we are in a position to establish more meaningful criteria of serious consideration. We can use the behavioral patterns established in the consideration of other cars to determine if the alternative vintage was seriously considered.

TABLE 22

Buyers Undertaking Specific Acts of Consideration for the Car Purchased

	Number answering "Yes"	Percentage of respondents answering "Yes"
Discussion with family (396)*	324	81.8
Discussion with friends (394)	143	36.3
Visit to dealer or private individual (396)	355	89.6
Test drive (354)**	286	80.8
Price negotiation (351)**	117	33.3

* Numbers in parentheses are the number of respondents in each category.

** The decrease in the number of respondents for the categories of "test drive" and "price negotiation" is attributable to the fact that they were considered dependent on dealer visit. If a respondent answered "no" to dealer visit, he was not asked about test drive or price negotiation. This pattern and its treatment is the same for this sequence of questions applied to all cars mentioned as alternatives considered.

Returning to Table 22, we again note the relative proportion of respondents who undertook specific actions in considering the car which they ultimately purchased. Two cases stand out as indicative of relatively unimportant behavioral steps in the consideration process, namely discussion with friends and price negotiation. On the basis of the evidence that only approximately one-third of all buyers go through these processes on the car which they purchased, we should be unwilling to drop from our market segment those buyers saying they did not undertake these steps for the other vintage alternative considered.

The data in Table 22 indicate that the other three behavioral criteria (i.e., discussion with family; dealer visit; test drive) are relatively important to buyers in their consideration of the car purchased. Using only those three behavioral criteria, Table 23 compares the search activities of the entire sample on the car purchased with the search activities of our relevant segment on the other vintage alternative considered. For example, we see that while 81.8% of the automobile buyers in the sample discussed the car which they purchased with their families, only 76.8% of those buyers who considered both new and used cars undertook such discussion with respect to the first mentioned alternative vintage which they claimed to have considered. This pattern of decreasing percentages in relating the two columns of Table 23 continues throughout. It culminates in the most marked relative decline in the "test drive" category, where only 50% of the respondents in our relevant segment reported test driving the alternative vintage considered.

TABLE 23

Respondents Undertaking Specified Information Search Processes--Car Purchased Versus First Other Vintage Alternative Considered

	Percentage of respondents in the total sample answering "Yes" (For car purchased)	Percentage of respondents in the segment considering both vintage alternatives answering "Yes" (For other vintage alternative considered)
Discussion with family	81.8 (396)*	76.8 (56)*
Visit to dealer or private individual	89.6 (396)*	80.0** (55)*
Test drive	80.8 (354)*	50.0** (42)*

* Numbers in parentheses indicate the total number of respondents from which the percentages are calculated.

** Chi square analysis indicates a significant difference at the .05 level.

To be certain that the behavior of our special segment of interest is being specifically investigated, Table 24 deals only with individuals in the group reporting consideration of both new and used cars. Here again, the comparison is made on the three specific behavioral criteria between the car purchased and the first other vintage alternative considered.

Table 24 reinforces even more strongly the data in Table 23. Again, we note the overall decline in the relative percentage of respondents undertaking the specific search processes when we move from the car purchased to the alternative vintage considered. For example, 83.8% of those buyers who considered both new and used cars reported family discussion about the car purchased, while only 76.8% of the same group engaged in such discussion for the other vintage car mentioned as considered. Not only does this pattern of decrease hold for all of the categories, the relative decrease is even more pronounced in Table 24 than it was in Table 23. The explanation for this lies in the fact that individuals in our segment of interest reported a higher incidence of information search on these three criteria for the car purchased then did the sample as a whole. In other words, the relatively higher percentages in column 1 of Table 24 compared to column 1 of Table 23 serves to accentuate the decrease in reported information search in moving from the car purchased to the other vintage alternative considered.

The first reaction to the data presented in Tables 23 and 24 might reinforce our suspicion that the consideration process for the other

TABLE 24

Respondents Considering Both Alternatives Undertaking Specified Information Search Processes--Car Purchased Versus First Other Vintage Alternative Considered

	Percentage of respondents in the segment considering both vintage alternatives answering "Yes" (For car purchased)	Percentage of respondents in the segment considering both vintage alternatives answering "Yes" (For other vintage alternative considered)
Discussion with family	83.8 (68)*	76.8 (56)*
Visit to dealer or private individual	97.1 (68)*	80.0** (55)*
Test drive	89.2 (65)*	50.0** (42)*

* Numbers in parentheses indicate the total number of respondents from which the percentages are calculated.

** Chi square analysis indicates a significant difference at the .05 level.

vintage alternative was somewhat weak. We did, after all, isolate certain actions or behavioral processes which were deemed important by virtue of the large percentage of respondents who reported undertaking them in considering the car ultimately purchased. We then found a decrease in the relative proportion of respondents indicating that they had pursued these activities in considering the other vintage alternative. At the extreme, perhaps we should now insist that those cases in which these three activities were not undertaken should be dropped from the segment for our measurement purposes.

Before this is done, however, there is one other area of analysis which should be pursued. We stated previously that it could be reasonably expected that individuals expend their greatest efforts and time in the consideration and evaluation of the car which they ultimately purchased. There might well be a sharp decline in information seeking activity for any other alternative, whether of the same vintage or a different vintage. On this basis, a more valid comparison of search or consideration behavior could be between the first same vintage alternative of those considering only one vintage and the other vintage alternative of those who considered both.

Table 25 makes such a comparison, and the data therein confirm the view that the decline in consideration behavior is a pervasive one and not related to the vintage of the alternative. Analysis shows that there is no significant difference in the pattern of behavior shown by

TABLE 25

Respondents Undertaking Specified Information Search Processes--First Same Vintage Alternative Versus First Other Vintage Alternative Considered

	Percentage of respondents in the segment considering only one vintage answering "Yes" (For first same vintage alternative considered)	Percentage of respondents in the segment considering both vintage alternatives answering "Yes" (For other vintage alternative considered)
Discussion with family	73.1 (156)*	76.8 (56)*
Visit to dealer or private individual	83.4 (157)*	80.0 (55)*
Test drive	44.5 (128)*	50.0 (42)*

* Numbers in parentheses indicate the total number of respondents from which the percentages are calculated.

those who considered only one vintage and those who considered both with respect to the consideration given to a non-purchased alternative. Instead, the decline in specific search processes reported takes place in comparing the car purchased with any other alternative.

This latter finding raises serious doubts as to whether we have any objective basis for dropping individuals from our special segment because of their failure to undertake these specific acts of consideration. On an analysis of group behavior with respect to the three behavioral processes isolated as important, individuals in the segment appear to have considered the other vintage alternative as seriously as any same vintage alternative was considered by those outside the segment. While it is true that the data indicate less consideration effort for the other vintage alternative when compared with the car purchased, they also point out that such a differential exists regardless of the vintage of the non-purchased alternative. In other words, we are simply finding that individuals do go to greater lengths in considering and evaluating the car purchased than any other, but that they do expend approximately equal effort in evaluating non-purchased alternatives of either vintage.

Summary and Conclusions

In this Chapter we isolated 69 cases, representing 17.2% of the total sample, in which buyers claimed to have considered both new and used cars in the purchase decision. The bulk of these cases represented buyers who ultimately purchased used cars.

In order to ascertain whether or not the segment so measured was an accurate representation of actual segment size, analysis was undertaken to test the depth or sincerity of the consideration process for the other vintage alternatives which members of the segment claimed to have considered. These tests were formulated using both subjective and objective approaches. The former approach involved a more general evaluation of the consideration and purchase processes, while the latter attempted a more rigorous comparison of behavioral processes for various alternatives purchased and considered.

After evaluating the empirical results presented in this Chapter, it has been decided to retain all 69 cases in the market segment for the analyses presented in Chapters V and VI. There are two major reasons for this decision. First, it is desired to maintain as large a data base as possible. This is especially true in light of the requirements for adequate data cell sizes for the multivariate analysis presented in Chapter V. Second, and most important, the analyses conducted in Chapter IV provide little basis for any downward adjustment in the size of the segment. Probably the most convincing argument for dropping individuals from the segment was found in Table 16, where five cases of "general consideration" of the alternative vintage were isolated. Beyond this, the data do not appear to support the contention that the consideration reported for the alternative vintage was shallow. Both in the subjective evaluations and the more objective comparisons of

behavior, we find little evidence to warrant an adjustment in segment size. Instead, we are willing to accept respondents' statements that they did consider both vintages as sufficient evidence for inclusion in the market segment which is under investigation.

CHAPTER V

PREDICTING MEMBERSHIP IN THE SEGMENT CONSIDERING BOTH NEW AND USED CARS

The Goal of this Chapter

In Chapter IV, sixty nine cases representing 17.2% of the sample were isolated in which recent purchasers of automobiles considered both new and used cars in the purchase decision. These cases, when aggregated, were defined as a market segment. The goal of this chapter is to test the second hypothesis presented in Chapter II, namely that certain socioeconomic, demographic, purchase, usage, and ownership variables can be employed to successfully predict membership in this segment. In testing this hypothesis, we are attempting to explain some of the reasons for buyer behavior as well as setting the stage for possible estimation of segment size in the automobile market of the future.

Methodology

There are a number of analytical approaches which might be considered at this point. It would be possible to employ a bivariate analysis in which the effects of the predictor (independent) variables upon the criterion (dependent) variable are considered one at a time. This could be done in the case at hand by using the Chi-Square test. As a purely hypothetical example, we might find in applying such a

test that individuals between 18 and 24 years of age are much more likely to consider both new and used cars than are individuals in other age brackets, this result being statistically significant at some prespecified level.60/

Although this type of approach has been very popular in the context of market segmentation studies; it has a major area of weakness. To begin with, it does not state any results in terms of probabilities of buyer behavior. Rather, it offers a statement about significant differences among sub-groups in a sample. As a result, a related disadvantage is that we are left with statistical summaries which are descriptive in nature and are therefore of little use in predicting behavior. To return to the hypothetical results based on age, we are well aware that there are many individuals in the age range between 18 and 24 but that these individuals may be differentiated on a number of other dimensions such as income level, stage in the life cycle, occupation, and so on. While we are able to say that some percentage of the totality of individuals in this age bracket considered both new and used cars and that this percentage was significantly different from that found in other age brackets, we would be unwilling to state that each of the individuals

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60/ For an example of the application of this analytical approach, see Peters, "Variation in Consumer Buying Behavior," Chapter III. Peters also has a discussion of the limitations of such an analysis on pp. 75-77, which I have drawn on for this section.

in this group has a specified probability of following such a pattern of consideration because of this age factor alone. Rather, the age variable is descriptive, not predictive.

A solution to this problem is found in the use of multivariate analysis, which Sheth has defined as "all statistical methods which simultaneously analyze more than two variables on a sample of observations."[61/] In discussing the need for multivariate techniques in sociology, Sonquist has stated that this need "results from the reasonable assumption that human behavior is influenced by many factors operating simultaneously . . . ."[62/] It is this assumption which we said was most violated in the bivariate analysis to which we referred.

As noted, in multivariate analysis, the effect of one predictor variable on the criterion or independent variable is considered taking into account all other predictor variables. Continuing our previous example, we would now consider the effect of age on behavior while holding all other variables constant. In doing so, we would be able to

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61/ Jagdish N. Sheth, "The Multivariate Revolution in Marketing Research," Journal of Marketing, Vol. 35 (January, 1971), p. 14.

62/ John A. Sonquist, Multivariate Model Building (Ann Arbor, Mich.: Institute for Social Research, The University of Michigan, 1970), p. 5.

attribute variations in behavioral patterns to the age variable, i.e., we would be isolating the behavior of an individual because he is in a specific age category. Such a view comes much closer to one in which the "whys" of buyer behavior may be discussed.

It should be carefully emphasized that multivariate analysis does not claim to isolate causes for behavior. Instead, it isolates explanations for observed behavior differentials among individuals or groups by holding all variables but one constant. It is doubtful whether any statistical techniques can ever prove cause in the former sense. However, isolating cause in the latter sense gives the analyst a much greater insight into the possible explanations of buyer behavior.

There are many types of analytical techniques which are classified under the heading of multivariate.[63/] Perhaps the most commonly used is multiple regression, in which regression coefficients for independent variables express their explanatory power on the dependent variable. One critical stipulation in the use of multiple regression is that the variables, both dependent and independent, be continuous. That is, they must be measurable on a metric scale. In this study, a number of

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63/ For an enumeration and classification of such methods, see Thomas C. Kinnear and James R. Taylor, "Multivariate Methods in Marketing Research: A Further Attempt At Classification," Journal of Marketing, 35 (October 1971), 56-59.

predictor variables are categorized (e.g., occupation; education; month in which purchase was made). The existence of such nominally scaled variables rule out the application of multiple regression as well as a related technique, multiple discriminant analysis.

In order to overcome these problems, this study employs multiple classification analysis (MCA) as the primary means by which to test the second hypothesis presented in Chapter II. MCA is an analysis of variance technique which was developed at the Survey Research Center, Institute for Social Research, The University of Michigan. It is related to dummy variable multiple regression.[64/]

The primary advantages in using MCA in this study are as follow:

1. We have already noted that MCA allows us to input nominally scaled predictor variables. This is an advantage especially applicable to cases such as this where the analysis is based on survey data.

2. As opposed to more traditional analysis of variance techniques, MCA is able to work with predictors which are moderately correlated with each other. Such a situation is likely to occur given the large number of variables in this study.

64/ Frank M. Andrews, James N. Morgan, and John A. Sonquist, Multiple Classification Analysis (Ann Arbor, Mich.: Institute for Social Research, The University of Michigan, 1969). The remainder of this description is based on the discussion found on pages 7-23. For an additional discussion of some technical aspects of MCA, see Appendix E.

3. The output from the MCA program is easy to understand. In addition, the output shows the effect of an independent variable on the dependent variable in two ways, one considering the other predictors and another not taking them into account. In this way, the MCA program includes a bivariate analysis while maintaining its multivariate emphasis.

