

A EVALUATION OF CONSUMER'S PREFERENCES IN THE CLUJ-NAPOCA RETAIL MARKET BASED ON A MULTINOMIAL LOGIT MODEL

Associate Professor, PhD, Ciprian Marcel POP
Teaching Assistant, PhD Student Andrei Mircea SCRIDON
Teaching Assistant, PhD Student, Dan Cristian DABIJA
Babes-Bolyai University of Cluj-Napoca

Abstract:

A long period of time investors were interested in the Bucharest market, but the need for investment in the rest of the country, coupled with the high potential markets present there, resulted in increasingly more investors interested in Romania, switching to provincial cities. The application presented in this paper involves clients of several types of retail stores present in the commercial area of Cluj-Napoca. The results obtained in the study, through the multinomial logit model, show different aspects of the client's behaviour from the Romanian retail market.

Keywords: discrete choice, multinomial logit model, retail market

Introduction

The discrete choice models have been developed mostly in the last two decades with applications in various economic areas: banking industry – Berger et al. (2003), Blochlinger and Leippold (2006), automobile industry – Wojcik (2000), Dragos (2005), labor economics – Eymann and Ronning (1997), transportation – Horowitz (1980), Hess (2006), leisure and tourism – Huybers (2003), Siomkis (2006), energy economics – Liao (2002). In practice they are preferred to others modeling techniques (neural networks, artificial intelligence algorithms) because of their simple structure and ease of use. Moreover, the prediction accuracy is very good when the right model is chosen. Of course there are also disadvantages, the main one being the large number of possible models, especially if one chooses classical econometric criteria (pseudo R^2 , significance of parameters, heteroscedasticity) for model comparison.

This paper proceeds to present the Romanian retail market, to describe the

data and estimation model, to present the empirical results, and to conclude with the findings of this study.

Also it must be mentioned that the application is based on a large sample not intended for an econometric purpose, but for a descriptive data analysis, so the results and conclusions must be regarded with caution. The target is to present a possible application of discrete choice models and not necessarily build a strong econometric model for practice use.

The Romanian Retail Market

Reported to the retail value of investments per capita, Romania in 2007, occupied first place in Central and Eastern Europe, with an average of 30.9 euro, followed by Bulgaria with 28.5 euro. Hungary, the Czech Republic and Slovakia were situated on the next three places in this ranking, with values ranging between 24.2 euro and 21.9 euro.

Central Europe, especially Poland, the Czech Republic, Hungary, and Slovakia to some extent, have all become saturated markets. Most retail

networks that were interested in this area have entered the market in these countries in the mid'90. These companies have had enough time to develop in the local market and is normal that growth pace is at present slower as is used to be.

Compared with these countries, Romania and Bulgaria are new territories for the international retailers. The first Western company began the process of expansion in these countries in 1996 (Billa), but really significant foreign investments began to appear near moment when these two states where to join the European Union.

Development strategies applied by retailers in Romania and Bulgaria have been and are similar to those tested in Poland and the Czech Republic a few years ago, the companies making the first step in the big cities, especially in the capital of the country.

One quite interesting aspect is that the two countries took advantage of their relative underdevelopment, new hypermarkets in Romania for example, being more modern and sophisticated than those built ten years ago in Central Europe. Instead of simple cubic construction, combined with several boutiques, Auchan, Carrefour and Cora subsidiaries from Romania and Bulgaria have opened commercial centers which have, in addition to the hypermarket itself, two or more rows of shops and restaurants.

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interested in Romania, switching to provincial cities.

Data and estimation model

The application involves clients of several types of retail stores present in the commercial area of Cluj-Napoca. In June 2008, a sample was constructed consisting of 1185 subjects who visited a retail store in that period. Five types of retail stores were taken into consideration: Proximity store, Hypermarket, Cash&Carry, Supermarket and Discounter, which altogether represent the main store types found in Cluj-Napoca.

The Model

Supposing that each one of the individuals of the sample especially prefers only one type of store, the decision of choosing the store is discreet. Consequently, the model chosen for explaining the choice of a type of store is a discreet one, so the estimation is made using the econometrics of qualitative variables. The model is a multinomial one because the qualitative dependent variable y has more than two values: $y_i = j, j = 0, 1, 2 \dots m$, respectively. In this application, the values of y represent the type of stores.

The Multinomial Logit Model.

