Consumer survey on the new format of the European Energy Label for televisions

-

Comparison of a "A-G closed" versus a "beyond A" scale format

Working Paper No. 3 within the project:
Soziale, ökologische und ökonomische Dimensionen eines nachhaltigen Energiekonsums in Wohngebäuden
Funded under the BMBF Programme „Vom Wissen zum Handeln - Neue Wege zum nachhaltigen Konsum“

Authors:
Stefanie Heinzle (Uni St Gallen)
Rolf Wüstenhagen (Uni St. Gallen)

St. Gallen
August 2009

Structure of the paper:

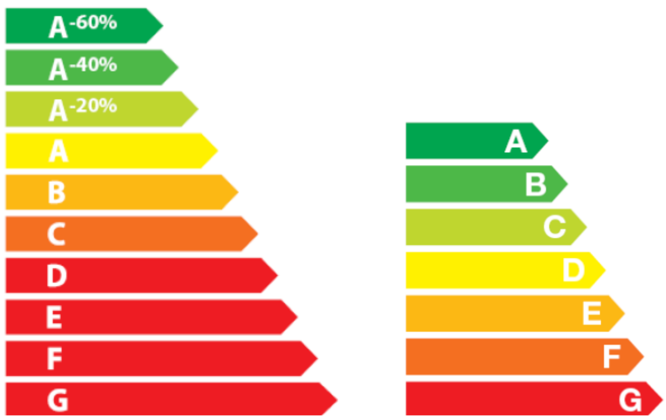
1. Introduction

The 92/75/EEC "Energy Labelling Directive for Household Appliances", adopted in 1992, requires retailers to display a compulsory label for fridges, freezers, washing machines and a few other product categories. The labels show the level of energy consumption at the point of sale (COM 778, 2008). By providing accurate, relevant and comparable information, consumers are given the opportunity to rate the energy efficiency of labelled household appliances more easily (European Parliament, 2009). The purpose of the introduction of the label is to influence consumers' choices in favour of more energy efficient appliances (OJ L 297, 1992). It additionally gives producers the incentive to manufacture appliances that consume less energy and helps them to get better returns on their investments in research of more efficient household appliances (COM 778, 2008). In an impact assessment, the European Commission estimated that energy labelling contributed to annual energy savings in the order of about 14 Million tonnes of CO2 emission reductions per year between 1996 and 2004 (COM 778, 2008).

Through technical advancements and better know-how, manufacturers were able to produce more energy efficient appliances faster than expected at the time when the labelling directive was adopted in 1992. By fostering innovation, more and more energy-efficient products were developed so that for many product categories, the highest class of the scale has already been achieved or even surpassed. That is why nowadays there are hardly any appliances with an energy efficiency class below D sold on the market. For the product categories of refrigerators and washing machines, almost only appliances with energy efficiency classes better than C are available for purchase (Energieinstitut, 2009; CECED, 2005). That is why in 2003 the entire scaling system was expanded to include new energy efficiency categories on top of class A (A+ for washing machines, A+ and A++ for refrigerators and freezers). The introduction of these new classes attempted to make the best products identifiable for consumers again (Anonymous, 2008). However, that scheme was regarded as only an interim arrangement until a comprehensive revision of the energy labelling classes had taken place (OJ L 170/10, 2003). The enlargement of the scale was criticized as being non-transparent and difficult to understand since consumers could not judge in a glance how much better an A+ class labelled product was compared to an A class labelled product (ANEC, 2008). Therefore, critics said that it became difficult for consumers to select the best class A product because there was no explanation as to how much better the product was in comparison to the entry level of the same class (Anonymous, 2008). With too many appliances crowded into the top of the scale, the EU Energy Label has become a victim of its own success and is now about to be revised by the Commission (ANEC, 2008). Different stakeholders and political authorities have reached a consensus that a revision of the Energy label is needed (Stø and Strandbakken, 2009). The EU Commission has already worked for a couple of years on a revision of the label and the need for introducing a new system was published in the Energy Efficiency Action Plan in 2006 (COM 545,

2006) and in the Sustainable Consumption and Production Action Plan from 2008 (Stø and Strandbakken, 2009). On March 30 and 31, 2009, the European Commission presented their proposal to change the scale used to rate products of the categories televisions, fridges, freezers and washing machines by introducing an scale based on the current A-G scale with extra levels for products considered to be beyond A (A-20%, A-40%, A-60% etc.) (ECEEE, 2009). The rationale behind this label is that no reclassification of products would be needed and that this system could easily be harmonized throughout all EU countries. The Council reached an agreement in March to add these extra levels for top-rated products, and while the European Parliament adopted the proposed scheme for fridges and freezers, the decision was blocked for the product category of televisions. Now, the European Parliament has called on the Commission to withdraw the draft directive and to submit a new proposal for the product category of televisions to the committee by the end of September 2009. At the time of writing, the Commission was launching a big consumer survey in order to test the effectiveness of both labels; they have also decided not to suggest new labels for other product categories (e.g. computers, monitors, imaging equipment, etc.) until the new label for TVs has been adopted (ECEEE, 2009). Figure 1 illustrates the energy efficiency classes of both label options and the next paragraph will shortly review the pros and cons of both discussed label schemes.

