

Aldi, Edeka & Co. – Consumer preferences and store image

Aldi, Edeka & Co. – Konsumentenpräferenzen und Einkaufsstättenwahl

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Summary

Store choice decisions in the food retailing industry have been widely discussed in the literature. The importance of pricing, quality and assortment is known, and the influence of socio-demographic variables is small. In this paper, a mixed nested logit model is used to study the relationship between specific attitudes of households and their store choice for fruits and vegetables in Germany. Household attitudes are about environment, freshness, organic food, prices and quality. An implied image ranking of stores regarding these attitudes can be established. The weekly farmers' market has throughout a very high implied image, while the discounters Penny, Plus and Aldi enjoy good to average images. The supermarkets Edeka and Rewe get comparable bad results.

Keywords: store choice, mixed nested logit, image, fruits and vegetables

Zusammenfassung

Über die Einkaufsstättenwahl im Lebensmitteleinzelhandel wurde bereits ausgedehnt diskutiert. Preise, Qualität und Sortiment spielen dabei eine wichtige Rolle, während soziodemographische Variablen eher unbedeutend für die Einkaufsstättenwahl sind. Ein „Mixed Nested Logit Modell“ untersucht den Zusammenhang zwischen der Einkaufsstättenwahl und bestimmten Einstellungsmerkmalen (Bio, Frische, Umwelt, Preis und Qualität) von Konsumenten für Obst und Gemüse in Deutschland. Ein implizites Image-Ranking bezüglich der betrachteten Variablen kann erstellt werden. Wochenmärkte erhalten

durchweg ein sehr gutes implizites Image, während die Discounter Penny, Plus und Aldi gute bis mittlere Bewertungen erhalten. Die Supermärkte Edeka und Rewe schneiden unterdurchschnittlich ab.

Schlagnvorte: Einkaufsstättenwahl, Mixed Nested Logit, Image, Obst und Gemüse

1. Introduction

Expenditures on food and soft drinks were 152 bn euros in Germany in 2008. The share of food expenditures in total expenses was about 11%, which is nearly the lowest in a European comparison. In the EU-27, the share was on average 19.4%. Expenditures for fruits and vegetables (f&v) have increased from 16.3 bn in 1991 to 23 bn euros in 2008.

The food retailing sector in Germany is in heavy competition. Only a few large retailers in Germany share the largest portion of the market. The six companies Edeka, Rewe, Schwarz, Aldi, Metro and Tengelmann share more than 75% of total revenues in the food market. The companies use different stores and store types to sell their groceries. A store type is generally characterized by stores, which have similar attributes over a long time period. They can be classified by four categories: 1. the amount of different products (full, part or special), 2. general service (self-service), 3. service (personnel, location) and 4. quality of products (SPECHT and FRITZ, 2005). Distinguished by these four categories, four different main store types are established in the food market: discounters, supermarkets, small and large hypermarkets. For f&v, specialized stores like weekly farmers' markets can be added as a store type as they account for about 6% of all store choices within f&v. The stores within a store type usually share many similar characteristics, but nevertheless they are mostly at least a bit different.

The consumers' decision to buy groceries is based on a dynamic decision behaviour of 1. determining whether there is a need to go shopping or not, 2. deciding what purchases need to be made, and 3. choosing a particular store (LESZCZYC et al., 2000). At the third decision, choosing a particular store, first a specific store type is chosen and then a specific store within this store type. The existing literature on store or store type choice is huge. There are static models which consider one time period and provide a snapshot of current consumer decisions.

GONZÁLEZ-BENITO et al. (2005) and SOLGAARD and HANSEN (2003) among others use a kind of logit model and conclude that price level, assortment and distance are the most significant variables influencing consumer choice of store type; quality and service have no notable influence. On the other hand there are dynamic models which take the sequence of choices into account. They usually include a loyalty factor. Following BUCKLIN and LATTIN (1992) and LESZCZYC et al. (2000), demographics have almost no influence on store-switching, but loyalty is important and promotions increase the probability of visiting a store. PAN and ZINKHAN (2006) obtain the following sequence of factors in their meta-study: assortment, service, quality, location and price. The sequence depends on the merchandise category studied or the method used.