The multinomial Logit is an extension of the binary Logit model, having more than two values for the dependent variable. Let (p_0, p_2, \dots, p_m) be the probabilities of $m + 1$ alternatives of choice. The probability of an individual i to choose the alternative j is given by:

$$p_{ij} = P(y_i = j) = \frac{\exp(x_i b_j)}{1 + \sum_{j=1}^m \exp(x_i b_j)} \quad j = 1, 2, \dots, m \quad (1)$$

where x_i is the vector of the independent variables associated to the individual i , and b_j is the vector of

parameters associated to the alternative j .

Results presentation

In order to estimate the parameters of the model the

econometric software LIMDEP 7.0 was used.

Table 1

Parameters estimates

Discrete choice (multinomial Logit) model. Maximum Likelihood Estimates.

Number of observations: 1185. R-sqrd = 0.1495

Variable	Coefficient	Standard Error	t-statistic
ASEX	0.000	Fixed parameter	-
HSEX*	0.236758	0.144215	1.6417
CSEX*	-0.23922	0.1582	-1.51216
SSEX	0.15694	0.15061	1.04202
DSEX	0.099627	0.151058	0.659526
AAGE	0.000	Fixed parameter	-
HAGE***	-0.01398	0.004145	-3.37204
CAGE*	-0.0048	0.004346	-1.10345
SAGE**	-0.00722	0.004223	-1.71018
DAGE***	-0.01079	0.004285	-2.51907
ANP	0.000	Fixed parameter	-
HNP	0.051968	0.060119	0.86442
CNP	0.058776	0.064485	0.911465
SNP*	-0.1037	0.064271	-1.61344
DNP	0.018087	0.063	0.287095
AINCOME	0.000	Fixed parameter	-
HINCOME***	0.000259	8.90E-05	2.91052
CINCOME***	0.000218	9.45E-05	2.30085
SINCOME***	0.000345	8.91E-05	3.87417
DINCOME***	0.000245	9.19E-05	2.66782

*** $p < 0.01$ ** $p < 0.05$ * $p < 0.10$

The parameters values could be interpreted as follows: the negative sign of the variables related to age show that when age increases, it decreases the probability of choosing the other store types with respect to the reference type, proximity store. On the other hand, the positive sign of the variables related to income show that when household income increases, it also increases the probability of choosing the other types of retail stores with respect to the reference type.

The parameters related to sex and number of persons present in the household are not statistically significant, but are taken into account, because they increase the predictive power of the econometric model considered.

For each individual, one can compute according to formula (1) the probability of choosing each of the five types of retail stores. A study of the estimated probabilities shows that the predictive power of the model, in terms of correct predictions, is a medium one, the percentage of correct predictions in the sample being 52.6%.

The applicability of the model

The model can be used for building some marketing strategies (advertising, direct marketing, promotion) and a better understanding of clients. Considering this, one can estimate the market shares of the five types of stores, for different values of the variables sex, number of persons, age and income. These estimates are

done by varying the values of a particular variable, while keeping the values of the others fixed at their average values from the sample or at an arbitrary value chosen by the analyst.

Table 2
Estimated market shares for the store types (Age group: 30-40 years, Np: 3, Female)

	Income (RON/month)			
	500	1500	2500	3500
ABC	0.20283	0.16272	0.12902	0.10126
Hypermarket	0.26563	0.27611	0.28366	0.28845
Cash&Carry	0.14134	0.14094	0.13891	0.13551
Supermarket	0.18771	0.21264	0.23808	0.26385
Discounter	0.20248	0.20757	0.21031	0.21091
	Income (RON/month)			
	4500	5500	6500	7500
ABC	0.07877	0.06080	0.04662	0.03554
Hypermarket	0.29072	0.29076	0.28887	0.28533
Cash&Carry	0.13103	0.12572	0.11983	0.11355
Supermarket	0.28981	0.31590	0.34204	0.36819
Discounter	0.20965	0.20679	0.20262	0.19738

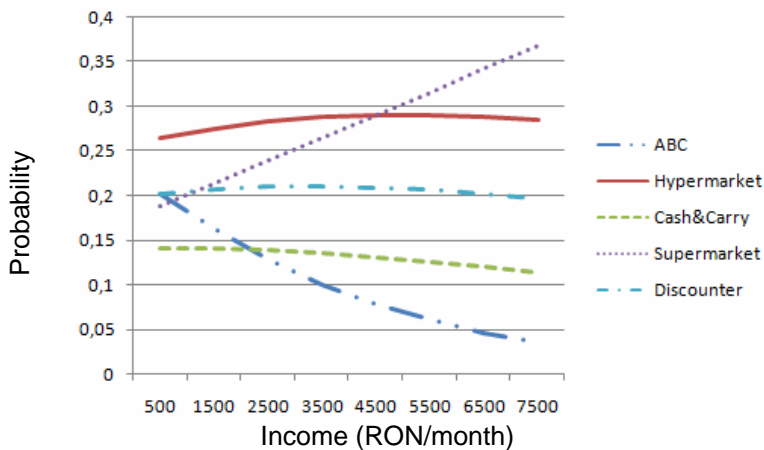


Figure 1. The evolution of the store types with respect to income (35 years old person)