4. In studies such as this, results yielded by MCA are in terms of probabilities of buyer behavior. As stated previously, this is a major advantage over bivariate methods.

In describing the output or results of the MCA techniques, Pelz states:

> The coefficients generated for a particular predictor may be considered an estimate of the effects of that predictor alone, taking into account all other predictors that are entered.
>
> With the output of the MCA program, it is possible to construct a measure analogous to a multiple R^2, indicating the amount of the total variance which is explained by, or is attributable to the combined main effects of the various predictors. 65/

While the latter comment expands the point about the ease of interpretation of the MCA programs' output, it also indicates that the assumption behind MCA is that of an additive model. This means that interaction effects are either assumed away or explicitly built in at the beginning of the analysis when input variables are defined. 66/

65/ D. C. Pelz, as quoted in Sonquist, Multivariate Model Building, p. 17.

66/ As a general notion, interaction may be understood as the condition under which the relationship between predictor A and the dependent variable varies with the level of predictor B. For a further discussion of this phenomenon and its effect on the MCA program, see Andrews, Morgan, and Sonquist, Multiple Classification Analysis, pp. 25-31.

In this study, the analysis was initiated under the assumption that interaction effects may be generally ignored for the variables employed. This decision was based primarily on the results of two previous studies of automobile purchase and ownership. Peters, using many of the variables employed in this study, cited the fact that interaction was not great enough to warrant building combination variables.[67] Friedman, in a study of automobile ownership, states:

> Some interaction is unavoidable, and a moderate amount would not materially affect the broad results of the analysis. An examination of a cross-classification of automobile ownership by households based on a sample of about 20,000 households from the 1960 Census of Population indicated no substantial interaction.[68]

While there is not a complete parallel between these studies (i.e., Peters and Friedman) and my own in terms of either the dependent or independent variables, the findings on interaction which they present have been used as an empirical basis for accepting the additivity assumption of the MCA model.

The other potential problem in the use of MCA which was alluded to previously is that it cannot handle extreme correlation between two

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67/ Peters, "Variation in Consumer Buying Behavior," p. 175.

68/ Charles S. Friedman, "Automobile Ownership by Households in Mid-1964: Influences of Income and Other Socioeconomic Factors," Survey of Current Business, XXXXVI (October, 1966), p. 15.

or more predictor variables. The avoidance of this difficulty has two facets. To begin with, care was exercised in the selection of the variables in an attempt to keep this potential correlation to a minimum. For example, many segmentation studies employ a life cycle variable which is a combination of age, marital status, number of children in the family unit, and ages of children in the family unit. We know that this constructed variable would have a high correlation with each of its component variables. For this reason, the life cycle variable has been omitted in the MCA analysis in preference for using the component variables individually.

The second step involved in avoiding this problem was to use output from early MCA runs to test for high correlation among predictors.[69/] In cases where such correlation caused problems, data categories were combined or eliminated. The end result was an MCA run in which high correlation among predictor variables was not a factor.

The dependent variable in the application of MCA is membership in the segment which considered both new and used cars in the purchase decision. The independent (predictor) variables may be classified as follow:

69/ For a discussion of these steps, see Andrews, Morgan, and Sonquist, Multiple Classification Analysis, pp. 35-38 and p. 50.

Socioeconomic and demographic variables

1. Annual income of the economic unit. (45)
2. Relative position of the economic unit within its income class. (46)
3. Number of adults in the economic unit. (39)
4. Number of children in the economic unit. (39)
5. Occupation of the head of household. (41; 42)
6. Education of the head of household. (40)
7. Age of purchaser (decision maker). (39)
8. Sex of purchaser (decision maker). (39)

Purchase, usage, and ownership variables

1. Number of drivers in the household. (39)
2. Who normally drives the car recently purchased. (16)
3. Primary usage of the car recently purchased. (17)
4. Average yearly mileage anticipated on the car recently purchased. (15)
5. Month in which the purchase was made. (5)
6. Trade-in or sale made on the purchase. (10b)
7. Part or all of the purchase price borrowed or financed. (11a)
8. Existence of debt payments when purchase was made. (47)
9. Household trading cycle. (35)
10. Respondent's purchase history. (36a)
11. Number of other automobiles owned in the economic unit. (33a; 33b)

Attitudinal variables

1. Outlook for the financial situation of the economic unit. (44)
2. Attitude toward the importance of automobile styling. (38)

The numbers in parentheses for each of the independent variables cited above indicate the questions in Appendix C employed to derive the data. The rationale for the inclusion of these predictor variables was presented in Chapter II. It should be emphasized that the above groupings of the predictor variables is for convenience only. All the variables are inputted into the MCA run simultaneously in order to achieve the full multivariate analysis.

The Empirical Results: MCA

An illustrative example

At this point it is useful to present an illustrative example of the MCA output and the line of analysis applied to the data. To serve this purpose Table 26 is employed, showing the MCA results when the independent variable is "number of children in the economic unit." The following is a step by step explanation of the data found in Table 26:

Mean = .17206. This figure (also referred to as the grand mean) is the mean for the entire subset of the sample for the dependent variable. In this study, the dependent variable is a dichotomy (i.e., a buyer either considered both vintage alternatives or he did not). Thus, the mean is that percentage of the total sample in which both vintages were considered; that is, 17.2% of all buyers considered both new and used cars in the purchase decision.

Standard deviation = .37791. This is a measure of dispersion about the mean. It is the average distance which each case lies from the mean. It is used in calculating standard errors for the differences from the mean (See Appendix E for techniques used in the calculation of standard errors).

TABLE 26

Illustrative Example: MCA Results When the Independent Variable is Number of Children* in the Economic Unit

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
None	180	-.0331	-.0263
One	62	-.0107	-.0290
Two	72	.0918	.1150
Three or more	84	-.0054	-.0265

Beta square = .022

* Children are defined as those under eighteen.

Number of cases. This is the number of respondents in each subset of the predictor variable. Since no weighting factors were applied to the data, this is the same as a raw count from the questionnaires. Categories in which there were fewer than 50 cases were deleted from the output tables.[70/]

Gross difference from the mean. This is the change in the mean which occurs if an individual falls in the subset of the independent variable. It is the unadjusted difference without taking into account the effect of the other explanatory variables and, as such, represents the more descriptive bivariate approach referred to earlier. It might be argued that the analysis of these gross differences from the mean is of prime importance to practitioners such as sales managers and salesmen in their attempt to utilize the concept of market segmentation. This is true in that for practical situations such as customer qualification, all other variables cannot be held constant and practitioners would like to know the gross impact on the probability of segment membership given that an individual is a member of a

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70/ See page 231, Appendix E.

certain subset. This is done by analyzing the gross differences from the mean. For example, the subset "two children" in Table 26 has a gross difference from the mean of .0918. This means that while 17.2% of the total sample considered both new and used cars in the purchase decision, 26.4% (.1720 + .0918) of those families with two children followed such a behavioral pattern. While such a finding is an illustration of primarily descriptive statistics, we can see how this type of approach is useful to the practitioner in finding population subsets with above or below average membership in the segment being investigated.

Net difference from the mean. This is the change in the mean which occurs because an individual falls in the subset of the independent variable. It is the adjusted difference which takes account of all the other explanatory variables by holding them constant. As the key figures in the multivariate approach of MCA, net differences from the mean provide the basis for an analysis of the underlying reasons for buyer behavior, something which could not be done with the more descriptive gross differences from the mean. Continuing the previous example, the subset "two children" in Table 26 has a

net difference from the mean of .1150. This tells us that when all other variables are held constant, the probability of being in the market segment of those considering both vintage alternatives increases from .1720 to .2870 (a difference of .1150) given that there are 2 children in the economic unit. It also tells us that while the gross difference from the mean correctly showed the direction of the relationship between membership in the segment and the subset "two children," the extent or "true nature" of the relationship was understated as a result of the correlation among the predictor variables.

Beta square. This is a measure of the relative importance of the independent variable with all its subsets in explaining the variation in the dependent variable after adjusting for the effects of all other predictors.[71/] From Table 26, we note the beta square for the variable "number of children in the economic unit" is equal to .022. When we develop the full set of MCA tables, we will be in a position to compare the relative beta squares of different independent variables in order to ascertain the relative strength of each in the multivariate analysis.

71/ Care must be exercised in interpreting beta squares, especially when one seeks some analogous measure in standard multiple regression. A good discussion is found in Andrews, Morgan, and Sonquist, Multiple Classification Analysis, pp. 117-122.

In addition to these statistics, a multiple R^2 is presented for all the variables at the conclusion of the series of MCA tables in the next section. This statistic represents the total variance in the dependent variable explained by all the independent variables. If R^2 were equal to 1, it would mean that we could predict exactly whether an individual would be in the segment of those considering both vintages if we knew his score on each of the predictor variables.

If the R^2 is high enough to warrant further analysis of the data (i.e., if it indicates some minimum level of predictive power for our model as a whole, thus confirming the second hypothesis), we turn to an investigation of which predictor variable subsets show a statistically significant effect on membership in the market segment. To illustrate this type of analysis, let us return to the subset "two children" in Table 26. Using the formulae found in Appendix E, the standard errors of the gross and net differences from the mean are .0445 and .0437 respectively. Since these differences from the mean each exceed twice their standard error, they are significant at the .05 level, telling us that inclusion in the subset indicates a significant adjustment to the grand mean of membership in our market segment.

This testing for significance would be carried out for each of the gross and net differences from the mean. The reader should note that this is not as formidable a task as it first appears. The standard errors of gross and net differences from the mean may be cast as functions of

the square root of the cell size (number of cases) in each predictor subset. At the .05 level, differences from the mean will be significant only if they exceed twice the standard error. Thus, it is fairly easy to run through the data quickly and reject many differences as not significant.

MCA results

Tables 27 through 34 show MCA results using the socioeconomic and demographic variables. For purposes of continuity, Table 26 which was used as our illustrative model is repeated as Table 30 in this section. Tables 35 through 45 show MCA results for the purchase, usage, and ownership variables. Tables 46 and 48 contain the MCA results for the attitudinal variables and are preceded by a short discussion of some of the measurement problems unique to these variables.

In all cases, the tables share the interpretive guidelines shown by our illustrative example. In addition, all have the common starting point of the grand mean being equal to .17206 and the standard deviation equaling .37791. For all independent variables, the total number of cases used in the MCA run was 401.[72/] The only variable subsets for which results are shown are those in which the number of valid data cases is 50 or more.

72/ Missing data cases were included in the MCA run. Such treatment has no effect on the interpretation of MCA results and allows for maximum utilization of valid responses. See Appendix E, pp. 230-31.

TABLE 27

MCA Results When the Independent Variable is the Annual Income of the Economic Unit

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
Under $10000	106	.0071	.0250
$10000-14999	111	.0441	.0297
$15000-19999	73	.0608	.0151
$20000 and over	68	-.0544	-.0171

Beta square = .017

TABLE 28

MCA Results When the Independent Variable is the Relative Position of the Economic Unit Within Its Income Class

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
High	75	-.0120	-.0622
Middle	142	.0462	.0412
Low	61	.0574	.0296
Beta square = .011			

TABLE 29

MCA Results When the Independent Variable is the Number of Adults in the Economic Unit

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
2 or less	294	-.0156	-.0418
More than 2	104	.0394	.1101*

Beta square = .035

* This difference exceeds two standard errors.

TABLE 30

MCA Results When the Independent Variable is the Number of Children** in the Economic Unit

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
None	180	-.0331	-.0263
One	62	-.0107	-.0290
Two	72	.0918*	.1150*
Three or more	84	-.0054	-.0265

Beta square = .022

* This difference exceeds two standard errors.

** Children are defined as those under eighteen.

TABLE 31

MCA Results When the Independent Variable is the Occupation of the Head of Household

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
Professional and technical; managers, officials and proprietors	151	-.0528	-.0546
Clerical and sales workers; craftsmen; foremen	145	.0417	.0377
Operatives; laborers; service workers; private household workers	59	.0482	.0229
Beta square = .012			

TABLE 32

MCA Results When the Independent Variable is Education of the Head of Household

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
Non high school graduate	68	.0044	-.0272
Graduated high school	123	.0067	-.0055
Some college	99	.0299	.0081
College graduate (including any post-graduate work)	110	-.0357	.0145
Beta square = .001			

TABLE 33

MCA Results When the Independent Variable is the Age of the Decision Maker**

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
24 or less	68	.0779	.0871
25-34	114	.0560	.0457
35-44	63	-.0292	-.0384
45-49	55	-.0447	-.0717
50 and older	84	-.0649	-.0406

Beta square = .024

** In cases of joint decision making, the age of the respondent is used.

TABLE 34

MCA Results When the Independent Variable is the Sex of the Decision Maker**

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
Male	225	.0412	.0313
Female	172	-.0499	-.0410

Beta square = .008

** In cases of joint decision making, the sex of the respondent is used.

TABLE 35

MCA Results When the Independent Variable is the Number of Drivers in the Household

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
One	68	-.0544	.0046
Two	223	.0162	.0243
Three	53	-.0588	-.1095*
Four or more	52	.0779	.0196

Beta square = .017

* This difference exceeds two standard errors.

TABLE 36

MCA Results When the Independent Variable is
Who Normally Drives the Car
Recently Purchased

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
Entire family	263	-.0237	-.0301
Head of household	53	-.0022	.0001
Wife and/or child	79	.0937*	.1127*

Beta square = .024

* This difference exceeds two standard errors.