This paper analyzes store choices of households in the food market for f&v. It considers specific consumer attitudes towards quality, freshness, environment, organic food and prices, several socio-demographics and a loyalty factor. While the retailer determinants have been analyzed extensively, there is up to now no research with the focus on the explicit role of consumer attitudes towards store choice. Analyzing these attitudes and the actual point of purchase shows, which of these attitudes actually influence to which degree store choice. It shows which store is preferred by e.g. quality orientated, freshness orientated, organic food orientated, or price-conscious households. Assuming there is a true relation between these choices, an implied image ranking can be established. That means it can be shown that e.g. specific stores have a higher or lower implied quality or price image. Suggestions can be given for improving the implied image of specific stores.

2. Data and Model

The dataset is provided by the GfK GROUP (2009) and is based on their ConsumerScan household panel dataset. The GfK records a representative sample of more than 12,000 households. The aim of GfK is the continuous collection of all purchases of these households, with focus on fast moving consumer goods. 1,300 households with f&v purchases between January and June 2006 are randomly selected for estimation and a random sample of 700 households is taken for

validation. The socio-demographics age, gender and income are included in the model. The householder who is responsible for shopping answers attitudes towards different themes, which influence store choice. This paper considers attitudes about quality, freshness, pricing, environment and organic food, to estimate store choice. These attitudes can be split into two categories: (a) quality, freshness, pricing and (b) environment, organic food. The variables of the first category (a) are mostly included in past research, but determined by the retailers. Instead of concluding, that quality, freshness and pricing, determined by the researcher, are important, this study distinguishes between the attitudes of households towards these variables. For instance individuals can have a high-quality preference, a low-freshness preference or do not care about pricing. These attitudes are not captured by the according retailer determinants and need therefore a closer examination, regarding that not all households have the same preferences. Category (b)-variables were seldom considered yet. Store types are likely associated with different characteristics of these variables.

After the realization, whether there is a need to go shopping or not, which is the very first decision, also the choice of the products is the base for further decisions. In LESZCZYC et al. (2000), next comes the choice of the store, similar to DILLER et al. (1997), who sees a strong relation between the brand or product choice and the store choice. KRAFFT and ALBERS (1996) say that the selected store type affects the buying behaviour more directly than just the single store choice. Following KRAFFT and ALBERS (1996), store type choice is, knowing which products to buy, the second decision. GONZÁLEZ-BENITO et al. (2005) support this result; they conclude that the consumers choose first a specific store type and then a single store within this store type.

Accounting for this information, a mixed nested logit model (mixed NL) is used to estimate store choice. The stores are nested within store types, an individual i chooses a specific store, given his store type choice. The mixed NL allows random taste variation, correlation in unobserved factors over time and unrestricted substitution patterns (TRAIN, 2003). Taste variation maybe also understood as "heterogeneity", where unobserved tastes influence the choices, and these unobserved tastes are independent from past choices.

The mixed NL is used with random coefficients for each grocery store type and with fixed coefficients for all other variables. Random effects are applied only to the intercepts for capturing heterogeneity through not included variables. The log-likelihood function to estimate has no closed-form expression due to the inclusion of random coefficients. The multi-dimensional integral contains four dimensions and cannot be solved analytically. To maximize the likelihood function of the mixed NL the literature suggests numerical integration methods like adaptive quadrature or simulation. The resulting estimator is called Maximum Simulated Likelihood (MSL). In this paper 200 Halton sequences are taken for every household to simulate the model. Halton sequences are one of the most popular quasi-random types (HESS et al., 2003) and were first introduced by HALTON (1960). Halton sequences ensure a better coverage of the multi-dimensional area of integration than random draws. With this better coverage, fewer draws need to be taken than with pseudo-random numbers and this reduces computational time. For discrete choice models TRAIN (2000) and BHAT (2001) show, that 100 Halton draws provide better accuracy than 1,000 pseudo-random draws do.