Figure 1: Illustration of energy efficiency classes of both label options



2. Pros and cons of the two discussed label schemes

At the time of writing, the well-known "A-G closed" scale in combination with regular updates was one of the two options being evaluated by the European Commission. Besides members of parliament, consumer and retail organizations such as BEUC, Anec, BRC, FCD and the European Council for an Energy Efficient Economy (eceee) were in favour of maintaining the current A-G layout, provided that a dynamic system would be implemented in order to review the thresholds of the various classes every couple of years. For example, each time a predefined percentage (e.g. 20%) of the available products on the market would reach an A grade. Therefore, a product that would be placed at the top of the scale in 2009 could be reclassified into a lower efficiency class in a later year. That means that a label with the new rating would be changed after every rescaling of the energy efficiency scale. On the other hand, the consumer interface of the label would remain simple and clear, with no changes to the A to G scale. This option would require the inclusion of a date on the label indicating how long the energy efficiency class would be valid. Opponents of this approach criticize that even if this rescaling process would take place regularly, there could be overlapping during the transition phase and therefore a parallel existence of old and new labels for the same product category (Anonymous, 2008). Supporters of this scheme claim that a different system would only cause confusion for customers and would undermine their ability to choose appliances with higher energy efficiency whereas the well-known scale would be clear, comprehensive, comparable and easy to understand (ANEC, 2008; Topten, 2009). Proponents of this approach are also supported by research that shows that 90% of consumers in Europe are aware of the label (MORI, 2008a) and that the "A-G closed" scale is much easier to understand than any other alternative tested (MORI, 2008b).

The new label format proposal by the European Commission is based on the A-G scheme with additional pre-defined classes (e.g. A-20%, A-40%, A-60%) added above class A. The main feature of this system is that the energy efficiency class of a particular appliance would remain unchanged over time. For product categories, which have already introduced the two classes A+ and A++ on top in the current scale, there would be a transition with the energy efficiency class A+ corresponding to A-20%, and A++ corresponding to A-40%. The highest class arrow on the label would be shown in dark green whereas the lowest class would be shown in dark red corresponding to the same colours used in the current A-G label. When a higher class on top of the energy class A would be introduced, the colours would be brought up accordingly (COM 778, 2008). One benefit of this new label format compared to the interim arrangement with the classes A+ and A++ would be the possibility to compare at a glance the different classes. Therefore consumers – provided that they actually understand the concept – would be able to judge how much "better than A" the appliance is (e.g. 40% more efficient than a current A labelled product). Additionally, there would be no need for retailers to attach an updated sticker on the appliances in the store (ECEEE, 2009). However, opponents of this system mention that it would leave consumers and retailers more confused and the label would prove less effective in meeting its objectives (ANEC, 2009). Additionally, the question would still remain unanswered of what would happen in the long term as critics regard an additional enlargement of the scale to be counterproductive (Energieinstitut, 2009). Consumer organisations also mention that for mail order business, Internet sales and in advertising, consumers usually cannot see the entire label but only the energy efficiency class. If, for example, the product would be advertised promoting the energy efficiency class A, consumers who are familiar with the well-known scheme A-G would think that this is the most efficient appliance as he or she would not know how many classes beyond A still exist and which one would be the best (Verbraucherzentrale Bundesverband, 2009).

3. Objective of the study

The purpose of this paper is to provide empirical evidence on the effect of both discussed labelling schemes on consumer decisions regarding investigated choices for televisions. Whereas fridges and freezers, washing machines and dishwashers have been labelled for more than a decade, televisions were not part of the European Union labelling scheme up to now. Within the last couple of years, the TV market has undergone a continuous and dramatic technological change by moving from traditional cathode tubes to flat screen TVs. The additional ongoing trend towards increasingly large screens had resulted in very high power consumption during viewing times (GfK, 2008). Televisions can therefore be classified as high-energy consuming appliances and consequently there is a large energy reduction potential in adding this category to the European energy labelling scheme; this is what makes TVs an interesting product category for this research.

We aim to demonstrate the difference in magnitude of the effect of both schemes in realistic choice experiments in order to define how to best move forward from a policy and a marketing perspective. To address this question, a choice-based conjoint experiment was designed. Corresponding to these objectives, our research question was the following:

Which label is more effective in making energy efficiency a relevant attribute in customer decisions regarding new televisions?

4. Methodological considerations

4.1. Theoretical framework

An energy label helps consumers to rate the energy efficiency of a household product with the aim of providing credible and comparable information on the performance of the products. Therefore, the energy label aims to mitigate potential inefficiencies resulting from imperfect information distribution about energy use and is thus related to Akerlof´s (1970) work on information asymmetry. Within information economics, a typology exists with the distinction between search, experience and credence attributes. The distinction between search and experience attributes was defined by Nelson (1970) and was further developed by Darby and Karni (1973) adding the credence category for product characteristics which are generally unobservable qualities, even after purchasing (Darby and Karni, 1973). The term search attribute refers to those characteristics of a product (e.g. size or colour) about which the consumer can get information before he buys, whereas experience attributes refer to those attributes revealed only through use. Credence attributes, on the other hand, cannot be fully evaluated even after use. The key difference between the categories is the level of information customers possess or could cheaply acquire compared to sellers. The energy consumption of an appliance is therefore usually a credence attribute of a product which can lead to negative externalities of asymmetric information. As consumers are usually not able to identify the energy consumption level before their purchase decision, they have to trust the manufacturer. The risk of adverse selection can be overcome by the introduction of an energy label, where a third party certification process takes place and the credence attribute can be converted into a "quasi-search attribute". Compared to a search attribute, a quasi-search attribute cannot be evaluated by the consumer himself but only through a third party (Hüser and Mühlenkamp, 1992).