TABLE 37

MCA Results When the Independent Variable is the Primary Usage of the Car Recently Purchased

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
Business	169	-.0063	-.0070
Errands (Shopping; Children to School)	62	-.0269	-.0025
Pleasure	50	-.0120	-.0196
General	72	.0223	.0403

Beta square = .003

TABLE 38

MCA Results When the Independent Variable is the Average Yearly Mileage Anticipated on the Car Recently Purchased

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
Less than 9000 miles	121	-.0067	-.0105
9000-12999 miles	151	-.0131	-.0126
13000-16999 miles	59	.0143	.0633
17000 miles or more	59	.0143	-.0298
Beta square = .008			

TABLE 39

MCA Results When the Independent Variable is the Month in Which the Purchase was Made

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
October; November; December	112	.0332	.0365
January; February; March	77	-.0422	-.0624
April; May; June	97	-.0483	-.0394
July; August; September	114	.0384	.0411
Beta square = .014			

TABLE 40

MCA Results When the Independent Variable is Whether a Trade-in or Sale Was Made on the Purchase

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
Had a trade-in or sale	241	.0022	.0234
No trade-in or sale	160	-.0033	-.0352
Beta square = .005			

TABLE 41

MCA Results When the Independent Variable is Whether All or Part of the Purchase Price Was Borrowed or Financed

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
Borrowed or financed	208	.0442	.0210
Did not borrow or finance	184	-.0416	-.0217
Beta square = .003			

TABLE 42

MCA Results When the Independent Variable is Whether the Economic Unit Had Other Instalment Debt Payments When the Purchase was Made

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
Had instalment debt payments	62	.0859	.0216
Did not have instalment debt payments	324	-.0084	-.0022
Beta square = .000			

TABLE 43

MCA Results When the Independent Variable is the Household Trading Cycle

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
Purchase at least every 2 years	86	.0256	.0240
Purchase every 3 years	86	-.0092	.0081
Purchase every 4 years	52	-.0374	-.0827
Purchase more than 4 years apart	84	-.0054	-.0000
Purchase irregularly	92	.0127	.0180
Beta square = .007			

TABLE 44

MCA Results When the Independent Variable is the Respondent's Purchase History

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
3 or less previous purchases	99	-.0003	-.0713
4-6 previous purchases	105	.0850*	.1111*
Over 6 previous purchases	195	-.0438	-.0221

Beta square = .033

* This difference exceeds two standard errors.

TABLE 45

MCA Results When the Independent Variable is the Number of Other Automobiles Owned in the Economic Unit

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
None	112	-.0024	.0150
One	205	-.0062	.0052
Two or more	84	.0184	-.0328
Beta square = .002			

The last two variables employed in the MCA regression are measures of buyer attitudes. The first of these variables measures the buyer's outlook for the financial situation of the economic unit, while the second is designed to measure buyer attitude toward automobile styling. In these cases, some comments as to objectives and scaling are in order.

The general hypothesis for each of the independent variables is that the variable is a significant predictor of membership in the market segment which considered both new and used cars. With respect to the buyers outlook on the financial situation of the economic unit, the more specific hypothesis is that buyers who are uncertain about the financial future or who do not foresee a change from the present level will be more inclined to consider both vintage alternatives. This is interpretable as a type of hedging action; we are hypothesizing that all other things held constant, buyers with an optimistic view will consider only new cars while pessimistic or uncertain buyers will consider only used cars because of possible financial constraints.

The real problem with testing this hypothesis concerns the timing of the measurement of attitude. Ideally, we want to capture the outlook of the respondent at the time of the consideration process. Technically, this would involve a question such as: "How did you feel about the outlook for the financial situation of your household at the time you were considering your purchase?" It was felt that such an unbiased reconstruction of attitude was impossible. One alternative

solution was to ask the respondent if the financial situation of the economic unit had in fact improved, declined, or stayed the same over the past twelve months, a period which would have included the point of purchase. This was rejected because of the fear that such a more objective, retrospective measure might not capture the subjective attitudinal outlook prevailing at the time of the purchase.

The option finally selected was to ask the respondent about his subjective outlook for the financial situation at the time of the interview. While this also raises the issue of whether that outlook is necessarily the same as the one prevailing at the time of purchase, it seems the best solution to a persistent problem. Such a solution really assumes that over a limited period of time, such a subjective attitude will not change significantly. Using this approach, the results of MCA for this attitudinal variable are shown in Table 46.

The other attitudinal variable employed is a measure of the individual's weighting of the importance of styling in purchasing a car, i.e., his style consciousness. As noted in Chapter II, it is expected that individuals who are highly sensitive to the styling and appearance attributes of the product would consider only new cars, while those less sensitive would be more inclined to consider used cars in the buying process. We would expect those who consider both new and used cars to be at some intermediate level of style consciousness.

TABLE 46

MCA Results When the Independent Variable is the Outlook for the Financial Situation of the Economic Unit

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
Better next year	176	.0154	-.0152
Same next year	151	-.0065	.0218
Worse or uncertain	72	-.0192	.0010
Beta square = .006			

In order to measure this sensitivity, a scale was developed based on the questions presented in Table 47.[73] Points were assigned to responses as indicated by the numbers in Table 47. These points were cumulated to arrive at a score, and individuals were assigned to a category as follows:

Total score	Category
17-25	High style orientation
12-16	Medium style orientation
5-11	Low style orientation

These categories were then run as the subsets of the independent variable in the MCA regression. The results are presented in Table 48.

Table 49 summarizes the beta squares for all the independent variables, ranking them from largest to smallest. They are all generally low, with only five predictor variables achieving a beta square of .02 or greater. While the primary interpretation of the beta squares is this relative ranking of the predictors in terms of importance, the consistently low level of each starts to raise serious doubts as to their absolute predictive power.[74]

73/ The approach used in developing these questions is found in Wiseman, "A Segmentation Analysis on Automobile Buyers."

74/ The reader is again referred to the discussion of the interpretation of beta square found in Andrews, Morgan, and Sonquist, Multiple Classification Analysis, pp. 117-122. For a much stronger (and possibly incorrect) interpretation, see Peters, "Variation in Consumer Buying Behavior," pp. 83-84.

TABLE 47

Questions Used To Develop A Measure of Style Consciousness

I would like you to tell me to what extent you agree or disagree with the following statements as they apply to you. Please put a check in the appropriate place:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I prefer to drive a car with whitewall tires.	5	4	3	2	1
2. I prefer economical to stylish automobiles.	1	2	3	4	5
3. I can tell the difference between cars of different model years.	5	4	3	2	1
4. I pay attention to the new models when they come out whether I plan to buy or not.	5	4	3	2	1
5. I think that the American automobile manufacturers should follow Volkswagen's lead in keeping style changes to a minimum.	1	2	3	4	5

TABLE 48

MCA Results When the Independent Variable is the Attitude of the Purchaser Toward the Importance of Styling

Mean = .17206 Standard deviation = .37791	Number of Cases	Difference from Mean Gross	 Net
High style consciousness	147	.0320	.0238
Medium style consciousness	194	-.0122	-.0097
Low style consciousness	54	-.0239	-.0223
Beta square = .002			

TABLE 49

A Summary of Beta Squares for All Independent Variables
(ranked from highest to lowest)

Predictor	Value of Beta Square
Number of adults in the economic unit	.035
Respondent's purchase history	.033
Age of the decision maker	.024
Who normally drives the car recently purchased	.024
Number of children in the economic unit	.022
Annual income of the economic unit	.017
Number of drivers in the household	.017
Month in which the purchase was made	.014
Occupation of the head of household	.012
Relative position of the economic unit within its income class	.011
Sex of the decision maker	.008
Average yearly mileage anticipated on the car recently purchased	.008
Household trading cycle	.007
Outlook for the financial situation of the economic unit	.006
Trade-in or sale made on the purchase	.005
Primary usage of the car recently purchased	.003
Part or all of the purchase price borrowed or financed	.003
Number of other cars owned in the household	.002
Importance of styling	.002
Education of the head of household	.001
Instalment debt when purchase was made	.000

These doubts are confirmed when we find that the multiple adjusted R^2 for the MCA run is equal to .034. This means that our predictive model, using all 21 predictors, explained only 3.4% of the variance in the dependent variable. At this level of R^2, we must reject the second hypothesis; that is, we conclude that membership in the market segment of those who consider both vintage alternatives can not be predicted by the independent variables employed in this study.

The conclusion that our model does not predict membership in the market segment raises the question as to what interpretation we should place on the fact that some of the predictor variable subsets (those with gross and/or net differences from the mean exceeding two standard errors) proved to be significant in terms of adjusted probabilities of membership in the segment. If we go back to the data in Tables 27 through 48, the following subsets were found to be significant at the .05 level:

Gross differences from the mean

Two children (standard error = .0445)
Primary user is wife and/or child (S.E. = .0425)
Buyer had made 4-6 previous purchases (S.E. = .0370)

Net differences from the mean

Two children (S.E. = .0437)
Primary user is wife and/or child (S.E. = .0417)
Buyer had made 4-6 previous purchases (S.E. = .0364)
More than 2 adults in the household (S.E. = .0364)
Three drivers in the household (S.E. = .0510)

The question which remains is whether we can have a situation in which the model as a whole shows very low predictive power while some components of the model (i.e., predictor variable subsets) show significant predictive power. In other words given the level of R^2 attained, should we go into the model for any further analysis at all?

The answer is no.[75/] We must treat the differences (coefficients) which exceed two standard errors with skepticism, noting that their occurrence could well be by chance. For example, there are 93 net differences from the mean in our model. The 5 which are designated as significant could be so large by chance. We must remember that one constraint of the MCA program is that the sum of all differences from the mean equals zero. In a sense, since every difference must equal something, it is not too surprising that a few of the values might be relatively large.

To repeat, with an R^2 of .034, we should not rely on the fact that some variable subsets have coefficients which can be designated significant. The model does not predict membership in our market segment; therefore, we can not expect components of the model to be powerful predictors.

75/ This conclusion is supported by Miss Laura Klem and Dr. Frank Andrews, both with the Institute for Social Research, The University of Michigan and both very experienced in the interpretation of MCA results. Miss Klem's comment is that she would not go further into an analysis of the subset coefficients until an R^2 of .10 was achieved, and that she would be reluctant to argue a strong case for coefficient significance even at that level.

When the low R^2 was discovered, attempts were made to investigate if any external reasons could be found to explain it, external meaning those things apart from the question of whether any true relationship existed at all. One factor which was observed related to the collapsing of data categories.[76/] The MCA run for which results were presented in Tables 27 through 48 was performed using a maximum of collapsing. This collapsing was done in order to maximize the number of predictor subsets in which there were at least 50 cases, the minimum standard for obtaining stable coefficients.

To measure the impact of this collapsing on R^2, the MCA program was rerun using the larger number of categories initially employed in the questionnaires (See Appendices C and D for original questionnaire categories). While the number of unstable and, thus, unusable coefficients increased as expected, the R^2 yielded by this run was .099. In addition, the following subsets of predictor variables in which differences from the mean exceeded two standard errors were isolated:

Gross differences from the mean

Occupation of the head of household is that of craftsman, foreman or government protective service worker. (.0982)
Two children in the household. (.0918)

76/ "Collapsing" in this sense means to combine. For example, the questionnaire used six income categories (see p. 208, Appendix C). These were originally coded as six separate categories, but a combining of some adjacent classes led to a final set of four income subsets.

Net differences from the mean

Two children in the household. (.1032)
Two adults in the household. (-.0687)
Three adults in the household. (.1636)
Three drivers in the household. (-.1458)
Occupation of the head of household is that of
a professional or technical worker. (-.0892)

The actual differences from the mean are shown in parentheses above.

This latter application of the MCA technique raises a number of questions. Is R^2 now high enough to warrant confidence in the predictive model as a whole; that is, have we overcome the objection to further analysis and testing of the data which was raised in the MCA run which yielded an R^2 of .034? The answer is a qualified "no" (See footnote 74). While .099 is an improvement over the level of R^2 reported earlier, it is still quite low in terms of giving us confidence in the ability of the model to predict membership in the segment. The question still remains as to how good the component parts of the model can be when the overall predictive power remains low. Again, looking at the fact that some coefficients exceed twice their standard error, we are reminded of the possibility of chance occurrence. Such a possibility is heightened by the fact that the total number of coefficients was expanded in the second MCA run.

There are two brighter aspects in a comparison of the two MCA runs. First, an examination of the data in Table 50 indicates that there was a general increase in the level of beta squares from the first run to the second. This is consistent with the rise in R^2 which occurred.

TABLE 50

Values of Beta Square for the Second MCA Run
(ranked from highest to lowest)

Predictor	Value of Beta Square
Number of adults in the economic unit	.070
Average yearly mileage anticipated on the car recently purchased	.056
Number of drivers in the economic unit	.051
Respondent's purchase history	.047
Occupation of the head of household	.037
Who normally drives the car recently purchased	.036
Annual income of the economic unit	.034
Age of the decision maker	.030
Number of other cars owned in the household	.026
Education of the head of household	.022
Number of children in the economic unit	.020
Month in which the purchase was made	.019
Household trading cycle	.008
Primary usage of the car recently purchased	.007
Sex of the decision maker	.007
Relative position of the economic unit within its income class	.005
Importance of styling	.004
Instalment debt when purchase was made	.004
Outlook for the financial situation of the economic unit	.003
Part or all of the purchase price borrowed or financed	.002
Trade-in or sale made on the purchase	.002

Secondly, the following predictor subsets showed common results in significance testing over both runs:

Gross differences from the mean

Two children in the household

Net differences from the mean

Three adults (More than two adults in the first run)
Two children in the household
Three drivers in the household

This commonality might bolster our confidence that these variables really do play a significant role in adjusting the probabilities of membership in the segment which considers both vintage alternatives.

Conclusions: MCA results

The overall conclusion drawn from the MCA results cited above is that the predictive power of our model is very low, leading us to reject the second hypothesis. While membership in some predictor subsets appears to have a significant impact on the probability of segment membership, such an interpretation must be made with great reservation because of the overall low predictive power. It does appear that there is a trade-off between achieving a higher R^2 and maximizing the number of stable coefficients generated by the MCA program (i.e., maximizing the number of variable subsets with at least 50 cases). This phenomenon might temper our conclusions somewhat, leading us to reject the model's predictive power only for the small sample case. If a larger sample were obtained, the above mentioned trade-off would not be necessary,

and we might be willing to ascribe more predictive power to the model. Even in such a case, however, the results of the second MCA run made for this study indicate that great care must be exercised in assigning any strong predictive power to any independent variable or its subsets.