Consumers facing the same set of alternatives and having the same characteristics may make different choices. HECKMAN (1981) introduced two possible explanations for this behaviour. The first explanation is that past choices or experiences of consumers influence directly current choices. Even if characteristics of the chosen alternative or characteristics of the consumer change over time, the consumer might choose always the same alternative. Consumers, who did not experience this alternative in the past, with all characteristics being the same, might behave differently on the current choice. HECKMAN (1981) calls this “true state dependence”. Explanations for this behaviour may be e.g. habit persistence or learning combined with risk aversion (KEANE, 1997). Another explanation is that there are unobserved tastes, which influence the choices and that these unobserved tastes are independent from the past choice. An existing correlation over time between the unobserved tastes seems for the researcher, as if past choices influence current choices. In this case there is “spurious state dependence”, also termed as “heterogeneity”. To ignore either heterogeneity or true state dependence can lead to misspecification and therefore to biased estimators. The fact, whether there is spurious or

true state dependence in a specific market, is important for decisions of firms about changing choice variables directly or indirectly. The used mixed NL with random intercepts allows for heterogeneity. Unobserved tastes are absorbed by the random intercept. But how can true state dependence be modelled? True state dependence is often linked to the term “loyalty” and there are several ways to introduce a loyalty factor. In this paper, a dummy variable which is 1 if the previous choice is the same choice as the current choice is used, like e.g. in GROVER and SRINIVASAN (1987), KRISHNAMURTHI and RAJ (1991), BUCKLIN and LATTIN (1992), GOLDFARB (2006), RAMADURAI and SRINIVASAN (2006).

To identify the model, the discounter Aldi is taken as the base category, so all coefficients for that choice are normalized to zero. This leads all coefficients to interpret relative to Aldi. Table 1 shows the included retailers and the according distributive channels with their share of choices in the dataset for f&v.

Tab. 1: Retailers and their distributive channels share of choices (in %)

	Edeka	Rewe	Schwarz	Tengelmann	Other
Discounters	Netto (4.8%)	Penny (5.7%)	Lidl (9.5%)	Plus (3.8%)	Aldi (18.5%) Norma (3.8%)
Supermarkets	Edeka (3.9%)	Rewe (3.5%)			
Large hypermarkets			Kaufland (9.4%)		
Specialized stores	weekly farmers' market (6.2%)				

Note: The retailers and their listed distributive channels are based on data from June 30th, 2006. Only stores with a market share of more than 3% are included.

Source: Own illustration

3. Results

Three different models are estimated: 1. The basic model, where only the household attitudes are used to explain consumers' choice. Additionally a random constant is estimated allowing for an intrinsic preference for one or another store type. 2. The dummy loyalty model

extends the basic model by a loyalty variable. Loyalty is represented by a dummy variable, which is 1 if the previous choice is the same choice as the current choice. 3. The socio-demographic model, which extends the basic model by the three variables age, gender and income.

Correct predictions within the validation sample are between 11.3 and 25.8 percentage points superior to the chance criterion. The chance criterion is simply the share of the most chosen store. The estimated standard deviations of the random coefficients are all highly significant. Heterogeneity over households is present and nearly all random coefficients are significant. The influence of the socio-demographics is small. The loyalty dummies are significant for most stores and represent mostly the share of purchasing occasions.

The 27% of consumers who care about the environment prefer Rewe and weekly farmers' markets. Nearly all other stores are less preferred compared to Aldi. The within-variance regarding environmental characteristics for f&v is supported by the result that foreign farmers' markets are less preferred than some discounters by consumers who care about the environment, and a standard weekly farmers' market is more preferred. Within discounters, Aldi is the ruling store. Penny, Plus, Netto and Norma are generally less preferred with no significant difference within these stores.

