



An empirical investigation of the impact of behavioural and psychographic consumer characteristics on car preferences: An integrated model of car type choice



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ABSTRACT

Based on the data collected from a large-scale survey research of 1622 consumers, the present paper develops a disaggregate, compensatory choice model to collectively examine the impact of under-examined factors on consumer car type choice behaviour. All existing econometric forecasting models of vehicle type choice in the literature have so far considered objective measures as determinants of vehicle type choice. The proposed choice model considers 12 car-type alternatives and is successively extended to allow for choice probability distortions resulting from individual heterogeneity across a set of 30 variables, related to objective, behavioural and psychographic consumer characteristics. The results provide clear evidence that variables such as purpose of car use, prepurchase information source used, consumer's proneness towards buying an ecological car, consumer's involvement with cars, and consumer's attachment to cars, significantly affect car type choice. The results yield important implications for manufacturers, transportation planners and researchers.

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1. Introduction

Consumer preferences for car types vary greatly from time to time. For example, SUVs have become more popular among large families than they were a few years ago, increasing their market share at the expense of four-door sedans from segments D and E. In this direction, economists and market researchers have been interested through years in identifying the factors that affect consumers' car buying behaviour to estimate market share (e.g., [McFadden, 2000](#); [Train and Winston, 2007](#)). In the literature of vehicle type choice, two types of disaggregate, compensatory choice models have been developed to explain vehicle type choice, namely, multinomial logit (e.g., [Choo and Mokhtarian, 2004](#); [Kitamura et al., 2000](#); [Mannering and Winston, 1985](#)) and nested logit (e.g., [Berkovec and Rust, 1985](#); [Hocherman et al., 1983](#); [Mannering et al., 2002](#)).

Furthermore, a look at the vehicle type choice literature suggests that most of these models have been primarily focused on the examination of objective measures as determinants of vehicle type choice, such as vehicle attributes, household characteristics, and demographic characteristics (e.g., [Adjemian et al., 2010](#); [Whelan, 2007](#); [Yamamoto and Kitamura, 2000](#); [Hess et al., 2006](#); [Fang, 2008](#); [Bhat et al., 2009](#); [Bhat and Sen, 2006](#)). Contrary to existing applications, the present study apart from objective measures, takes also into consideration novel "intangible" variables as car type choice determinants, which are highly subjective and have never examined before in the respective literature.

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More specifically, the purpose of this study is to develop a baseline disaggregate multinomial choice model of car type choice which will be successively extended to incorporate collectively the effects of various unexplored factors, such as purpose of car use, prepurchase information sources used, consumer's proneness towards buying an ecological car, consumer's involvement with cars, and consumer's attachment to cars. To the best of our knowledge, in none of the existing studies have behavioural and psychographic factors like these been considered as potential determinants of vehicle type choice.

In the empirical literature of travel mode choice, most choice models have traditionally used objective-modal attributes to explain travel mode choice. However, in recent attempts to gain more insight into the individual's decision making process, traditional travel mode choice models have been enriched with the inclusion of intangible-subjective variables (see for example, Johansson et al., 2006; Ashok et al., 2002; Morikawa et al., 2002; Pendleton and Shonkwiler, 2001). For example, Morikawa et al. (2002) include modal comfort and convenience in their analyses of mode choice. Motivated by these recent developments in the travel mode choice literature, we were surprised to see that no similar attempts have been reported so far in the literature of vehicle type choice, besides the study of Choo and Mokhtarian (2004), which introduces subjective variables, such as attitudes and lifestyle to explain vehicle type choice.

As we show in this paper, subjective variables like the ones examined here are important in car type choice, in ways that are relevant not only to marketing managers, but also to transportation planners and policy makers. The overriding purpose of the paper is to examine whether intangible-subjective variables, mirroring the individual's preferences, are able to provide insights into the individual's decision making "black box" and, thus, to help to set priorities in governmental policy, by providing useful information for transportation planners in their attempt to design sustainable transportation policies.

Above all, designing and executing a study in which both objective and subjective variables are considered, gives the researcher the opportunity to formally assess their relative separate and joint contributions to vehicle type choice, and thus gain a clearer and more holistic picture of the factors shaping vehicle type choice.

The data for the present study were collected from a large scale survey of 1622 consumers, examining consumer buying behaviour and preferences in the car market. The dependent variable, most preferred car type, has been classified into 12 vehicle type categories: segment A (mini cars), segment B (super-mini cars), segment C (small family cars), segment D (medium-sized cars), segment E (large family cars), segment F (luxury cars), SUVs, MPVs, coupes, cabriolets, roadsters, and station wagons. The probability of choosing each of these categories has been estimated by successively incorporating the effects of car characteristics, demographics, driver's characteristics, purpose of car use, prepurchase information source used, consumer's involvement with cars, and consumer's attachment to cars.

The rest of the paper is organized as follows. In the following section, a review of the relevant literature on vehicle type choice is provided. Data and variables are presented in Section 3, whilst Section 4 develops the proposed integrated vehicle type choice model in a step-by-step approach. Results are presented in Section 5, and a concluding section summarizes the paper that provides important implications for managers, transportation policy makers and researchers.

2. Literature review

Forecasts of car demand play an important role in the planning and policy making of numerous organizations. For example, state departments of energy base their projections of future gas consumption on forecasts of automobile demand. State departments of transportation finance the construction of highways based on the demand of automobiles and air quality boards base their policies to reduce air pollution on the projected automobile use and demand. Furthermore, it's needless to mention the great impact of consumer demand for automobiles on the profitability of the automobile industry.

Given the importance of automobile demand forecasts for a variety of organizations, relevant literature on car demand has been a lively area of research during the last decades. Numerous models have been developed in the literature to forecast automobile demand, including aggregate and disaggregate approaches (depending on whether the unit of analysis was the individual consumer), as well as compensatory and noncompensatory approaches (depending on whether the unit of analysis was assumed to trade off characteristics in the sense that the high value of one characteristic could compensate for the low value of another characteristic). This section focuses on the presentation of existing disaggregate, compensatory vehicle type choice models, which are relevant to the present study.

2.1. Previous disaggregate, compensatory vehicle type choice models

Modelling vehicle type choice has been of interest to the profession for many decades. Most of the studies in early 50s examined vehicle ownership in terms of the number of vehicles owned by the household. A few decades later, in the early 80s, the focus of research in the vehicle holdings arena was clearly shifted to understanding which vehicle type to own. This shift was largely motivated by energy and environmental concerns and facilitated by the availability of detailed data about household vehicle holdings. As a result, numerous empirical studies in the early 80s, started examining vehicle type choice (e.g., Beggs and Cardell, 1980; Berkovec and Rust, 1985; Booz, Allen, and Hamilton, 1983; Hocherman et al., 1982; Lave and Bradley, 1980; Lave and Train, 1979; Manski and Sherman, 1980; Winston and Mannering, 1984).

All existing disaggregate, compensatory, vehicle type choice models presented in the literature are either MNL (Choo and Mokhtarian, 2004; Kitamura et al., 2000; Lave and Train, 1979; Mannering and Winston, 1985; Manski and Sherman, 1980) or nested logit (Berkovec and Rust, 1985; Hocherman et al., 1983; Mannering et al., 2002). For example, Lave and Train

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