Empirical Results: "Special Cases"

One of the steps taken before the MCA program was employed was to establish whether or not individuals in the market segment considering both vintages were, in certain senses, "special cases" of purchasers. Such cases were defined as those in which a somewhat atypical purchase motive, opportunity, or constraint existed. Specifically, they were identified as follow:

1. Was the car purchased a dealer demonstration model or an executive car?

2. Was the car purchased in a "special deal" (e.g., purchased from a relative or employer) which the average car buyer would have been unable to get?

3. Was the car purchased primarily to resell at a profit or to repair or customize as a hobby?

4. Did the General Motors strike of Fall, 1970 affect the choice of cars or the timing of the purchase in any way?

5. Did the wage-price freeze beginning in August, 1971 affect the choice of cars or the timing of the purchase in any way?

A certain number of these "special cases" was expected. The important question at this point is whether there is a higher or lower

incidence of these cases in our market segment as opposed to the group of buyers who considered only one vintage of automobile in the purchase decision. If a significant difference between the groups exists, we have additional potential explanations for the differences in consideration behavior between the subgroups in the sample.

Because of the desire to maintain the continuity of the MCA approach and because these avenues of investigation are peripheral to the major thrust of this chapter, the analysis of these "special cases" has been deferred to this point.

Dealer demonstration or executive cars

Table 51 shows the number of cases in which respondents purchased a dealer demonstration or executive car. Statistical analysis of the data reveals a significant difference between those purchasing a demonstration/executive car and those not making such a purchase in terms of inclusion in the segment which considered both vintage alternatives. As Table 51 stands, it is interpretable as indicating that individuals purchasing a demonstration or executive car were more likely to be in the market segment considering both vintages than those who did not purchase such a car.

Such an interpretation leaves much to be desired in terms of any practical application. One of the arguments used to justify the study was that if segment membership could be predicted, dealership sales personnel would have some basis for perceiving whether the sales

TABLE 51

Individuals Purchasing a Dealer Demonstration or Executive Car

	Number purchasing a demonstration or executive car	Percentage of sub-group purchasing a demonstration or executive car
Considered only one vintage (260)*	18	6.9
Considered both new and used cars (55)	9	16.4
Chi square = 5.163 Degrees of freedom = 1 Significant at the .05 level		

* Numbers in parentheses are the number of respondents in each category. Total responses to this question are less than the total sample size because of the inapplicability of the question to those who purchased used cars from private individuals.

presentation could be profitably shifted from one vintage alternative to the other. It follows that one major objective of the study has been to isolate variables which predict membership in the segment. In the case of the data found in Table 51 such a strict interpretation is somewhat sterile, because it uses the final purchase behavior as a predictor of behavior in the purchase decision process; this would obviously be of no benefit to the automobile salesman in determining whether or not to introduce the other vintage in the sales approach. Probably the only safe conclusion drawn from Table 51 is that individuals who enter the dealership expressing specific interest in demonstration or executive cars may be interested in considering cars of both vintages, a finding which is probably not at all surprising to experienced car salesmen.

There is one rather interesting finding which is not presented in Table 51. Of the 27 individuals who reported buying a demonstration or executive car, 19 reported buying a new car. In other words, these 19 individuals perceived the car as new even though some mileage was registered on it.

If we look at the data for the mileage on these demonstrator cars at the time of purchase as presented in Table 52, we find that the 19 buyers who perceive the demonstrator car as new are those falling into the relatively low mileage categories (16 cases where mileage is less than 5000; 2 cases between 5000 and 10000). This interpretation of newness, then, appears reasonable in light of the limited mileage on the cars. It also suggests that individuals' conceptualization of used

TABLE 52

Mileage on Demonstration or Executive Cars When Purchased

	Mileage When Purchased						
	Under 500	500-999	1000-1999	2000-4999	5000-9999	10000-19999	2000 and over
Perceive the demonstration car as new*	5	1	6	4	2	--	--
Perceive the demonstration car as used	1	--	--	2	--	--	5

* In one case in which a demonstration car was perceived as new, the respondent did not answer the mileage question; thus, the total number of cases presented here is 26.

versus new may be based more on the dimension of previous ownership (or the lack of it) than any physical use concept.

One other factor should be noted here. The next section of "special cases" concerns special deals which the average car purchaser could not make. There are five cases in which a demonstration or executive car was purchased where such a special deal was also claimed. In these cases, one wonders if such a purchase situation is analyzable at all in terms of the hypotheses we have been testing.

Special deals

Table 53 indicates the relative frequency of special deals made in both subdivisions of the sample. The data indicate that there is no significant difference between those making special deals and those not making such deals in terms of their inclusion in the market segment considering both vintages.

We might express some surprise at the relatively large number of respondents reporting such a favorable purchase opportunity (16.2% of the total sample). What should be remembered here is that while respondents were given guidelines as to what "special deal" meant (e.g., purchase from a relative or employer), they were free to use their own perceptions in answering the question. For example, it is possible that respondents who perceived the price paid for the automobile as very favorable reported making a special deal.

TABLE 53

Individuals Receiving a "Special Deal" on the Car Purchased

	Number receiving a "special deal" on the car purchased	Percentage of sub-group receiving a "special deal"
Considered only one vintage (332)*	52	15.7
Considered both new and used cars (69)	13	18.8

Chi square = .425
Degrees of freedom = 1
Not significant at the .05 level

* Numbers in parentheses are the number of respondents in each category.

Purchase for resale or repair

Table 54 deals with the special case of individuals whose primary motivation in buying the car which they did was that of reselling it at a profit and/or repairing it or customizing it as a hobby. The results of the statistical analysis of the data in Table 54 indicate a significant difference in terms of segment membership on the basis of whether such a special motivation to buy existed. On the surface, the data shown in Table 54 and their interpretation appear quite illogical. It would seem that individuals interested in resale and repair would consider only used cars. In fact, of the total 17 cases in which such a motivation to buy was reported, fifteen were used car purchasers; all six cases in which both vintages were reported as considered were ultimate used car purchasers. Probably the only way in which to interpret those cases in which a used car was bought primarily to resell or repair but a new car was also reportedly considered is to assume that buyers considered both vintages with different purchase motivations for each. In this light, the ultimate acquisition of a used car to resell or repair is a fundamental alternative to acquiring a new car primarily for transportation purposes. In some sense, it represents the selection of the "hobby" or "profit" alternative over new transportation. In another sense, it could represent a delaying action in terms of the purchase of a new car. In any event, even the evidence of a statistically significant difference as reported in Table 54 sheds no light on our attempt at market segmentation along the behavioral lines we are using. In addition, the two cases in which buyers considered

TABLE 54

Individuals Purchasing Cars Primarily to Resell or Repair

	Number purchasing to resell or repair	Percentage of sub-group purchasing to resell or repair
Considered only vintage (332)*	11	3.3
Considered both new and used cars (69)	6	8.7

Chi square = 4.077
Degrees of freedom = 1
Significant at the .05 level

* Numbers in parentheses are the number of respondents in each category.

only new cars and yet claimed to buy for purposes of resale/repair remain inexplicable.

Table 55 indicates that very few buyers were influenced in their decision process by the 1970 General Motors strike. It also shows no significant difference in terms of strike impact on the breadth of consideration in terms of vintages considered.

Table 56 shows the cases in which the wage-price freeze announced in August, 1971 affected the purchase plans of buyers. The data indicate that there is no significant difference between those claiming to have been affected by the freeze and those who weren't in terms of their inclusion in the market segment considering both vintages.

An analysis of special cases offers us little, then, in terms of any potential explanation of market segmentation along the behavioral lines which we are employing. This investigation, however, should serve to reassure us that the incidence of special cases is not so high as to impair the validity of the sample. The need for such an investigation does point out one of the real frustrations of any study dealing with automobile purchase as the focal point. This product is so pervasive in use yet so important a purchase that an almost infinite set of purchase circumstances and motivations may exist. To some extent, we could define as many situations of "special cases" as there are total purchases. The element of control in such a study thus becomes an important consideration.

TABLE 55

Individuals Affected by the 1970 General Motors Strike

	Number of individuals whose purchase plans were affected by the strike	Percentage of sub-group whose purchase plans were affected by the strike
Considered only one vintage (332)*	8	2.4
Considered both new and used cars (69)*	1	1.4

Chi square = .240
Degrees of freedom = 1
Not significant at the .05 level

* Numbers in parentheses are the number of respondents in each category.

TABLE 56

Individuals Affected by the 1971 Wage-Price Freeze

	Number of individuals whose purchase plans were affected by the strike	Percentage of sub-group whose purchase plans were affected by the strike
Considered only one vintage (332)*	19	5.7
Considered both new and used cars (69)*	6	8.7

Chi square = .864
Degrees of freedom = 1
Not significant at the .05 level

* Numbers in parentheses are the number of respondents in each category.

Summary and Conclusions

In this Chapter, a relatively new multivariate technique (Multiple Classification Analysis) was used to test the second hypothesis presented in Chapter II, namely that certain independent variables could be used to predict membership in the market segment of those who consider both new and used cars in the purchase decision. The MCA results led us to reject that hypothesis. Although there were some indications that some buyer or purchase characteristics might have a significant impact on the probability of segment membership, the overall predictive power of the model was too low to allow a great deal of confidence in such finding.

An analysis of "special cases" of atypical purchase motivations and opportunities was undertaken in a further attempt to isolate factors which might be used to predict segment membership. Here again, the analysis failed to offer any potential explanations of market segmentation along the behavioral lines employed by the study. The conclusions again lead us to reject the hypothesis regarding the predictability of membership in the segment.

CHAPTER VI

OTHER BEHAVIORAL CHARACTERISTICS OF THE MARKET SEGMENT CONSIDERING BOTH NEW AND USED CARS

The Goal of This Chapter

In Chapter V, membership in the segment of those who considered both new and used cars was treated as the dependent variable. We then employed various socioeconomic, demographic, purchase, usage, and ownership variables in an unsuccessful attempt to isolate those variables which would allow us to predict such membership.

In this Chapter, membership in this market segment is treated as the independent variable in an attempt to explain further behavioral differences between those who consider both vintages and those who do not. Specifically, the goal of this chapter is to test the following hypotheses:

1. Buyers in the market segment considering both new and used cars in a single purchase decision consider a wider variety of makes than buyers who consider only new or only used cars.

2. Buyers in the market segment considering both new and used cars in a single purchase decision consider a wider variety of models

than buyers who consider only new or only used cars.

3. Buyers in the market segment considering both new and used cars in a single purchase decision consider a wider variety of product classes than buyers who consider only new or only used cars.

4. Buyers in the market segment considering both new and used cars in a single purchase decision exhibit less make loyalty over multiple purchases (over time) than buyers who consider only new or only used cars.

The reader is reminded that a listing of the automobile makes, models, and classes employed in this study is found in Appendices A and B.

Methodology

In order to test these hypotheses, chi square analysis is employed. For the first three hypotheses, distributions were developed for the number of different makes, models, and classes considered by buyers. In the case of the fourth hypothesis, a measure of make loyalty over the last two purchases was developed and used as the basis for the chi square test.[77/]

77/ For a further discussion of this measure, see Chapter II, p. 42.

The Empirical Results: Breadth of Alternatives Considered

Tables 57, 58, and 59 respectively show the results of the analysis with respect to the number of makes, models, and classes considered. As the data indicate, the first three hypotheses stated in this chapter are supported: buyers in the market segment considering both new and used cars consider a wider variety of alternatives in the purchase decision than buyers who consider only new or only used cars, alternatives being defined in terms of makes, models, and product classes.

The data in each of the tables are consistent in supporting their respective hypotheses. In each case, a majority of the buyers considering only one vintage considered only one make, model, and class alternative while a majority of buyers who considered both vintages considered two or more makes, models, and classes.

A note of caution should be interjected here regarding the interpretation of the data in these tables. Some readers may express surprise at the apparently narrow range of alternatives considered by some buyers (e.g., Table 57 tells us that 55.1% of all buyers who considered only one vintage also considered only one make; Table 58 tells us that 52.4% of all buyers who considered only one vintage considered only one model). What must be remembered is that none of these tables necessarily tells us about the total number of products or "product packages" which the buyer may have considered. For example, while a buyer in Table 57 might have considered only one make of car, he could have considered a number of different models

TABLE 57

Number of Different Automobile Makes Considered
(in per cent)

	Number of Different Makes Considered			
	One	Two	Three	Four or Five
Buyers considering only one vintage (332)*	55.1 (183)	26.2 (87)	12.7 (42)	6.0 (20)
Buyers considering both new and used (69)	27.5 (19)	40.6 (28)	17.4 (12)	14.5 (10)

Chi square = 19.40
Degrees of freedom = 3
Significant at the .05 level

* Numbers in parentheses are the number of respondents in each category.

TABLE 58

Number of Different Automobile Models Considered
(in per cent)

	Number of Different Models Considered				
	One	Two	Three	Four	Five or Six
Buyers considering only one vintage (332)*	52.4 (174)	23.2 (77)	15.1 (50)	6.6 (22)	2.7 (9)
Buyers considering both new and used (69)	17.4 (12)	34.8 (24)	26.1 (18)	15.9 (11)	5.8 (4)

Chi square = 19.11
Degrees of freedom = 4
Significant at the .05 level

* Numbers in parentheses are the number of respondents in each category.

TABLE 59

Number of Different Automobile Classes Considered
(in per cent)

	Number of Different Classes Considered		
	One	Two	Three or Four
Buyers considering only one vintage (332)*	69.3 (230)	23.8 (79)	6.9 (23)
Buyers considering both new and used (69)	30.4 (21)	50.7 (35)	18.8 (13)

Chi square = 37.62
Degrees of freedom = 2
Significant at the .05 level

* Numbers in parentheses are the number of respondents in each category.

within that make. Even in the case of a buyer who is classified as having considered only one model in Table 58, we cannot be too quick to assume that this represents extremely narrow search behavior. In this latter case, it is possible that such a buyer may have considered a variety of sources (e.g., different dealerships) for that single make, thus evaluating a number of different "product packages." The overall point is that the interpretation of the data in Tables 57, 58 and 59 should be limited to the comparative analysis which was cited earlier.