4.2. Choice experiments and discrete choice analysis

As the energy label has not been introduced for the category of televisions yet, no market data is available about revealed preferences. Thus, it was not possible to observe people's actual purchase decisions. Accordingly, for the present study a market research technique was necessary to measure stated preferences. In contrast to the revealed preferences approach, which observes actual choices made by decision-makers in real market circumstances, stated preferences are derived from preferred choices made under different hypothetical scenarios in experimental markets (Danielis and Rotaris, 1999). Particularly in the area of individual decision behavior regarding new technologies, which have not reached extensive market penetration yet, and in the field of environmental behavior analysis, the stated preference approach using conjoint analyses is recommended (Train, 2003; Hensher et al., 2005).

Discrete choice experiments (DCE) belong to the family of conjoint analysis methods and are widely used in market research. Conjoint analysis is based on the work by Luce and Tukey (1964) but has been further developed in the last few decades into a method of preference studies which has not only drawn the attention of theoreticians but also those who carry out field studies (Gustaffson, Hermann and Huber, 2003). Green and Rao (1971), McFadden (1974) and Green and Srinivasan (1978) introduced the method into marketing literature in the 1970s. The early conjoint analysis work highlighted modelling of behavioural processes in order to comprehend how consumers form preferences (Green and Rao, 1971; Norman and Louviere, 1974). Today it is largely used for marketing research and product design surveys; it has gained broader acceptance in the last decade with the technical advancement of personal computers which helped to simplify the application of the process (Hair et. Al, 1995).

The basic idea of this method is that preferences for one specific stimulus are composed of separate contributions of different attributes. The underlying assumption of this method was subsumed by Lancaster (1966): "[t]he good, per se, does not give utility to the consumer; it possesses characteristics, and these characteristics give rise to utility". Therefore, the overall utility of a product or service is build up by the sum of the utilities assigned to its separate attributes or part worth utilities. Conjoint analysis is a technique designed to analyze and predict consumers´ responses by measuring the importance and degree of preference the individuals attach to each of these attributes. Consumers are asked to choose a set of criteria from numerous presented sets. Although the marketplace usually requires tradeoffs between different characteristics, consumers typically avoid the evaluation of conflicting attributes during market research. By forcing consumers to decide which characteristics are most important and by making tradeoffs between different levels of product attributes, it is possible to measure preferences in simulated quasi-realistic decision/purchasing situations since the decision making criteria are not presented separately, but simultaneously (Orme, 2006; Lilien, Rangaswamy and De Bruyn, 2007; Huber, 2005). Furthermore, conjoint analysis usually selects only a reduced number of attributes on which to base the decision. The simplification in the conjoint analysis mirrors that in the market, as most decisions in the marketplace are also based only on remarkably few dimensions (Huber, 2005; Olshavsky and Grandbois, 1979).

4.3. Discrete choice design

In this study, preferences for attributes of televisions were estimated in a choice-based-conjoint experiment in order to identify which label format has a stronger impact on consumer decisions. The choice tasks were randomly calculated with the software program Sawtooth and were full profile in the sense that all attributes were presented for each set of four television alternatives. Respondents therefore had to choose between four product alternatives in each choice task. The recorded choices on each of the twelve randomly generated choice tasks by each respondent were analyzed in a hierarchical Bayes estimation to calculate the respondents´ utility functions across all attributes. The results were the input into a market simulation for determining preference shares of the respondents in simulations of competing product alternatives.

Hierarchical Bayesian analysis is regarded as being a state-of-the-art method for estimating utilities from Choice Based Conjoint Studies. Compared to traditional aggregate models (e.g. multinomial logit analysis) the Hierarchical Bayesian approach significantly improves the analysis of preferences. While earlier methods combined data for all individuals and were criticised for obscuring important aspects of the data, with a Bayesian framework, it is possible to analyze choice data at the individual level (see Allenby and Rossi, 2003; and Huber, 2001 for more detailed discussion of hierarchical modelling).

Respondents were split up into two different samples, which only differed with regard to the presentation format of the label. Technically, the set of attributes and levels for both subgroups was identical. Therefore, differences in the preference structure between two subgroups could be traced back to the different formulation of the label version. Two assumptions were made. First, for the "A-G closed" scale, we assumed that a dynamic system was in place by revising the thresholds of the categories every couple of years. In contrast, for label version 2 ("beyond A" scale) we assumed that due to technical advancements, almost all TVs on the market had a grade higher than A. Therefore we could assume that intervals, which correspond to the amount of energy consumption between two label efficiency classes between the energy classes A, B, C and D in the label version "A-G closed" scale correspond to the same intervals between energy classes A-60%, A-40%, A-20% and A in the label version "beyond A" scale.

