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主　論　文　の　要　旨

論文題目　Empirical Studies on the Ownership and Usage of Eco-Friendly Vehicles
エコカーの保有及び利用に関する実証的研究

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論　文　内　容　の　要　旨

In order to relieve the external diseconomy of private cars, Japanese Cabinet Meeting proposed the action plan to promote next-generation vehicles in the sales market through the policy of tax exemption. As one kind of next-generation vehicles, the electric vehicle is treated as one ideal vehicle type, since the price of this vehicle is not very expensive. Meanwhile, the electric vehicle can be charged at home, if the household has individual parking space. As one of the competitors to the electric vehicle, the light motor vehicle has its merits, such as cheap price, low displacement and excellent fuel consumption. So this thesis is focusing on the ownership and usage of these two types of eco-friendly vehicles in the Chukyo region in Japan.

Chapter 3 examines the preference of electric vehicles purchasing behavior and gives insight into factors which have significant effects on promoting electric vehicles. 5766 stated preference survey data collected in the Chukyo region is treated as the research sample. A 3-level nested logit model is proposed to properly represent the purchasing behavior including Addition, Exchange and Constant. Main conclusions in this chapter contain three aspects as follows. Firstly, it is found that the factors including price of the electric vehicle, installation rate of charging facilities at the gas station, charging vehicles near home, annual income of the household, owning the hybrid vehicle, the number of drivers in one household and no occupation may play important roles on purchasing behavior involving Addition and Exchange. Secondly, capacity and vehicle range of the electric vehicle are key factors on Addition and Exchange. While, charging time is a key factor only on Exchange. Thirdly,

displacement, vehicle age and vehicle capacity are important factors of choosing the vehicle in use, when the respondent decides to treat the electric vehicle as Exchange.

Chapter 4 develops a discrete-continuous model to examine the ownership and usage of electric vehicles in the household. The impact of the ownership and usage of ordinary vehicles is taken into consideration. 5766 stated preference data concerning purchasing electric vehicles in the Chukyo region in Japan are utilized as the research sample. The monthly mileages of ordinary and electric vehicles are measured by a tobit model, respectively. The ordinary vehicle ownership is measured by an ordered probit model, while the electric vehicle ownership is measured by a binary probit model. The Gibbs sampler algorithm is used to estimate four jointed equations. The result shows that there is a substitution effect between two types of vehicles in the ownership and usage. The price, capacity, range and charging rate in the gas station impact both the ownership and usage of electric vehicles. Meanwhile, charging time does not affect either the ownership or usage.

Chapter 5 forecasts the demand of electric vehicles ownership and usage in the Chukyo region in Japan. The discrete-continuous model proposed in chapter 4 is applied in this chapter. The 4th person trip survey data (2001) in this region are used as the sample. The household annual income is estimated using an ordered probit model. The result shows that average ownership and monthly mileage of electric vehicles are 0.324 and 259.36 km per household, respectively. Meanwhile, it shows that the average ownership and monthly mileage of electric vehicles in suburban areas are more than that in urban areas.

Chapter 6 examines the variation of the household vehicles owning behavior in the Chukyo region in Japan. The vehicle type is classified into the light motor car and the ordinary motor one. The person trip survey data in 1971 and 2001 are used as the sample. A bivariate ordered probit model is proposed for analyzing the ownership of two types of private cars. The Gibbs sampler algorithm is implemented in this chapter. The conclusions of this chapter are listed as follows. Firstly, age of the householder, numbers of workers and number of members (>= 25 years old) were significant factors with same effects both in 1971 and 2001. Secondly, gender of the householder, district, population density and density of railway stations changed their effects from 1971 to 2001. The households with female householder were unwilling to own the light motor car only in 1971.The residents living in Nagoya would not like to own the ordinary motor car in 2001. Population density and density of railway stations affected ownership of the

light motor car only in 2001. Lastly, there was a substitution effect on ownership between the light motor car and the ordinary motor one only in 2001.

Chapter 7 analyzes the ownership of the light motor vehicle considering the heterogeneity of family constitution. The 4th person trip survey data in the Chukyo region is used as the research sample. We divide 85047 sample data into 9 groups according to its family type. The bivariate binary probit is utilized to analyze the ownership of the light motor vehicle in the households with only one member. Meanwhile, the bivariate ordered probit model is utilized to examine the ownership of the light motor vehicle in the family with multiple members. The bivariate binary probit model is estimated by the maximum likelihood estimation. Meanwhile, the bivariate ordered probit model is estimated by the Gibbs sampler algorithm. The annual income data is also complemented and included in the model. It is shown that the ownership of the light motor vehicle is impacted by family constitution significantly, since estimated parameters in different groups are not identical. The ownership of the light motor vehicle in many family types is affected by the district, number of workers, and population density. The female young single and childless middle-age female single are willing to own the light motor vehicle rather than the ordinary motor vehicle. The annual income only affects the ownership of the light motor vehicle in the childless middle-age single household. The accessibility to railway system only affects the ownership of the light motor vehicle in the young single and childless young couple household. The annual income and accessibility to the railway system impacts the ownership of ordinary motor vehicle significantly for many family types. It is also found that the substitution effect between the ownership of the light motor vehicle and the ordinary motor one is not existed in the childless elder single household.

The econometric models proposed in the thesis can be used by the local government to forecast vehicles demand in the region. Meanwhile, the manufacturers of private vehicles can also utilize the similar economic methods to analyze the market share of their vehicles based on the individual consumer oriented survey.