What might account for the above findings regarding the breadth of alternatives considered? To some extent, the willingness of members of our segment of interest to entertain consideration of a greater variety of makes, models, and classes could be a manifestation of the greater flexibility and open mindedness which led to their segment membership in the first place. This might be related to the overall concept of buyer trade-offs, where buyers in the segment considering both vintages are evidencing a greater willingness to entertain an overall wider variety of alternatives as they attempt to optimize the purchase decision with respect to product attributes such as age, style, size, options, etc.

Another explanation might be found in the fact that buyers who consider both new and used cars simply have more contact with a greater variety of product sources, hence with more product types. This would be, in effect, a snowballing phenomenon in which a search of alternatives which starts on a broad basis will breed even more alternatives than a narrower initial search. Such an explanation would

be supported by the consistency of the findings across makes, models, and classes.

While we are theorizing on the explanation of these findings, it is easier to see the possibility of a concrete application of them. If an automobile salesman knows that he is dealing with a buyer who is considering both vintage alternatives, he would want to be aware of the likelihood that such a buyer will entertain a wider variety of alternatives in terms of makes, models, and classes. Rather than staying within the confines of a given model or even class of automobile, the salesman should be inclined to introduce a much wider range of products for such a buyers consideration.

The Empirical Results: Make Loyalty

Data in Table 60 show the relative levels of make loyalty for buyers in our relevant market segment and those outside it. The Table shows we must reject the fourth hypothesis, since the chi square analysis indicates no significant difference between the two groups on the dimension of make loyalty.

One interesting finding presented in Table 60 is the relatively low level of make loyalty in the sample as a whole. If we momentarily ignore the division of the sample on the basis of the consideration of the other vintage alternative, we find that only 29.1% of all buyers may be classified as make loyal. This is low when compared with make loyalty

TABLE 60

Buyers' Make Loyalty
(in per cent)

	Make Loyal*	Not Make Loyal
Buyers considering only one vintage (307)**	28.7	71.3
Buyers considering both new and used (61)	31.1	68.9

Chi square = .152
Degrees of freedom = 1
Not significant at the .05 level

* A buyer is classified as make loyal if he bought the same make of car in each of his last two purchases.

** Numbers in parentheses are the number of respondents in each category. These numbers do not sum to the total sample size of 401 because there are 33 cases of first purchase in the sample. A make loyalty measure is not applicable in these cases.

measures found in some other buyer studies.[78/] The author has no explanation for this result other than noting that these other buyer studies dealt with new car buyers only while this study employed a sample of both new car and used car buyers. This comparison with other buyer studies was not pursued because of the relatively tangential interest of this study in the phenomenon of make loyalty.

Summary and Conclusions

In this chapter, membership in the market segment of those considering both vintage alternatives was treated as the independent variable in an analysis of other behavioral characteristics of car buyers. Analysis showed that individuals who considered both new and used cars in the purchase decision considered a wider range of alternatives in terms of automobile makes, models, and classes than those who considered only new or only used cars. These groups of buyers showed no differences in behavior on the dimension of make loyalty exhibited. In addition, the overall incidence of make loyalty in the sample as a whole proved to be considerably lower than that found in many other buyer studies.

78/ Make loyalty is measured in various ways in different studies. In some cases, the last two purchases are compared. Sometimes, buyers are asked about their inclination to buy the same make again. Frequently, a comparison is made between make purchased and make traded-in. These various measures yield a wide range of results. In addition, different makes frequently have different degrees of loyalty. In general, these various measures run higher than the result found in this study. For example, see The Pittsburgh Press and Pittsburgh Post-Gazette, A Study of Automobile Purchases, (1968: No publication information given.), pp. 8-9. Also, Newsweek, 1967 Census of New Car Buyers (No publication information given.), pp. 13 and 21.

CHAPTER VII

CONCLUSION

Final Summary and Conclusions

The detailed findings from the research were presented in the specific chapters dealing with empirical results (Chapters IV, V, and VI). The purpose of this final summary is to restate the overall major results of the study in light of the hypotheses tested. In Chapter II, these hypotheses were recast in terms of the objectives of measurement, prediction, and investigation of behavioral characteristics. On this basis, the major findings may be summarized as follow:

1. Measurement of the size of the market segment in which buyers considered both new and used cars in the purchase decision yielded the result that 17.2% of all buyers in the sample considered both vintage alternatives. While this figure was based on individuals' own perceptions as to what was entailed in the consideration process, subsequent subjective and objective analyses of the purchase decision process yielded no firm evidence of artificial or superficial consideration which would warrant a

downward reduction in this figure. While tests showed that buyers were less inclined toward overt search behavior for the other vintage considered, the consideration of the other vintage appeared to be as strong as that of any non-purchased alternative.

2. The attempt to predict membership in the segment of those considering both vintage alternatives was generally a failure. Twenty one independent variables were employed in the application of a system of dummy variable multiple regression (Multiple Classification Analysis), these variables including socio-economic, demographic, purchase, usage, and ownership factors. While some categories of these variables appeared to have a significant impact on the level of probability of segment membership, the low R^2 achieved for the model as a whole left such significance in doubt. At no point in the MCA applications was there a strong implication of predictive power. As a result, the explanatory hypotheses supporting the inclusion of these predictor variables were rejected.

3. The investigation into the breadth of alternatives considered led to the finding that buyers who considered both new and used cars in the purchase decision considered a wider range of alternative makes, models, and product classes than buyers who considered only new or only used cars. The two groups did not differ with respect to make loyalty exhibited, with both groups showing a lesser degree of make loyalty than that reported in other buyer studies.

These are the major findings of the study. When the potential implications of the research were cited in Chapter I, we noted that the results could be of interest to economists, practitioners, and researchers in marketing. Looking at each of these groups separately, the utility of the findings may be judged in light of the special interests of the audience.

For economists, it is hoped that the results of the measurement phase will provide an input into the discussion of the extent of competition in the automobile industry and, more specifically, the applicability of concentration ratios to the measurement of such competition. While this study makes no claim to answer the theoretical economic questions raised, it is hoped that the empirical data which it provides are of use in their formulation and discussion.

Practitioners include manufacturers, dealers, and salesmen. The findings of this study probably have the strongest impact on the latter two groups. In establishing that the market segment of those considering both new and used cars was as large as indicated, the study provides support for a strategy of closer integration of the new and used car sales operations in dealerships which have both. The findings regarding the breadth of alternatives considered can be of help to salesmen in determining the range of products which should be introduced for consideration by buyers.

Perhaps the biggest disappointment for practitioners lies in the failure to achieve success in predicting segment membership. This failure makes it impossible to redirect marketing strategy to this market segment because the segment's members can not be readily identified. It also leaves sales personnel unable to undertake a convenient customer qualification procedure.

Researchers whose primary interest is market segmentation and prediction and explanation of buyer behavior are also likely to be frustrated by the failure of the model to predict segment membership. It is true that there is a positive side to such negative findings in that there is a ruling out or elimination of potential explanatory hypotheses. In this study, however, it was felt that if prediction was at all possible, the variables employed would at least point in that direction. Thus, while the study has tested some explanations of buyer behavior, it has done little in advancing our understanding of it.

Future Research

Some of the future research suggested by this study is a direct offshoot of the results presented. In fact, some is suggested by the frustrations encountered in this study. Still other future research efforts lie in the incorporation of the approach and findings of this study into larger theoretical frameworks.

One area which should be pursued is replication of the study, with replication being used in different senses here. To begin with, a straightforward or unmodified replication of the study would be useful in confirming the accuracy of the results. In addition, modified replications of the approach could be very useful in expanding our understanding of the buying behavior under investigation. Replication with a larger sample could be employed in an attempt to increase the level of R^2 to a point where more confidence could be placed in the micro-analytic MCA results. Replication in a more concentrated geographic area might be undertaken in an attempt to compare behavior in such a region with the more "national" results of this study. Such an analysis could hypothesize regional differences in taste, automobile usage, automobile taxation practices, and a number of other factors. Finally, replication over time is probably the most important step which should be taken in this context. Does the segment which considers both new and used cars in the purchase decision remain stable in size over time? The answer to this question is an integral part of an investigation into the more dynamic aspects of buyer behavior. Here, the

potential focal points of such an investigation could be factors such as differentials in buyer behavior over varying economic conditions, changing buyer attitudes toward automobiles and styling, and so forth.

Another avenue for future research lies in changing and expanding the explanatory variables used in attempting to predict membership in the market segment of those considering both vintage alternatives. The lack of success in this study in predicting membership in this segment should not discourage us from looking at different variables. Perhaps some of the weak signals provided by some of the predictor variables in this study may be used as a point of departure in selecting a new set. Perhaps more psychological measures (e.g., perceived risk) are needed. Certainly, a few of the more exploratory variables such as style consciousness could use further investigation in terms of construct validity.

Beyond these fairly specific and narrow recommendations, a number of other future research needs are apparent. One factor which must receive additional emphasis is the area of information search as it relates to buyer decision making. This is true in general, not just for the automobile purchase decision. One of the problems encountered in this study was the relatively high level of non-response on questions pertaining to information search. The author remains convinced that this problem is symptomatic of the need for a much more detailed study of information search and requirements, a study which has this topic as its major focus. We simply do not have enough insight into how much buyers know, how much they want to

know, or how they get information and weight the sources. We need this insight as an input into any explanation of their decision making behavior.

Another area which must be pursued is the whole general question of buyer trade-offs. There are so many discretionary aspects of an automobile purchase (e.g., timing; product vintage; style; price; options) and we do not yet have a grasp on the nature and extent of the trade-offs which buyers make among them. This study touched on the possibility of a trade-off between vintage and some other factors, but it certainly did not provide the critical answers necessary for a complete understanding of this phenomenon. For such an understanding, it is important that future work in market segmentation continue to explore the types of behavior exemplified in this study. That is, we must continue to investigate differences in purchase decision processes, not just differences in final purchase behavior.

Related to this is the question of other aspects of competition in the automobile industry when buyers' perceptions of alternatives are used as the keystone in the definition of such competition. What are the dynamics of the decision to purchase an automobile as opposed to other durables? What are the elements of the decision to postpone purchase of an automobile and instead extend the use of the current stock? What is the framework for resolution of the car versus car decision in terms of makes, models, and classes considered? All these questions stem from the same outlook as the one prevailing for the initiation of this study.

This latter point leads us back to the area which provided one impetus for this study, the more theoretical considerations of economists. While this study pursued primarily a marketing orientation, it began by citing the literature of economics as it attempted to define competition. Now that we have established the existence of a market segment in which new and used cars are viewed as alternatives, what does this do to the concept of a market in the economic sense? Certainly, much more is required before this work can become part of a larger body of thought on market segmentation, industrial organization, or consumer welfare.

APPENDIX A

AUTOMOBILE MAKES AND MODELS

Make	Model
Buick	Buick/Le Sabre/Electra/Wildcat/Centurion
	Riviera
	Skylark/Special
	Station Wagon*
	Other Buick**
Cadillac	Cadillac/Calais/De Ville/Fleetwood
	Eldorado
	Other Cadillac
Chevrolet	Chevrolet/Biscayne/Bel Air/Impala/Caprice/De Luxe
	Chevelle/Malibu
	Chevy II/Nova
	Corvair
	Camaro
	Monte Carlo
	Vega
	Corvette/Stingray
	Station Wagon
	Other Chevrolet
Oldsmobile	Oldsmobile/Delta 88/98/Dynamic 88/Del Monte 88
	F-85/442/Cutlass
	Toronado
	Station Wagon
	Other Oldsmobile

Make	Model
Pontiac	Pontiac/Catalina/Bonneville/Grand Ville/Executive Tempest/GTO/LeMans/T37 Grand Prix Firebird Ventura/Ventura II Station Wagon Other Pontiac
Chrysler	Chrysler/Newport/300/New Yorker/Windsor Imperial Station Wagon Other Chrysler
Plymouth	Plymouth/Fury I, II, III/ Sport Fury Roadrunner/GTX/Belvedere/Satellite/Sebring Valiant/Duster/Signet/Scamp Barracuda/Cuda Cricket Station Wagon Other Plymouth
Dodge	Dodge/Polara/Monaco/Super III Coronet Dart/Demon/Swinger Charger Challenger Colt Station Wagon Other Dodge
Ford	Ford/Galaxie/XL/Custom/LTD/Ford 500 Fairlane/Torino Falcon/Futura Mustang/Grande/Boss Thunderbird Maverick Pinto Station Wagon Other Ford

Make	Model
Lincoln	Lincoln/Continental
	Mark III/Mark IV
	Other Lincoln
Mercury	Mercury/Monterey/Marauder/Marquis
	Comet/Montego/Cyclone/Caliente/Capri
	Cougar
	Station Wagon
	Other Mercury
American Motors	Ambassador
	Rebel/Matador
	Hornet/American
	Gremlin
	Javelin
	AMX
	Station Wagon
	Other American Motors
Other Domestic	Other Domestic
Imports***	Volkswagen
	Datsun
	Toyota
	Mercedes Benz
	Opel
	MG/Triumph
	Renault
	Volvo
	Porshe/Audi
	Fiat
	Other Import

FOOTNOTES

* Station Wagons are treated as a distinct model throughout the analysis, regardless of the second name plate which they carry.

** The "other" category is used primarily to classify used car models on which production runs have ended. Pickup trucks and vans are coded "other."

*** Imports have been consolidated so that the entire category is treated as a "make" while the major product line of a given manufacturer is treated as a model. Only leading imports are specifically coded in the study.