All respondents received a series of 12 choice tasks involving comparisons of different televisions with varying levels of attributes. Each choice task presented four different television alternatives where respondents had to choose their preferred alternative. The attributes and the attribute levels that were presented in the choice tasks are listed in Figure 2; a typical choice task is displayed in Appendix 1.

Figure 2: Attributes and attribute levels in the choice tasks

Sample 1 (“A-G closed” scale)

Attributes	Attribute levels
Brand	Samsung Sony Philips TCM of Tchibo
Equipment version	Simple* Medium** High-Tech**
Energy label	A B C D
Purchase price	499€ 649€ 799€ 949€

Equipment version:
* Simple: HD-Ready, 1xHDMI, Response time 8, contrast ratio 5000:1
** Medium: HD-Ready, 2xHDMI, USB, response time 6, contrast ratio 10000:1
*** High-Tech: Full-HD, 4xHDMI, PC connection, USB, response time 4, contrast ratio 50000:1

Sample 2 (“Beyond A” scale)

Attributes	Attribute levels
Brand	Samsung Sony Philips TCM of Tchibo
Equipment version	Simple* Medium** High-Tech**
Energy label	A-60% A-40% A-20% A
Purchase price	499€ 649€ 799€ 949€

Equipment version:
* Simple: HD-Ready, 1xHDMI, Response time 8, contrast ratio 5000:1
** Medium: HD-Ready, 2xHDMI, USB, response time 6, contrast ratio 10000:1
*** High-Tech: Full-HD, 4xHDMI, PC connection, USB, response time 4, contrast ratio 50000:1

4.4. Respondent sample

This study is based on 2148 choice observations in Germany, based on 12 choices each of 176 respondents. These respondents are a subsample of a representative random sample of individuals balanced across the regions of Germany, which was recruited by a commercial marketing research company (GfK)[1]. The data were collected in June 2009. Sample 1 (hereafter label version “A-G closed” scale) includes 1092 choice tasks, and sample 2 (hereafter label version “beyond A” scale) is based on data for 1056 choice tasks. Looking at the socio-demographic characteristics of both samples, they are largely consistent with regard to gender, age, education and income.

[1] The entire sample included 410 respondents, conducting 12 choice tasks each (a total of 4'920 observations). This paper only reports the results of those subsamples that were asked to assess the two versions of the EU Energy Label.

5. Results

5.1. Results of the Hierarchical Bayes model

In this section we present the estimated coefficients for sample 1 ("A-G closed" scale) and sample 2 ("beyond A" scale) and conduct hypothetical market simulations in order to answer our research question which of the two labels is more effective in influencing customer choice for energy-efficient televisions.

Table 1: Results of the discrete choice (Hierarchical Bayes) model for televisions

Hierarchical Bayes estimation						
Attribute Level	Sample 1 ("A-G" closed scale) N=90			Sample 2 ("Beyond A" scale) N=87		
Brand	Coeff.	Std. Error	T value	Coeff.	Std. Error	T value
Samsung	0.29	0.09	3.07	0.36	0.09	3.90
Sony	0.27	0.09	3.04	0.45	0.08	5.52
Philips	0.36	0.09	4.02	0.23	0.09	2.59
TCM of Tchibo	-0.92	0.11	-8.5	-1.04	0.10	-10.51
Equipment version						
Simple	-1.47	0.11	-13.78	-1.34	0.09	-14.18
Medium	0.03	0.08	0.35	-0.09	0.08	-1.15
High-Tech	1.44	0.10	14.51	1.43	0.10	14.47
Energy Label						
A / A-60%	3.18	0.13	24.90	1.00	0.12	8.26
B / A-40%	1.36	0.11	12.85	0.88	0.09	9.80
C / A-20%	-1.30	0.11	12.13	-0.69	0.11	-6.50
D / A	-3.23	0.14	23.52	-1.19	0.12	-9.88
Purchase price						
499	3.13	0.14	23.17	3.79	0.14	27.05
649	1.09	0.09	11.53	1.57	0.11	14.97
799	-1.18	0.10	11.82	-1.07	0.11	-10.10
949	-3.04	0.14	21.17	-4.29	0.17	-25.16