The specialized stores (foreign and weekly farmers' market) are the most favored stores for f&v by consumers who care about freshness. Also the discounters Plus and Penny are preferred compared to Edeka or Rewe and the other discounters. The implied freshness image of the supermarkets is the lowest over all stores. The discounters score on average quite well, but Aldi is not generally the most preferred store within the discounters. The implicit freshness image ranking, starting with the highest image, is: weekly farmers' or foreign farmers' market or Plus, Penny, Aldi, Lidl, Netto, Edeka or Rewe.

Specialized stores are the most preferred stores by the 26% of households in the dataset who like organic food. The supermarkets get the worst results and Plus and Netto are the preferred discounters. The implicit organic food image ranking, starting with the highest image, is: weekly farmers' or foreign farmers' market, Kaufland or Penny or Plus, Aldi, Edeka or Rewe.

The store types can be classified into different price strategies: Discounters offer every-day-low-pricing (EDLP), supermarkets offer

high-low pricing (HiLo), small and large hypermarkets offer hybrid pricing. Specialized stores offer prices between hybrid and high. The associated price order beginning with the lowest priced store type is discounter, large hypermarket, supermarket, small hypermarket and specialized store. It is assumed that price- and very price-conscious consumers prefer store types with a lower price image. Mainly the specialized stores are avoided and the large hypermarket Kaufland is preferred compared to discounters. There are two explanations why Kaufland is preferred to the discounters. First, consumers perceive large hypermarkets in average as really “cheaper” than discounters. Second, the hybrid pricing of large hypermarkets keep cherry pickers going to this store type. The huge assortment gives enough opportunities for consumers to find cheaper groceries than in discounters. Within the discounters, Aldi is the preferred discounter, means Aldi has the lowest implied price image of all discounters.

One way to signal quality is the use of prices as MILGROM and ROBERTS (1986) state. High prices signal high quality, and low prices signal low quality. The discounters Norma and Aldi are the least choice for f&v by quality orientated consumers. Lidl and Netto have a higher implied quality image. The specialized stores enjoy the highest implied image for f&v and enjoy therefore the highest confidence for this quality sensitive grocery. The implicit quality image ranking, starting with the highest image, is: weekly farmers’ or foreign farmers’ market, Edeka, Netto or Lidl, Aldi, Norma. Table 2 shows the implied image ranking of the attitude variables.

4. Discussion

Foreign and weekly farmers’ markets enjoy the highest implied freshness, organic food and quality image. Foreign farmers’ markets are rather negatively associated within the environment attitude. Nevertheless, the very good implied images come hand in hand with the highest implied price image. The supermarkets Edeka and Rewe get comparable bad results for freshness and organic food, while the discounters Plus and Penny score quite well in these two categories. Aldi gets average results in most categories.

Several issues have to be considered. The households reported their purchases by their own. Due to the self-observation one can expect

some changes in behaviour and therefore some bias in the estimation results. The intention to capture true loyalty by a dummy variable is rather unlikely. It can just represent, that visiting one store at one time, increases the probability to visit the same store next time. True loyalty cannot be captured by just the revealed point of purchase without further information of the consumer.

Tab. 2: The implied image ranking of the attitude variables

IIR*	Organic	Freshness	Environment	Pricing	Quality
1.	weekly farmers'	weekly farmers'/Plus	weekly farmers'/Rewe	weekly farmers'	weekly farmers'
2.	Kaufland/Penny/Plus	Penny	Aldi	Penny/Norma	Edeka
3.	Aldi	Aldi	Netto	Aldi	Lidl/Netto
4.	Edeka/Rewe	Lidl	Penny	Kaufland	Aldi
5.		Netto	Kaufland/Norma/Plus		Norma
6.		Edeka / Rewe			

* IIR = Implied Image Ranking

Source: Own illustration

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