This Appendix was compiled from material supplied by Market Facts, Inc., Chicago, Illinois and Slocum Publishing Co., Automotive News 1971 Almanac (Detroit: Slocum Publishing Company, 1970).

APPENDIX B

AUTOMOBILE MODELS BY MARKET CLASS

Subcompacts:

Gremlin
Pinto
Vega
Colt
Cricket

Compacts:

Comet/Cyclone/Caliente/Capri
Dart/Demon/Swinger
Hornet/American
Maverick
Nova/Chevy II/Corvair
Valiant/Duster/Signet/Scamp
Ventura/Ventura II

Intermediate:

Ambassador
Chevelle/Malibu
Coronet
F-85/442/Cutlass
Falcon/Futura
Le Mans/Tempest/GTO/T-37
Matador/Rebel
Montego
Satellite/Sebring/Belvedere/GTX/Roadrunner
Skylark/Special
Fairlane/Torino

Standard Size:

Buick/Le Sabre/Electra/Wildcat/Centurion
Cadillac/Calais/De Ville/Fleetwood
Chevrolet/Biscayne/Bel Air/Impala/Caprice/De Luxe
Chrysler/Newport/300/New Yorker/Imperial/Windsor
Dodge/Polara/Monaco/Super III
Ford/Galaxie/Custom/LTD/Ford 500
Lincoln/Continental
Mercury/Monterey /Marquis
Oldsmobile/Delta 88/98/Dynamic 88/Del Monte 88
Plymouth/Fury I, II, III/Sport Fury
Pontiac/Catalina/Bonneville/Grand Ville/Executive

Specialty Cars:

AMX
Barracuda/Cuda
Camaro
Challenger
Corvette/Stingray
Cougar
Eldorado
Firebird
Grand Prix
Javelin
Marauder
Mark III/Mark IV
Monte Carlo
Mustang/Grande/Boss
Riviera
Thunderbird
Toronado
Charger

Station Wagons:

Imports:

Other:*

* The other category is used primarily to classify used car models on which production runs have ended. Pickup trucks and vans are coded "other."

This Appendix was compiled from material supplied by Market Facts, Inc., Chicago, Illinois and Slocum Publishing Co., Automotive News 1971 Almanac (Detroit: Slocum Publishing Company, 1970).

APPENDIX C

THE QUESTIONNAIRE ADMINISTERED TO PURCHASERS OF NEW CARS

Hello, I'm _____ from Market Facts, Incorporated, a national consumer survey company. We're conducting a national survey about automobiles.

1. Have you or has any member of your household purchased a car within the past 12 months?

   Yes 1 No 2 (TERMINATE)

2. What is the make and year model of the car purchased most recently by you or someone in your household? (USE CAR MAKE PROBE SHEET TO DETERMINE MAKE OF CAR PURCHASED)

   19_____ _____ _____
   Model Year Make Model

IN ALL QUESTIONS REFERRING TO "SURVEY MAKE" READ MODEL YEAR AND MAKE NAMED IN QU. 2. FOR EXAMPLE: 1971 PLYMOUTH, 1972 MUSTANG, 1969 CHEVELLE, ETC.

3. Which member or members of the household had the primary responsibility for deciding which makes of cars to consider before the ____ (YEAR MODEL AND MAKE OF SURVEY CAR) was purchased?

Male head of household	1
Female head of household	2
Son.	3
Daughter	4
Other male (SPECIFY):_____	5
Other female (SPECIFY):_____	6
Joint decision (SPECIFY): _____AND_____	7

THE INTERVIEW SHOULD BE CONDUCTED WITH THE INDIVIDUAL INDICATED IN RESPONSE TO QUESTION 3. IF A JOINT DECISION IS INDICATED AND THE HEAD OF HOUSEHOLD IS A DECISION MAKER, CONDUCT THE INTERVIEW WITH HIM/HER. IF THE HEAD WAS NOT INVOLVED, CONDUCT THE INTERVIEW WITH ONE OF THE DECISION MAKERS. IF OTHER MALE/FEMALE, CONDUCT THE INTERVIEW WITH THAT INDIVIDUAL AND SPECIFY HIS RELATIONSHIP TO HEAD OF HOUSEHOLD ABOVE.

ASK TO SPEAK WITH QUALIFIED RESPONDENT. IF THAT PERSON IS NOT AVAILABLE, ARRANGE A CONVENIENT TIME TO CALL BACK.

QUALIFIED RESPONDENT'S NAME:_____

ADDRESS:_____

CALL BACK: TIME_____AM/PM DATE_____

IF SPEAKING TO NEW RESPONDENT, RE-INTRODUCE YOURSELF--

Hello, I'm_____from Market Facts, Incorporated. We are conducting a survey about cars and I understand that you had a major part in deciding which makes of cars to consider before you bought the _____ (YEAR MODEL AND MAKE OF SURVEY CAR).

4. We'd like to know a little more about the_____(YEAR MODEL AND MAKE OF SURVEY CAR)--Was it purchased new or used?

New	1	(GO TO WHITE QUESTIONNAIRE)
Used	2	(GO TO GREEN QUESTIONNAIRE)

5. In what month and year was the _____ (YEAR MODEL AND MAKE OF SURVEY CAR) purchased?

November, December	1970	1
January, February, March	1971	2
April, May, June.	1971	3
July, August, September	1971	4
October, November	1971	1
Any other month/year.		5 (TERMINATE)

6. Was there any special reason that you purchased it at the time you did rather than some other time?

_____

_____

(PROBE FOR SPECIFIC REASONS)_____

_____

_____

7. Did the dealer you bought the_____(YEAR MODEL AND MAKE OF SURVEY CAR) also deal in used cars?

Yes 1 No 2 Don't know 3

8a. Was it a dealer demonstration model or an executive car?

Yes 1 No 2 (SKIP TO QU. 9)

8b. Approximately how many miles were on the car when you bought it?

Under 500	1	5000-9999	5
500-999	2	10,000-19,999	6
1000-1999	3	20,000 and over	7
2000-4999	4		

9. Did you buy the_____(YEAR MODEL AND MAKE OF SURVEY CAR) from a relative or employer or make some other "special deal" that the average car buyer would have been unable to get?

Yes 1 No 2

10a. What was the total asking price for this car before any trade-in? _____

(READ ONLY IF RESPONDENT WILL NOT GIVE EXACT PRICE)

Less than $300	0	$2,400-3,399	4
$300-999	1	$3,400-4,499	5
$1,000-1,699	2	$4,500-5,999	6
$1,700-2,399	3	$6,000 or more	7

10b. When you bought the_____(YEAR MODEL AND MAKE OF SURVEY CAR), did you dispose of another car?

Yes 1 No 2 (SKIP TO QU. 11a)

10c. Was the car you disposed of traded-in to the dealer where you bought the_____(YEAR MODEL AND MAKE OF SURVEY CAR), sold to some other dealer or individual or did you dispose of it in some other way?

Traded-in	1	
Sold	2	(SKIP TO QU. 10e)
Other (SPECIFY): _____	3	(SKIP TO QU. 11a)

10d. What was the net selling price of the_____(YEAR MODEL AND MAKE OF SURVEY CAR) after the trade-in? _____

(READ ONLY IF RESPONDENT WILL NOT GIVE EXACT PRICE)

Less than $300	0	$2,400-3,399	4
$300-999	1	$3,400-4,499	5
$1,000-1,699	2	$4,500-5,999	6
$1,700-2,399	3	$6,000 or more	7

(SKIP TO QU. 11a)

10c. How much did you get for the car you sold? _____

(READ ONLY IF RESPONDENT WILL NOT GIVE EXACT PRICE)

Less than $300	0	$1,200-1,499	4
$300-599	1	$1,500-1,999	5
$600-799	2	$2,000-2,500	6
$800-1,199	3	Over $2,500	7

11a. As you know, many car buyers finance all or part of their purchase. Did you borrow or finance part or all of the total price?

Yes 1 No 2 (GO TO QU. 13)

11b. What are your monthly payments? _____
(READ ONLY IF RESPONDENT WILL NOT GIVE EXACT AMOUNT)

Lump sum repayment	0	(GO TO QU. 12)				
$1-29	1	$60-89	3	$120-149	5	Over $180 7
$30-59	2	$90-119	4	$150-179	6	

11c. Over how many months are these payments spread? _____
(READ ONLY IF RESPONDENT WILL NOT GIVE EXACT NUMBER OF MONTHS)

1-6 months	0	13-18 months	2	25-30 months	4
7-12 months	1	19-24 months	3	31-36 months	5
				Over 36 months	6

12. How much was the initial cash payment which you made? _____
(READ ONLY IF RESPONDENT WILL NOT GIVE EXACT AMOUNT)

$0.	0	$100-199	2	$400-499	5
$1-99	1	$200-299	3	$500-1,000	6
		$300-399	4	Over $1,000	7

13. Who paid for this car?

Male head of household.....	1	Other male (SPECIFY):_____	5
Female head of household...	2	Other female (SPECIFY):_____	6
Son	3	Joint effort (SPECIFY):	
Daughter.....	4	_____AND_____	7

14. Did you buy this car primarily to resell it at a profit or to repair or customize it as a hobby?

Yes 1 No 2

15. How many miles do you expect to put on this car in the first 12 months you own it?

Less than 5000 miles	1	13,000-16,999	4
5000-8999	2	17,000-25,000	5
9000-12,999	3	Over 25,000 miles	6

16. Who is the principal driver of this car?

Male head of household....	1	Other male (SPECIFY):_____	5
Female head of household..	2	Other female (SPECIFY):_____	6
Son.....	3	Two or more household	
Daughter.....	4	members.....	7

17. What was the main reason for buying this car; in other words, what is it used for mostly?

_____

_____

_____

_____

_____

18. About how long before you actually purchased did you first start thinking about buying a car?

Less than one week	1
One to four weeks	2
From one to three months	3
From three to six months	4
From six months to a year	5
A year or more	6

19. Did last year's General Motors strike affect your choice of cars or the timing of your purchase in any way?

Yes 1 No 2 (SKIP TO QU. 20)

In what way? _____

_____

_____

20. Did the wage-price freeze affect your choice of cars or the timing of your purchase in any way?

Yes 1 No 2 (SKIP TO QU. 21)

In what way? _____

_____

_____

21. When you first thought about buying a car, did you have a good idea of about how much you were willing to spend?

Yes 1 No 2 (SKIP TO QU. 24a.)

22. How much was that?

Less than $300	0	$2,400-$3,399	4
$300-$999	1	$3,400-$4,499	5
$1,000-$1,699	2	$4,500-$5,999	6
$1,700-$2,399	3	$6,000 or more	7

23. Did you finally stay pretty much within your budget, or did you spend more?

Generally stayed within my budget figure	1
Spent more	2

24a. When you were making your decision about what car to buy, did you also consider other makes and models of new cars besides the_____(YEAR MODEL AND MAKE OF SURVEY CAR)?

Yes 1 No 2 (SKIP TO QU. 24c.)

24b. Which specific makes and model years of new cars did you consider?

	Make	Model	Model Year
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____

(SKIP TO QU. 25a.)

24c. Was there any particular reason why you did not consider other makes of new cars?

_____

_____

_____

(PROBE FOR SPECIFIC REASONS)_____

_____

_____

25a. When you were making your decision about what car to buy, did you also consider used cars?

Yes 1 No 2 (SKIP TO QU. 25c.)

25b. What were the makes and year models of used cars you considered?

	Make	Model	Model Year
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____

(SKIP TO QU. 26)

25c. Was there any particular reason why you did not consider used cars?

_____

_____

(PROBE FOR SPECIFIC REASONS)_____

_____

_____

25d. Under what circumstances would you consider purchasing a used car?

26. Among the cars you considered, how did you get the information you needed to make up your mind about which one to buy?

QUESTIONS 27a-e ARE TO BE REPEATED FOR ALL CARS MENTIONED BY THE RESPONDENT AS CONSIDERED, INCLUDING THE ONE PURCHASED. THIS COVERS ALL CARS MENTIONED IN RESPONSE TO QUESTION 24b & 25b. ADDITIONAL SPACE IS FOUND ON THE NEXT PAGE. CARS SHOULD BE MENTIONED IN THE ORDER GIVEN BY THE RESPONDENT IN QUESTION 24b & 25b. COMPLETE ALL QUESTIONS FOR A GIVEN CAR BEFORE PROCEEDING TO THE NEXT CAR.

27.

	SURVEY CAR	Car #1	Car #2	Car #3	Car #4	Car #5
MAKE						
MODEL						
YEAR						
a. Did you discuss this car with your family?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2
b. Did you discuss this car with your friends?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2
c. Did you visit dealers or private individuals to look at this car?	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR
d. Did you test drive this car?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2
e. Was the price lowered during any later contact with the dealer or private individual?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2

27. (CONTINUED)

	Car #6	Car #7	Car #8	Car #9	Car #10
MAKE					
MODEL					
YEAR					
a. Did you discuss this car with your family?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2
b. Did you discuss this car with your friends?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2
c. Did you visit dealers or private individuals to look at this car?	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)
d. Did you test drive this car?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2
e. Was the price lowered during any later contact with the dealer or private individual?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2

28a. Imagine for a moment that the car you purchased was not available, what car do you think you would have chosen instead?

Make	Model	Year

(IF "NONE" SKIP TO QU. 29)

28b. Was that car new or used?

New 1 Used 2

29. (LOOK BACK TO QU. 25a. ASK QU. 29-31 ONLY IF RESPONDENT CONSIDERED USED CAR)

Did you check newspapers for used car ads and listings?

Yes 1 No 2 (GO TO QU. 31a.)

30. How often did you check?

Daily	1	Every week	3
About every day	2	Less than once a week	4

31a. When you first thought of buying a car, were you thinking mostly of a new car, a used car or both equally?

New 1
Used 2 (SKIP TO QU. 31c.)
Both 3 (SKIP TO QU. 32)

31b. How long after you first thought of buying a car did you first start considering a used car?