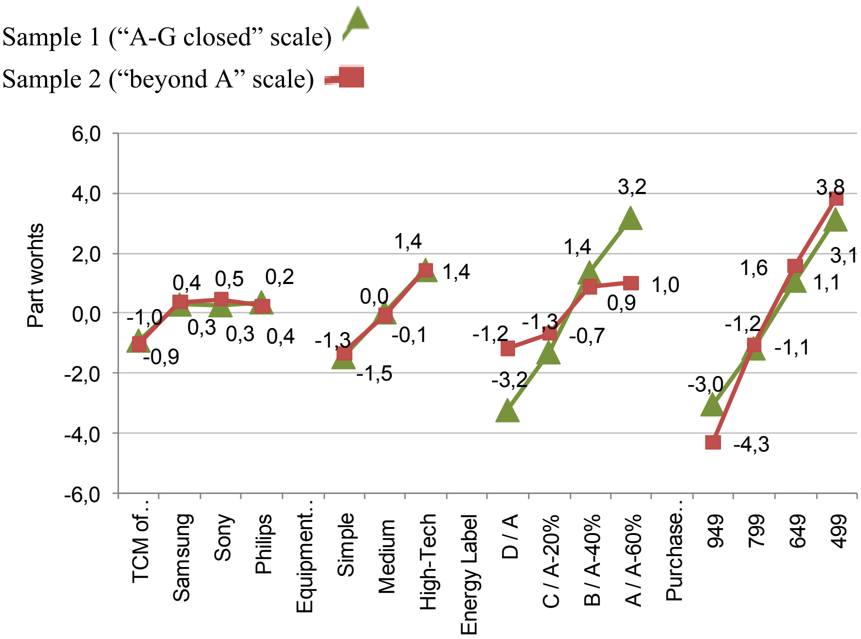
5. Results

The coefficient shows the level of influence of a change of attribute level on the consumer´s likelihood to choose the product. A positive value (e.g. a low price) increases the utility for a consumer, whereas a negative value (e.g. a high price) decreases the utility compared to the average level of a given attribute. Comparing the coefficient levels of sample 1 (“A-G closed” scale) with coefficient levels of sample 2 (“beyond A” scale), our analysis shows that the range from the lowest to the highest level of the attribute level "Energy Label" is much wider in sample 1 than in sample 2. In general, the range from the minimal to the maximal part-worth value within attributes is a measure of the attribute´s relative importance on choice decisions (Orme, 2007). Therefore we can conclude that the energy label influences the consumer decision more for respondents in sample 1 than in sample 2. Consistent with theories of utility maximization, the preferred television in both samples (i.e. the one with the greatest overall utility) was the one that had the attribute levels with the highest utility value within each attribute (high-tech equipment version, highest energy efficiency class and lowest price). Only with regard to the brand preferences the two samples showed a slight variation. The columns next to the coefficient levels show different measures for the goodness of fit. The standard error indicates the exactness of estimating the coefficient whereas the ratio of the coefficient to the standard error (t-value) delivers a standardized value to estimate the exactness of the coefficient. T-values greater than 2.58 indicate a reliable estimate (within a 99% confidence interval). In our analysis most coefficients are significant at the 99% level.

The impact of each attribute on consumers’ choices can be even better represented with graphs. Figure 3 displays graphs with average utilities for each attribute in the two samples. The rankings of attribute levels were very similar across groups, but respondents from sample 1 (“A-G closed” scale) disliked low energy efficiency levels more than respondents from sample 2 (“beyond A” scale). The opposite was true for high efficiency classes where respondents from sample 1 preferred higher classes much more than respondents from sample 2. An interesting aspect of this analysis is that the coefficient level of the best category (A-60%) in sample 2 was almost the same as the coefficient level for the second best category (A-40%). This is an interesting point because we can conclude that added classes in the “beyond A” scale included in our survey would only have a limited impact on consumer decisions. The same applies when analyzing the difference between the two lowest classes of the “beyond A” scale (A-20% vs. A) where the difference in coefficient values is very low.

5. Results

Figure 3: Graphical display of part-worths



5.2. Conjoint importances

In a second step, conjoint importances were computed. Importances describe how much influence each attribute has on the purchase decision. Conjoint importances are displayed in Table 2.

Table 2: Relative attribute importances derived from Hierarchical Bayes estimation of utilities

Importances of the attribute (HB method)		
Attribute	Sample 1: “A-G closed” scale	Sample 2: “Beyond A” scale
Brand	13.3%	13.7%
Equipment version	18.6%	18.6%
Energy Label	33.6%	23.5%
Purchase price	34.5%	44.3%

In both samples the most important product attribute of a TV was the purchase price, followed by the energy label, the equipment version and the brand. However, there were differences in conjoint importances of the attribute energy label between sample 1, with 33.5%, and sample 2, with 23.5%. This analysis shows that an energy label with a “A-G closed” scale has over 10% more influence on the consumer decision than an energy label with a “beyond A” scale.

5.3. Willingness-to-pay

The results presented above can also be expressed in terms of implicit willingness-to-pay when the part worth utility coefficients are converted into monetary units. The results can be interpreted as an indication of the average consumer´s willingness to pay for a change from a lower to a higher level of an attribute. This approach is often applied in pricing studies based on conjoint analysis (e.g. Green and Srinivasan, 1990; Orme, 2001).

In sample 1 (“A-G closed” scale) a utility difference of 6.2 of the attribute price (from the highest utility level of 3.13 for the lowest price to the lowest utility level of -3.04 for the highest price) reflects a 450€ change in price. Therefore, a 1€ change corresponds to 0.014 in utility change (6.2 utilities / 450€). It then follows that the highest energy efficiency level A, being worth 1.82 utility points more than the energy efficiency level B, is worth about 133€ more. An energy efficiency level B is worth about 194€ more than an energy efficiency level C and an energy efficiency level C is worth about 141€ more than an energy efficiency level D.