Table 3

Estimated market shares for the store types (Income group: 2500-3000 RON/month, Np: 3, Female)

	Age (years)					
	20	30	40	50	60	70
ABC	0.11310	0.12355	0.13467	0.14648	0.15898	0.17216
Hypermarket	0.30666	0.29128	0.27609	0.26113	0.24644	0.23206
Cash&Carry	0.13086	0.13624	0.14156	0.14676	0.15182	0.15671
Supermarket	0.23259	0.23636	0.23969	0.24254	0.24489	0.24672
Discounter	0.21677	0.21255	0.20798	0.20307	0.19784	0.19232

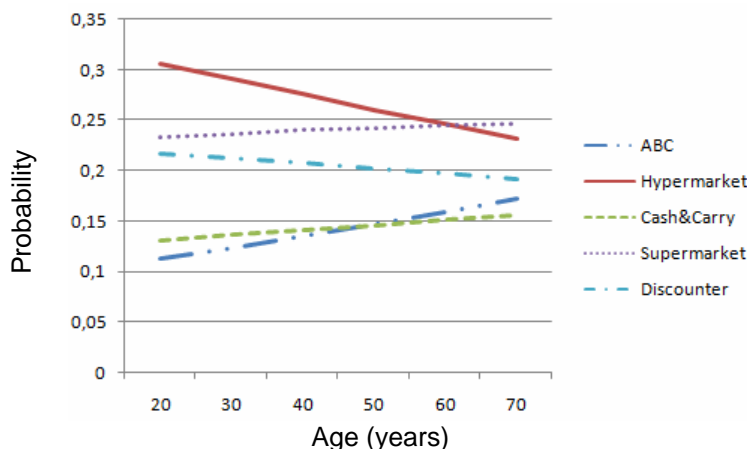


Figure 2. The evolution of the store types with respect to age (2500 RON/month household income)

Conclusions

In the last years a number of articles and studies were published regarding the retail market in general and the Romanian retail market in particular. These studies focused in describing different aspects and particularities which characterise that market – Prada (2008), or supply chain and distribution management strategies developed for the retail market as a competitive advantage – Purcarea and Purcarea (2008), or risk management – Preda and Negricea (2007). The majority of articles written in context with the Romanian retail market tried to describe and predict future developments in the market, but there was little interest in developing a model that could predict market shares according to store types taking into account consumer’s behaviour and buying preferences.

The results obtained in the application, through the multinomial logit model, show different aspects of the client’s behaviour from the Romanian retail market. They prefer more evolved retail store types for shopping as the average household income increases. In contrast the model predicts a change in preferences as the age of the persons increases, with more traditional types (proximity store, supermarket) favoured to the newer ones (hypermarket, discount store). The number of persons present in the household also plays a role in the type of store preferred, with a larger household preferring the types that offers a more complex product range (hypermarket, cash&carry).

The model can be used by modifying the characteristics of the individuals, in order to obtain a better picture of the market segments that

prefers one type of store to another. If one takes into account the number of customers that have similar characteristics (not only in terms of psycho-demographic characteristics but also in terms of demand and perception characteristics) and multiplies it with the probabilities calculated with the help of the proposed model, a rough estimate for market share according to store type can be obtained. This is particularly important because it contributes directly in calculating budgets for different marketing strategies (advertising campaigns, promotions) and for calculating sales targets in order to determine the break-even point. Also it helps the store focus on those target segments which show the best

development perspective. One segment may be more profitable than another, while the achievement of a demand structure, as profitable as possible for the store, can be determined based on the segment characteristics.

This study is far from a complete one; the study was not conducted from an econometric point of view, and so the sample is not highly significant; also the number of variables considered is small, and of course the predictive power will be small. Although, the model can explain to some extent the client's preferences for a type of retail store, it can only be considered as a base for further studies capable of explaining more precisely the preferences for different types of retail stores.

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