_____

_____

(GO TO QU. 32)

31c. How long after you first thought of buying a car did you first start considering a new car?_____

_____

32. Now I'd like to ask you some questions about cars in general, not just the last one you bought.

33a. In addition to the_____(YEAR MODEL AND MAKE OF SURVEY CAR), are there any other cars presently owned or leased by any members of your household?

Yes 1 No 2 (SKIP TO QU. 34)

33b. How many other cars are owned or leased by members of your household?

One	1	Three	3	Five	5
Two	2	Four	4	More than five	6

33c. What is the make, model and model year of the other cars owned or leased in this household? (RECORD UP TO FIVE BELOW)

33d. (FOR EACH CAR NAMED, ASK:) Was the_____(SPECIFY MAKE) purchased new or used, or is it a leased car? (RECORD BELOW)

	Make	Model	Model Year	Bought New or Used		Leased
1.			19___	1	2	3
2.			19___	1	2	3
3.			19___	1	2	3
4.			19___	1	2	3
5.			19___	1	2	3

34. Does anyone here own a jeep-type vehicle or a truck?

Yes 1 No 2

35. About how often does the head of your household buy a car?

Every year . . .	1	More than 5 years apart	6
Every 2 years	2	On an irregular basis	7
Every 3 years	3		
Every 4 years	4		
Every 5 years	5		

36a. Including your_____(YEAR MODEL AND MAKE OF SURVEY CAR), how many cars have you personally bought in your lifetime?

One	0 (SKIP TO QU. 38)	Six	5
Two	1	7-10	6
Three	2	More than 10	7
Four	3		
Five	4		

36b. How many of these were new cars? _____were new cars.

How many of these were used cars? _____were used cars.

37a. What was the last car you bought before the_____(YEAR MODEL AND MAKE OF SURVEY CAR)?

_____ _____ _____

Make Model Year

37b. Was the_____(CAR MENTIONED IN 37a) bought new or used?

New 1 Used 2

SCALING SHEET

I would like you to tell me to what extent you agree or disagree with the following statements as they apply to you. Please put a check in the appropriate place:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I prefer to drive a car with white-wall tires.	5	4	3	2	1
2. I prefer economical to stylish automobiles.	5	4	3	2	1
3. I can tell the difference between cars of different model years.	5	4	3	2	1
4. I pay attention to the new models when they come out whether I plan to buy or not.	5	4	3	2	1
5. I think that the American automobile manufacturers should follow Volkswagen's lead in keeping style changes to a minimum.	5	4	3	2	1

38. I would like you to tell me to what extent you agree or disagree with the following statements as they apply to you. Please put an "X" on the appropriate line. (HAND RESPONDENT SCALING SHEET)

(ALLOW RESPONDENT TIME TO ANSWER EACH STATEMENT. TAKE BACK SCALING SHEET AND STAPLE TO QUESTIONNAIRE. MAKE SURE THE RESPONDENT HAS AN "X" ON ONE LINE FOR EACH STATEMENT.)

39. What is the age and sex of head of the household? (RECORD BELOW)

From oldest to youngest, what is the age and sex of each of the other members of your household? (RECORD BELOW)

Is that person a driver? (RECORD BELOW)

Household Member	Sex	Age	Driver (indicate by check)	Indicate respondent by check
1. Head of Household				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				

40. What was the last grade of school completed by the head of household?

No high school	1
Some high school	2
Graduate high school	3
Some college	4
Graduate college	5
Some post-graduate college work	6
Post-graduate degree	7

41. Is the head of household working now, unemployed or laid off, retired, or what?

Retired	1	(SKIP TO QU. 43)
Permanently disabled	2	
Housewife	3	
Student	4	
Working now	5	
Unemployed, sick or temporarily laid off	6	

42. What is his/her main occupation, that is, the kind of work he/she has been doing to earn a living? _____

_____

_____

_____

43. We are interested in how people are getting along financially these days. Would you say that you and your family are <u>better off</u> financially, <u>worse off</u>, or about the same as you were a <u>year ago</u>?

Better now 1 Same 2 Worse now 3 Uncertain 4

44. Looking ahead, do you think that a year from now you people will be better off financially, worse off, or just about the same as now?

Better then 1 Same 2 Worse then 3 Uncertain 4

45. (HAND RESPONDENT INCOME CARD) For classification purposes only, we need to know which category represents your total family income. Your answer will be completely confidential and will be combined with the answers of others who take part in this survey. Would you please tell me which letter of this card indicates how much income you and your family received from all sources during the year 1970, I mean before any taxes and deductions.

A.	Under $7,500 (GO TO QU. 47)	0	D.	$15,000-19,999	3
B.	$7,500-9,999	1	E.	$20,000-24,999	4
C.	$10,000-14,999	2	F.	Over $25,000 (GO TO QU. 47)	5

46. Would you say that your income is at the high end, low end, or middle of that range?

High end 1 Low end 2 Middle 3

47. At the time you bought_____(YEAR MODEL AND MAKE OF SURVEY CAR), were you making any monthly payments on furniture and appliances? (DO NOT INCLUDE MORTGAGE PAYMENTS)

Yes 1 No 2 (GO TO END)

48. Approximately how much were these total payments per month?

$1-29	0
$30-59	1
$60-89	2
$90-119	3
$120-149	4
$150-179	5
$180-200	6
Over $200	7

Thank you for participating in this interview.

Name_____

Address_____

Telephone Number_____

Time Ended:_____AM/PM

APPENDIX D

THE QUESTIONNAIRE ADMINISTERED TO PURCHASERS OF USED CARS

Hello, I'm_____from Market Facts, Incorporated, a national consumer survey company. We're conducting a national survey about automobiles.

1. Have you or has any member of your household purchased a car within the past 12 months?

Yes 1 No 2 (TERMINATE)

2. What is the make and year model of the car purchased most recently by you or someone in your household? (USE CAR MAKE PROBE SHEET TO DETERMINE MAKE OF CAR PURCHASED)

19_____ _____ _____

Model Year Make Model

IN ALL QUESTIONS REFERRING TO "SURVEY MAKE" READ MODEL YEAR AND MAKE NAMED IN QU. 2. FOR EXAMPLE: 1971 PLYMOUTH, 1972 MUSTANG, 1969 CHEVELLE, ETC.

3. Which member or members of the household had the primary responsibility for deciding which makes of cars to consider before the ____ (YEAR MODEL AND MAKE OF SURVEY CAR) was purchased?

Male head of household	1
Female head of household	2
Son.	3
Daughter	4
Other male (SPECIFY):_____	5
Other female (SPECIFY):_____	6
Joint decision (SPECIFY): _____AND_____	7

THE INTERVIEW SHOULD BE CONDUCTED WITH THE INDIVIDUAL INDICATED IN RESPONSE TO QUESTION 3. IF A JOINT DECISION IS INDICATED AND THE HEAD OF HOUSEHOLD IS A DECISION MAKER, CONDUCT THE INTERVIEW WITH HIM/HER. IF THE HEAD WAS NOT INVOLVED, CONDUCT THE INTERVIEW WITH ONE OF THE DECISION MAKERS. IF OTHER MALE/FEMALE, CONDUCT THE INTERVIEW WITH THAT INDIVIDUAL AND SPECIFY HIS RELATIONSHIP TO HEAD OF HOUSEHOLD ABOVE.

ASK TO SPEAK WITH QUALIFIED RESPONDENT. IF THAT PERSON IS NOT AVAILABLE, ARRANGE A CONVENIENT TIME TO CALL BACK.

QUALIFIED RESPONDENT'S NAME:_____

ADDRESS:_____

CALL BACK: TIME_____AM/PM DATE_____

IF SPEAKING TO NEW RESPONDENT, RE-INTRODUCE YOURSELF--

Hello, I'm_____from Market Facts, Incorporated. We are conducting a survey about cars and I understand that you had a major part in deciding which makes of cars to consider before you bought the_____(YEAR MODEL AND MAKE OF SURVEY CAR).

4. We'd like to know a little more about the_____(YEAR MODEL AND MAKE OF SURVEY CAR)--Was it purchased new or used?

New 1 (GO TO WHITE QUESTIONNAIRE)

Used 2 (GO TO GREEN QUESTIONNAIRE)

5. In what month and year was the_____ (YEAR MODEL AND MAKE OF SURVEY CAR) purchased?

November, December. 1970 1

January, February, March 1971 2

April, May, June. 1971 3

July, August, September 1971 4

October, November 1971 1

Any other month/year. . . . . .5 (TERMINATE)

6. Was there any special reason that you purchased it at the time you did rather than some other time?

_____

_____

(PROBE FOR SPECIFIC REASONS)_____

_____

_____

7. Did you buy the_____(YEAR MODEL AND MAKE OF SURVEY CAR) from a dealer or private individual?

From a dealer 1 From a private individual 2 (GO TO QU. 8c)

Other (SPECIFY)_____ 3 (GO TO QU. 8c)

8a. Did the dealer you bought the_____(YEAR MODEL AND MAKE OF SURVEY CAR) also deal in new cars?

Yes 1 No 2 Don't know 3

8b. Was the_____(YEAR MODEL AND MAKE OF SURVEY CAR) a dealer demonstration or executive car?

Yes 1 No 2

8c. Approximately how many miles were on the car when you bought it?

Under 500	1	5000-9999	5
500-999	2	10,000-19,999	6
1000-1999	3	20,000 and over	7
2000-4999	4		

9. Did you buy the_____(YEAR MODEL AND MAKE OF SURVEY CAR) from a relative or employer or make some other "special deal" that the average car buyer would have been unable to get?

Yes 1 No 2

10a. What was the total asking price for this car before any trade-in? _____

(READ ONLY IF RESPONDENT WILL NOT GIVE EXACT PRICE)

Less than $300	0	$2,400-3,399	4
$300-999	1	$3,400-4,499	5
$1,000-1,699	2	$4,500-5,999	6
$1,700-2,399	3	$6,000 or more	7

10b. When you bought the _____(YEAR MODEL AND MAKE OF SURVEY CAR), did you dispose of another car?

Yes 1 No 2 (SKIP TO QU. 11a)

10c. Was the car you disposed of traded-in to the dealer where you bought the _____(YEAR MODEL AND MAKE OF SURVEY CAR), sold to some other dealer or individual or did you dispose of it in some other way?

Traded-in 1

Sold 2 (SKIP TO QU. 10e)

Other (SPECIFY):

_____ 3 (SKIP TO QU. 11a)

10d. What was the net selling price of the _____ (YEAR MODEL AND MAKE OF SURVEY CAR) after the trade-in? _____

(READ ONLY IF RESPONDENT WILL NOT GIVE EXACT PRICE)

Less than $300	0	$2,400-3,399	4
$300-999	1	$3,400-4,499	5
$1,000-1,699	2	$4,500-5,999	6
$1,700-2,399	3	$6,000 or more	7

(SKIP TO QU. 11a)

10e. How much did you get for the car you sold? _____

(READ ONLY IF RESPONDENT WILL NOT GIVE EXACT PRICE)

Less than $300	0	$1,200-1,499	4
$300-599	1	$1,500-1,999	5
$600-799	2	$2,000-2,500	6
$800-1,199	3	Over $2,500	7

11a. As you know, many car buyers finance all or part of their purchase. Did you borrow or finance part or all of the total price?

Yes 1 No 2 (GO TO QU. 13)

11b. What are your monthly payments? _____
(READ ONLY IF RESPONDENT WILL NOT GIVE EXACT AMOUNT)

Lump sum repayment	0	(GO TO QU. 12)					
$1-29	1	$60-89	3	$120-149	5	Over $180	7
$30-59	2	$90-119	4	$150-179	6		

11c. Over how many months are these payments spread? _____
(READ ONLY IF RESPONDENT WILL NOT GIVE EXACT NUMBER OF MONTHS)

1-6 months	0	13-18 months	2	25-30 months	4
7-12 months	1	19-24 months	3	31-36 months	5
				Over 36 months	6

12. How much was the initial cash payment which you made? _____

(READ ONLY IF RESPONDENT WILL NOT GIVE EXACT AMOUNT)

$0.	0	$100-199	2	$400-499	5
$1-99	1	$200-299	3	$500-1,000	6
		$300-399	4	Over $1,000	7

13. Who paid for this car?

Male head of household	1	Other male (SPECIFY):_____	5
Female head of household . . .	2	Other female (SPECIFY):____	6
Son.	3	Joint effort (SPECIFY):	
Daughter	4	_____AND_____	7

14. Did you buy this car primarily to resell it at a profit or to repair or customize it as a hobby?

Yes 1 No 2

15. How many miles do you expect to put on this car in the first 12 months you own it?

Less than 5000 miles	1	13,000-16,999	4
5000-8999	2	17,000-25,000	5
9000-12,999	3	Over 25,000 miles	6

16. Who is the principal driver of this car?

Male head of household.	1	Other male (SPECIFY):_____	5
Female head of household. . . .	2	Other female (SPECIFY):____	6
Son.	3	Two or more household members.	7
Daughter	4		

17. What was the main reason for buying this car; in other words, what is it used for mostly?

_____

_____

_____

_____

_____

18. About how long before you actually purchased did you first start thinking about buying a car?

Less than one week	1
One to four weeks	2
From one to three months	3
From three to six months	4
From six months to a year	5
A year or more	6

19. Did last year's General Motors strike affect your choice of cars or the timing of your purchase in any way?

Yes 1 No 2 (SKIP TO QU. 20)

In what way? _____

_____

_____

20. Did the wage-price freeze affect your choice of cars or the timing of your purchase in any way?

Yes 1 No 2 (SKIP TO QU. 21)

In what way? _____

_____

_____

21. When you first thought about buying a car, did you have a good idea of about how much you were willing to spend?

Yes 1 No 2 (SKIP TO QU. 24a.)