In sample 2 (“beyond A” scale) a utility difference of 8.1 of the attribute price (from the highest utility level of 3.79 for the lowest price to the lowest utility level of -4.29 for the highest price) also reflects a 450€ change in price. Therefore, a 1€ change in this sample corresponds to 0.018 in utility change (8.1 utilities / 450€). It then follows that the highest energy efficiency level A-60%, being worth 0.13 utility points more than the energy efficiency level A-40%, is worth about 7.2€ more. An energy efficiency level A-40% is worth about 86.8€ more than an energy efficiency level A-20% and an energy efficiency level A-20% is worth about 27.7€ more than an energy efficiency level A.

5.4. Simulation of market response

Discrete choice provides a tool that can be used to simulate market response to different alternatives. For the purpose of this study, what-if analyses were conducted to test the effect of the indication of the energy efficiency class. The estimated utilities (part-worths) from the HB estimation method provided the basis for estimating share of preferences. Share of preference can be defined as the percentage of respondents that would prefer one of the specified products. By applying simulations, one can test whether differences among subgroups are significant. For our analysis, we applied a randomized first choice simulation method to estimate share of preference which assumes a "maximum utility rule".

In the following scenario, a realistic market situation was demonstrated by calculating the share of preference of four hypothetical products. Reflecting the real market situation, the price of the appliance varied according to the energy efficiency class (i.e. the most expensive television came with the highest energy efficiency class, whereas the cheapest television was labelled with the lowest energy efficiency class). The attributes brand and equipment were set at a constant level to allow testing of the isolated effect of the combination of energy efficiency class and price.

Table 3: Share of preference (SoP) of four hypothetical products

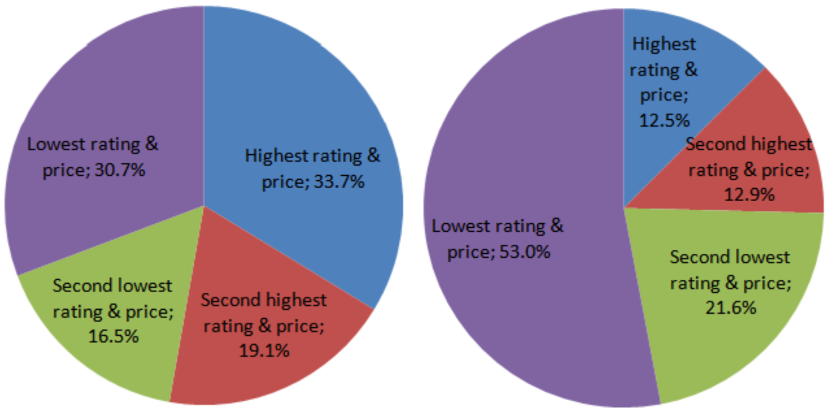
	Highest energy efficiency class, highest price		Second highest energy efficiency class, second highest price		Second lowest energy efficiency class, second lowest price		Lowest energy efficiency class, lowest price	
	Sample 1	Sample 2	Sample 1	Sample 2	Sample 1	Sample 2	Sample 1	Sample 2
Brand	Samsung		Samsung		Samsung		Samsung	
Equipment version	Medium		Medium		Medium		Medium	
Energy Label	A	A-60%	B	A-40%	C	A-20%	D	A
Price	949€		799€		649€		499€	
SoP in %	**33.7%**	**12.5%**	**19.1%**	**12.9%**	**16.5%**	**21.6%**	**30.8%**	**53.0%**
Standard error	4.03	2.97	2.63	2.31	2.75	3.14	4.05	4.22

NOTE: Share of preference represents that percentage of the respondents who would prefer or choose each television, assuming these are the only four choices available. Shares of preference are ratio data.

Respondents of sample 1 were about 2.6 times more likely to choose the television with the highest energy efficiency class in combination with the highest price than respondents from sample 2 (33.7% vs. 12.4%). Respondents of sample 1 were about 1.7 times less likely to choose the television with the lowest energy efficiency class in combination with the lowest price than respondents from sample 2 (30.7% vs. 53.0%). By changing the energy efficiency class from the lowest energy efficiency class in combination with the lowest price to a TV with the highest energy efficiency class in combination with the highest price, the preference share in sample 1 increased by almost 3% whereas the preference share in sample 2 decreased by more than 40%. We can therefore conclude that an increase from a D to an A labelled television produces enough utility for respondents in sample 1 so that the shares of preference are more than equalized although the price goes up. In other words, respondents of sample 1 are willing to put up with a high price if the energy efficiency class is high. Our analysis therefore proves once again that respondents of sample 1 have a higher willingness-to-pay for energy efficient appliances than respondents of sample 2. T statistics for the differences between shares of preferences of unique respondent groups in hypothetical product 1 and 4 have an absolute magnitude greater than 1.96 indicating a significant difference at the 95% confidence interval.

Figure 4: Illustration of share of preferences of four hypothetical products

Sample 1 (“A-G closed” scale) vs. Sample 2 (“beyond A” scale)



6. Implications

The purpose of this study was to analyze the influence of two different label formats on consumer decisions. As conjoint analysis results provide much richer results than simple willingness-to-pay studies or direct inquiries into people´s preferences we were able to reduce social desirability bias by asking consumers to face realistic trade-offs between different product attributes.

The survey shows that the well-known "A-G closed" scale has a greater impact on consumer decisions than a “beyond A” scale. The results clearly show that introducing the new label with its additional categories (A-20 % etc.) weakens the effect of the label, resulting in lower awareness of consumers about energy efficiency as an important attribute. Whereas with the old label, the energy efficiency rating was almost equally important as price, the importance of the energy label sharply dropped (from 33.5% to 23.5%) with the introduction of the new label, and consumers relied much more heavily on price (importance increasing from 34.5% to 44.3%). Hence, our results suggest that the confusion introduced by the new label categories makes consumers switch away from energy efficient products and shop for the cheapest TV instead. Differences between classes of the “beyond A” scale (e.g. between an A-60% and an A-40% efficiency class) are perceived much lower than differences between classes of the “A-G closed” scheme (e.g. between an A and a B efficiency class). Therefore, we can conclude that the added categories would only have a limited impact. Therefore the results of the study suggest sticking to the established, straightforward and easily understood format of the A to G label.

With regard to marketing, the most important result of our analysis is that the impact of a “A-G closed” scale on consumers’ decisions is much stronger and therefore consumers are more willing to pay a higher premium for the highest classes of the “A-G closed” scale than of the classes of the “beyond A” scale. Not only would a scheme of ever more fine-grained variations of the A category confuse consumers, it would also not be in the best interest of the industry. This strong willingness to pay for a labelled product should be encouraging for manufacturers to support the maintenance of the well-known A-G scheme in order to differentiate themselves based on energy-efficient products. By reaping the benefit of this higher latent willingness-to-pay, manufactures might get a higher return on their investment in R&D with the “A-G closed” scheme.

Nevertheless, taking the different positions discussed in the introduction into consideration, we suggest that regular rescaling must take place to guarantee the effectiveness of the energy label and that a date would be required to explain how long current efficiency levels are valid to qualify for a given category. In any case, changes to the existing label will require a substantial communication effort in order to reduce ambiguity for manufacturers, retailers and consumers.

7. List of tables

8. List of figures

References

Allenby, G. & Rossi , P. (2003): Bayesian Statistics and Marketing. Marketing Science, 22, 304 - 328.

ANNEC (2008): Consumers strongly in favour of keeping the A-G Energy Label. Press release by ANNEC-PR-2008-PRL-009, available at: http://www.anec.eu/attachments/ANEC-PR-2008-PRL-009.pdf

Anonymous (2008): Beyond A: the future of the energy label. Consumer Policy Review, Vol. 18, Nr. 4; pg. 100 – 103.

CECED (2005): Energy-Efficiency. A shortcut to Kyoto targets. The Vision of European Home Appliance Manufactures

COM 778 (2008): Proposal for a Directive of the European Parliament and of the Council on the indication by labeling and standard product information of the consumption of energy and other resources by energy-related products, Brussels 13.11.2008.

Darby, M. R./ Karni, E. (1973): Free Competition and the Optimal Amount of Fraud, in: Journal of Law and Economics, Vol. 16, Nr. 1, S. 67-88.

ECEEE (2009): The Energy Labelling Directive, available at: http://www.eceee.org/Energy_labelling/

Energieinstitut (2009): Eine deskriptive Betrachtung des neuen (EU)-Energielabels und der EcoDesign-Richtlinie im Vergleich zum japanischen Top-Runner Programm, available at: http://www.energieinstitut-linz.at

European Parliament (2009): European Parliament resolution of 6 May 2009 on the draft Commission directive implementing and amending Council Directive 92/75/EEC with regard to energy labelling of televisions, available at:
http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2009-0357+0+DOC+XML+V0//EN

Green, P. E. and V. R. Rao (1971): Conjoint Measurement for Quantifying Judgmental Data, Journal of Marketing Research 8 (3), 355-368.

Green, P.E. and V. Srinivasan (1990): Conjoint analysis in marketing: new developments with implications for research and practice, Journal of Marketing 54 (4), 3-19.

Gustafsson, A., Hermann, A. and F. Huber (2003): Conjoint Measurement. Methods and Applications, Berlin: Springer.

Hair, J.F., Anderson, R.E., Tatham, R.L. and W.C. Black (1995): Chapter 10: Conjoint analysis. In J.F. Hair et al. (Eds.), Multivariate data analysis (4th ed., pp. 556-615). Englewood Cliffs, N.J.: Prentice-Hall.

Hensher, D. A., J.M. Rose and W.H. Greene (2005): Applied Choice Analysis – A primer, Cambridge University Press, Cambridge.

Huber, J. and Train, K. (2001): On the similarity of classical and Bayesian estimates of individual mean partworths," Marketing Lett., Vol. 12, pp. 259-269.

Huber, J. (2005): Conjoint Analysis: How we got there and where we are, Sawtooth Software, Research Paper series.

Hüser, A./ Mühlenkamp, C. (1992): Werbung für ökologische Güter. Gestaltungsaspekte aus informationsökonomischer Sicht, in: Marketing ZFP, Heft 3, S. 149-156.