22. How much was that?

Less than $300	0	$2,400-$3,399	4
$300-$999	1	$3,400-$4,499	5
$1,000-$1,699	2	$4,500-$5,999	6
$1,700-$2,399	3	$6,000 or more	7

23. Did you finally stay pretty much within your budget, or did you spend more?

Generally stayed within my budget figure	1
Spent more	2

24a. When you were making your decision about what car to buy, did you also consider other makes and models of used cars besides the _____(YEAR MODEL AND MAKE OF SURVEY CAR)?

Yes 1 No 2 (SKIP TO QU. 24c.)

24b. Which specific makes and model years of used cars did you consider?

	Make	Model	Model Year
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____

(SKIP TO QU. 25a.)

24c. Was there any particular reason why you did not consider other makes of used cars?

_____

_____

_____

(PROBE FOR SPECIFIC REASONS)_____

_____

_____

25a. When you were making your decision about what car to buy, did you also consider new cars?

Yes 1 No 2 (SKIP TO QU. 25c.)

25b. What were the makes and year models of new cars you considered?

	Make	Model	Model Year
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____

(SKIP TO QU. 26)

25c. Was there any particular reason why you did not consider new cars?

_____

_____

(PROBE FOR SPECIFIC REASONS)_____

_____

_____

26. Among the cars you considered, how did you get the information you needed to make up your mind about which one to buy?

_____

_____

_____

_____

_____

_____

_____

_____

QUESTIONS 27a-e ARE TO BE REPEATED FOR ALL CARS MENTIONED BY THE RESPONDENT AS CONSIDERED, INCLUDING THE ONE PURCHASED. THIS COVERS ALL CARS MENTIONED IN RESPONSE TO QUESTION 24b & 25b. ADDITIONAL SPACE IS FOUND ON THE NEXT PAGE. CARS SHOULD BE MENTIONED IN THE ORDER GIVEN BY THE RESPONDENT IN QUESTION 24b & 25b. COMPLETE ALL QUESTIONS FOR A GIVEN CAR BEFORE PROCEEDING TO THE NEXT CAR.

	SURVEY CAR	Car #1	Car #2	Car #3	Car #4	Car #5
MAKE						
MODEL						
YEAR						
27.						
a. Did you discuss this car with your family?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2
b. Did you discuss this car with your friends?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2
c. Did you visit dealers or private individuals to look at this car?	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR
d. Did you test drive this car?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2
e. Was the price lowered during any later contact with the dealer or private individual?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2

27. (CONTINUED)

	Car #6	Car #7	Car #8	Car #9	Car #10
MAKE					
MODEL					
YEAR					
a. Did you discuss this car with your family?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2
b. Did you discuss this car with your friends?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2
c. Did you visit dealers or private individuals to look at this car?	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)	Yes 1 No 2 (GO TO NEXT CAR)
d. Did you test drive this car?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2
e. Was the price lowered during any later contact with the dealer or private individual?	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2

28a. Imagine for a moment that the car which you considered was not available, what car do you think you would have chosen instead?

Make	Model	Year
_____	_____	_____

(IF "NONE" SKIP TO QU. 29)

28b. Was that car new or used?

New 1 Used 2

29. Did you check newspapers for used car ads and listings?

Yes 1 No 2 (GO TO QU. 31a.)

30. How often did you check?

Daily	1	Every week	3
About every day	2	Less than once a week	4

31a. (LOOK BACK AT QU. 25a. ASK QU. 31 ONLY IF RESPONDENT CONSIDERED NEW CAR)

When you first thought of buying a car, were you thinking mostly of a used car, a new car or both equally?

Used 2 (SKIP TO QU. 31c.)

New 1

Both 3 (SKIP TO QU. 32)

31b. How long after you first thought of buying a car did you first start considering a used car?

_____

_____

(GO TO QU. 32)

31c. How long after you first thought of buying a car did you first start considering a new car?

_____

_____

32. Now I'd like to ask you some questions about cars in general, not just the last one you bought.

33a. In addition to the_____(YEAR MODEL AND MAKE OF SURVEY CAR), are there any other cars presently owned or leased by any members of your household?

Yes 1 No 2 (SKIP TO QU. 34)

33b. How many other cars are owned or leased by members of your household?

One	1	Three	3	Five	5
Two	2	Four	4	More than five	6

33c. What is the make, model and model year of the other cars owned or leased in this household? (RECORD UP TO FIVE BELOW)

33d. (FOR EACH CAR NAMED, ASK:) Was the_____(SPECIFY MAKE) purchased new or used, or is it a leased car? (RECORD BELOW)

	Make	Model	Model Year	Bought New or Used		Leased
1.			19___	1	2	3
2.			19___	1	2	3
3.			19___	1	2	3
4.			19___	1	2	3
5.			19___	1	2	3

34. Does anyone here own a jeep-type vehicle or a truck?

Yes 1 No 2

35. About how often does the head of your household buy a car?

Every year . . .	1	More than 5 years apart	6
Every 2 years	2	On an irregular basis	7
Every 3 years	3		
Every 4 years	4		
Every 5 years	5		

36a. Including your_____(YEAR MODEL AND MAKE OF SURVEY CAR), how many cars have you personally bought in your lifetime?

One	0	(SKIP TO QU. 38)	Six	5
Two	1		7-10	6
Three	2		More than 10	7
Four	3			
Five	4			

36b. How many of these were new cars? _____were new cars.

How many of these were used cars? _____were used cars.

37a. What was the last car you bought before the_____(YEAR MODEL AND MAKE OF SURVEY CAR)?

_____	_____	_____
Make	Model	Year

37b. Was the_____(CAR MENTIONED IN 37a) bought new or used?

New 1 Used 2

SCALING SHEET

I would like you to tell me to what extent you agree or disagree with the following statements as they apply to you. Please put a check in the appropriate place:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I prefer to drive a car with white-wall tires.	5	4	3	2	1
2. I prefer economical to stylish automobiles.	5	4	3	2	1
3. I can tell the difference between cars of different model years.	5	4	3	2	1
4. I pay attention to the new models when they come out whether I plan to buy or not.	5	4	3	2	1
5. I think that the American automobile manufacturers should follow Volkswagen's lead in keeping style changes to a minimum.	5	4	3	2	1

38. I would like you to tell me to what extent you agree or disagree with the following statements as they apply to you. Please put an "X" on the appropriate line. (HAND RESPONDENT SCALING SHEET)

(ALLOW RESPONDENT TIME TO ANSWER EACH STATEMENT. TAKE BACK SCALING SHEET AND STAPLE TO QUESTIONNAIRE. MAKE SURE THE RESPONDENT HAS AN "X" ON ONE LINE FOR EACH STATEMENT.)

39. What is the age and sex of the head of the household? (RECORD BELOW)

From oldest to youngest, what is the age and sex of each of the other members of your household? (RECORD BELOW)

Is that person a driver? (RECORD BELOW)

Household Member	Sex	Age	Driver (indicate by check)	Indicate respondent by check
1. Head of Household				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				

40. What was the last grade of school completed by the head of household?

No high school	1
Some high school	2
Graduate high school	3
Some college	4
Graduate college	5
Some post-graduate college work	6
Post-graduate degree	7

41. Is the head of household working now, unemployed or laid off, retired, or what?

Retired	1	(SKIP TO QU. 43)
Permanently disabled	2	
Housewife	3	
Student	4	
Working now	5	
Unemployed, sick or temporarily laid off	6	

42. What is his/her main occupation, that is, the kind of work he/she has been doing to earn a living? _____

_____

_____

_____

43. We are interested in how people are getting along financially these days. Would you say that you and your family are <u>better off</u> financially, <u>worse off</u>, or about the same as you were a <u>year ago</u>?

Better now 1 Same 2 Worse now 3 Uncertain 4

44. Looking ahead, do you think that a year from now you people will be better off financially, worse off, or just about the same as now?

Better then 1 Same 2 Worse then 3 Uncertain 4

45. (HAND RESPONDENT INCOME CARD) For classification purposes only, we need to know which category represents your total family income. Your answer will be completely confidential and will be combined with the answers of others who take part in this survey. Would you please tell me which letter of this card indicates how much income you and your family received from all sources during the year 1970, I mean before any taxes and deductions.

A.	Under $7,500 (GO TO QU. 47)	0	D.	$15,000-19,999	3
B.	$7,500-9,999	1	E.	$20,000-24,999	4
C.	$10,000-14,999	2	F.	Over $25,000 (GO TO QU. 47)	5

46. Would you say that your income is at the high end, low end, or middle of that range?

High end 1 Low end 2 Middle 3

47. At the time you bought_____(YEAR MODEL AND MAKE OF SURVEY CAR), were you making any monthly payments on furniture and appliances? (DO NOT INCLUDE MORTGAGE PAYMENTS)

Yes 1 No 2 (GO TO END)

48. Approximately how much were these total payments per month?

$1-29	0
$30-59	1
$60-89	2
$90-119	3
$120-149	4
$150-179	5
$180-200	6
Over $200	7

Thank you for participating in this interview.

Name_____

Address_____

Telephone Number_____

Time Ended: _____AM/PM

APPENDIX E

STATISTICAL NOTES

MCA Details[79]

MCA was developed at the University of Michigan by James Morgan, John Sonquist, and Frank Andrews. It is fundamentally a multiple regression technique using dummy variables. However, there is no need to generate 0-1 dummy variables explicitly, as the program itself does the building for each category (subset) of each variable.

In a comparison with more traditional analysis of variance techniques, it is found that the MCA application does not require equal or proportional numbers of cases in the data cells.

The dependent variable should be on an interval scale and should not be extremely skewed.[80] This restriction allows for the use of a two point nominal scale such as the dichotomy employed in this study.

Predictor variables may range in number from 2 to 34. Predictor variables may be intercorrelated with each other; however, extremely

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79/ The reader is again referred to Andrews, Morgan, and Sonquist, Multiple Classification Analysis, for a complete discussion of the MCA technique. The details presented in this Appendix are drawn from that source.

80/ The distribution of the dependent variable in this study is skewed. Consultation with Miss Laura Klem of the Survey Research Center, The University of Michigan, supports the conclusion that the degree of skewness is not so severe as to cause difficulties in the analysis.

high correlation between two predictor variables can cause problems. These problems stem from the fact that the program employs an iterative procedure to solve the normal equations of multiple regression. When there is high intercorrelation between two predictor variables, the sequential adjustments do not converge rapidly; thus, estimates are still changing when iterations stop. In the extreme case of perfectly correlated predictors, the process does not converge at all and no solution is yielded.

The solution to the problem of high intercorrelation is either the omission of an offending variable or a collapsing of data categories. The output of the MCA program includes certain options which make the detection of the problem a good deal easier than it might seem. The program will output tables in which each predictor variable is run against each other predictor variable, thus facilitating the search for overlap categories. Also, successive iterations can be printed out, allowing the user to ascertain the degree of convergence. Finally, predictor variables may be inputted in varying orders, thus allowing the user to note any changes in coefficient values obtained.

A related problem with the analysis exists if interaction effects are present. MCA assumes an additive model, that is, it assumes that the average score on the dependent variable for a set of individuals is predictable by adding together the "effects" of several predictors.

Weighting of the data is permitted in the application of MCA. Missing data on a predictor can be handled either by coding "NA" as a separate

category and retaining these cases in the analysis or by instructing the program to omit missing data cases. The optimum handling of missing data appears to be the former. To begin with, it keeps a larger number of cases in the analysis. Also, since one advantage of the MCA program is that including categories with very few cases does no damage to other estimates, including cases where missing data is a relatively insignificant factor will not affect the basic analysis.

While the program will handle categories in which there are relatively few cases without damage to other estimates, there are overall requirements in terms of the minimum number of cases needed to apply the analysis. In general, each category of each predictor must have enough cases to provide reasonably stable estimates of means. Fifty observations is cited as a cut-off point in order to keep sampling errors of coefficients within allowable limits.[81/] Overall, there should be substantially more cases than there are degrees of freedom in the model, with degrees of freedom calculated as the total number of predictor variable categories minus the number of predictor variables.

As noted previously, the output of the program is relatively easy to interpret.[82/] Given the type of dependent variable employed in this

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81/ Andrews, Morgan, and Sonquist, Multiple Classification Analysis, p. 79.

82/ See the discussion of Table 26, pp. 113-119.

study, results are yielded in terms of probabilities of buyer behavior. A number of output options are available which help to diagnose potential difficulties in the predictor variables. These output features make MCA particularly useful to the individual with limited training in statistics.

Standard Errors and Tests of Significance

Tests of significance for differences from the mean were run at the .05 level. Since the MCA program does not output standard errors for the differences from the mean, the following formulae were used:

1. For gross difference from the mean,

   $SE = \frac{\sigma_y}{\sqrt{n}}$, where σ_y equals the standard deviation of the dependent variable and n equals the number of cases in the subgroup of the predictor variable.

2. For net difference from the mean,

   $SE = \frac{\sqrt{1-R^2}\ \sigma_y}{\sqrt{n}}$, where R^2 equals the multiple R squared for the regression, σ_y is the standard deviation of the dependent variable, and n is the number of cases in the subgroup of the sample.

These formulae deserve some comment, since they represent estimates derived from empirical work done by Kish and Frankel.[83/]

83/ Leslie Kish and Martin R. Frankel, "Balanced Repeated Replications for Standard Errors," Journal of the American Statistical Association, 65 (September 1970), 1071-1093. Specific reference to the application of their work to MCA output is found on pp. 1080-1083.

The development of standard statistical tests of significance are dependent on the assumption of independent observations in the sample. This assumption of unrestricted random sampling is violated by the designs employed in many survey samples. For example, the clustering of sample elements in the design employed for this study is a violation of the theoretical assumption of simple random sampling.

Researchers have been frequently forced to ignore these violations of simple random sampling found in their complex samples. However, using a process of balanced repeated replications, Kish and Frankel were able to isolate the relationship between standard errors in simple random samples and those found in complex sampling designs. The formulae presented above represent the results of their investigation with respect to the standard errors of the differences from the mean yielded by the MCA program. While the use of these formulae causes a slight underestimation of the standard errors calculated in Chapter V, empirical results show that the degree of underestimation is quite small.

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