GfK (2008): How to combine consumer electronics and environment?, available at: http://www.gfk.com/group/press_information/press_releases/002598/index.en.html

References

Lancaster, K (1966): A new approach to consumer theory. In: Journal of Political Economy (74), S. 132–157.

Lilien, G. L., Rangaswamy, A. and A. De Bruyn (2007): Principles of Marketing Engineering, Trafford.

Louviere and Woodworth (1983): Design and Analysis of Simulated Consumer Choice and Allocation Experiments: A Method Based on Aggregate Data, Journal of Marketing Research (20), 350-367.

Luce, R. D.; Tukey and John W. (1964): Simultaneous Conjoint Measurement: A new Type of Fundamental Measurement. In: Journal of Mathematical Psychology 1, S. 1–27.

McFadden, D. (1974): Conditional Logit Analysis of Qualitative Choice Behavior, in: Zarembka, P. (Ed.), Frontiers in Econometrics, New York, 105-142.

MORI (2008a): MORI research carried out for ANEC, BEUC, UK National Consumer Council (NCC), the UK Energy Savings Trust and the UK Department for Environment, Food and Rural Affairs in May 2008, available at:
http://www.anec.eu/attachments/ANEC-ENV-2008-G-040b.pdf.

MORI (2008b): MORI research carried out for the UK Government, Sweden and The Netherlands in December 2008, available at: http://www.mtprog.com/cms/library-publications/

Nelson, P. (1970): Information and Consumer Behavior, in: Journal of Political
Economy, Vol. 78, Vol. 2, S. 311-329.

O JL 170/10 (2003): Commission directive 2003/66/EC of 3 July 2003 amending Directive 94/2/EC implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations, available at:
http://www.osram.by/osram_com/About_Us/Society_and_the_Environment_-_Global_Care/EU_directives_and_promotion_opportunities/EU_directives/Energy_Labeling/DIRECTIVE-2003_66_EC.pdf

OJ L 297 (1992): Council Directive 92/75/EEC of 22 September 1992 on the indication by labelling and standard product information of the consumption of energy and other resources by househole appliances. Official Journal of the European Union L 297, pp. 16-19, available at: http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0075:EN:HTML

Olshavsky, R.W. and D.H. Grandbois, D.H. (1979): Consumer decision making - fact or fiction, Journal. of. Consumer Research (6), 93-100.

Orme, B. K. (2006): Getting Started with Conjoint Analysis: Strategies for Product Design and Pricing Research. Madison: Research Publishers.

Stø, E. and Strandbakken, P. (2009): The future of energy labels in Europe – a consumer and stakeholder approach to the revisions of the EU Energy Label. Paper presented at the Joint actions on Climate Change conference, 8-10 June 2009 – City of Aalborg

Timothy, J.R. (2008): The propensity for motorists to walk for short trips: Evidence from West Edinburgh, Transportation research part A: Policy and Practics 44(4), 620 – 628.

Topten.info (2009): Cold appliances: recommendations for policy design, available at:
http://www.topten.info/index.php?page=refrigerators_rg&fromid=144

Train, K. (2002): Discrete choice methods with simulation. Cambridge: Cambridge University Press.

Verbraucherzentrale Bundesverband (2009): Meilensteine im Bereich Energie, available at: http://www.europa-fuer-verbraucher.de/meilensteine-energie.html

Appendix

Appendix 1: Sample choice task for sample 1 and 2

The European Union is planning to introduce a new label for televisions, which will look like the following:

The colour "green" stands for low energy consumption, the colour "red" stands for very high-consuming energy appliances.

If these were your only options, which would you choose?
Choose by clicking one of the buttons below:

Brand	Philips	Samsung	Sony	TCM von Tchibo
Equipment version	High-Tech***	Medium**	Medium**	Simple*
Energy efficiency class	A	B	C	D
Price	949€	799€	649€	499€

Equipment version:
* Simple: HD-Ready, 1xHDMI, Response time 8, contrast ratio 5000:1
** Medium: HD-Ready, 2xHDMI, USB, response time 6, contrast ratio 10000:1
*** High-Tech: Full-HD, 4xHDMI, PC connection, USB, response time 4, contrast ratio 50000:1

The European Union is planning to introduce a new label for televisions, which will look like the following:

The colour "green" stands for low energy consumption, the colour "red" stands for very high-consuming energy appliances. The indications "A-20%, "A-40% and "A-60% imply that the appliance uses 20, 40 or 60% less energy than an appliance of class "A".

If these were your only options, which would you choose?
Choose by clicking one of the buttons below:

Brand	Philips	Samsung	Sony	TCM von Tchibo
Equipment version	High-Tech***	Medium**	Medium**	Simple*
Energy efficiency class	A-60%	A-40%	A-20%	A
Price	949€	799€	649€	499€

Equipment version:
* Simple: HD-Ready, 1xHDMI, Response time 8, contrast ratio 5000:1
** Medium: HD-Ready, 2xHDMI, USB, response time 6, contrast ratio 10000:1
*** High-Tech: Full-HD, 4xHDMI, PC connection, USB, response time 4, contrast ratio 50000:1