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Master's Thesis

How do consumers respond to missing product information?

Studying the inference formation process based on available information sources

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Abstract

What happens when consumers find information essential to make a purchase decision missing? I conducted an experimental survey study to discover the likely available sources that consumers infer the information from when cues such as product price are not explicitly given at the point of purchase. When that occurs and the given prices of alternative brands do not vary amongst each other, I propose that consumers' inferences about the product's missing price approach the most frequently displayed price rather than are consistent with the given cues depicted in the product's brand elements such as packaging or brand name. Moreover, the entire inference process is controlled for consumers' confidence in inferred price estimate, to test if depending on how confident consumers feel with what was inferred, are more or less likely to purchase that product. The results of the survey experiment using between-subjects design support the hypothesized dominance of other-brand information source on confidence in inferred price estimate over same-brand information source, especially if diagnostic. When incorporating consumers' responses, greater use of other-brand information source leads to greater purchasing intention, however the mediating effect of confidence does not appear to be significant in this process. Taken together, the study extends findings on inference formation to the retailing context and highlights the complex nature of studying inferences from the methodological point of view.

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1. Introduction

"We must acknowledge that we never have complete information. Yet we have to make decisions anyway" as cited in Ebenbach and Moore (2000). Indeed, former Vice President Al Gore in his book *Earth in the Balance* could not make a better conclusion.

In everyday life, consumers often face situations when information essential to make a decision is simply missing. Caroline Mayer, a consumer reporter working for Washington Post points out the problem of inconsistent or even non-existing price labelling in supermarkets: "Often the price tags on supermarket shelves are missing. Or they are not in right place and show up under the wrong items. (...) It's practically impossible to figure out which item is the best value" (Mayer, 2012). From uncertain quality of a newly produced vehicle, no display of expiration date on dairy products to simple situations of lack of a price tag or a sticker on a product. In result, a consumer needs to deal with such events by taking the extra effort to find that information, e.g. by scanning the product at a price checkpoint, asking the sales assistant or finding product reviews. Those examples are very common and often irritating to all of us, yet both with decision outcomes which are to follow they are surprisingly left under-researched by both academia and the retail industry.

Studies on consumer responses to missing product information often consider a cognitive process that consumers use and which subsequently impacts their product evaluations and choices, namely the inference making, which is defined as "(...) the construction of meaning beyond what is explicitly given" (Harris, 1981, as cited in Dick et al., 1990). Many authors agree that consumers are most likely to make inferences that go beyond the available information in order to make a purchase decision (Gunasti & Ross, 2008; Kardes et al., 2004). Burke (1995), although indicates that consumers process only 62% of attributes in the high missing information condition, proves in the following study that consumers make inferences even when facing full product information (Burke, 1996). This finding draws a picture of how common it is for us to use our mental ability of inferring as an alternative mechanism to help with constructing meaningful information, which is not provided elsewhere.

What is more, the topic of inferences and missing product information attracts attention from marketing practitioners and researchers, particularly in the area of advertising, branding, packaging, pricing, product design and retailing decisions (Broniarczyk & Alba, 1994). Recent studies confirm that omitting pieces of information can enhance the effectiveness of the advertisement (Lee & Olshavsky, 1997). In studies on comparative advertising, academics agree that when consumers face missing product information, they are highly likely to make an inference about the missing attribute to make appropriate choice decisions (Lee & Olshavsky, 1997). It is thus interesting to investigate *how confidently* and *when most likely* consumers infer

missing information and what are the likely consequences of that, as it might have significant implications for retailers and manufacturers.

Moon and Tikoo (1997) argue that there can be contexts where it is better for a manufacturer not to disclose full information, as consumers make inferences for the missing cues anyway. This puts inference making research in a highly relevant context for big retailers, who due to cuts in staff, struggle with constantly updating price tags for high turnover or promoted products. Since 2007, world's biggest retailer Walmart, has decreased the number of employees by 57 per each store. Without enough labour hours, operational activities such as routine stocking and price updates become more problematic to store management (Clifford, 2013). What is more, those retailers pay high fines for not disclosing full product information in their stores, such as the aforementioned price tags. In countries like the US (the state of Michigan) or UAE, law enforcements are exceptionally strict: examples of Walmart or Home Depot paying $1,000,000 settlements in the USA for missing price tags in their stores (NBC News, 2006) show, that there is certainly a lot to lose when a retailer does not pay attention to such routine activities. A Deloitte's case study on US publicly owned specialty retailer proves that on average half of the products displayed on the store shelves had incorrect or missing price tags and this resulted in increased negative publicity and customer dissatisfaction. By improving price tag execution, the retailer gained additional $9 million in margins over a period of just six months (Deloitte, n.d.). Thus, examples like those clearly emphasize the importance of providing information at any touch point in store, and there is a high need to develop strategies to remedy this problem.

Nevertheless, it is not yet entirely clear what is the impact on consumers' satisfaction levels, their store/brand loyalty, word of mouth, and store sales, once they face products with missing essential information. Surprisingly, Dickson and Sawyer (1990) claim that only 57.9% of supermarket shoppers check the price of the chosen item, whilst the remainder agrees that "price is not so important". Does that mean that retailers do not lose customers when not including full product information? Moreover, does the finding of Moon and Tikoo (1997) suggest that by inferring from available sources of information to compensate for missing values, consumers are incentivised to carry on with the purchase? And if so, as indicated by Gunasti and Ross (2008), can retailers increase the tendency of consumers to make a purchase by prompting them to make an inference about missing information?

This thesis aims to look at the above questions in a greater detail to come up with sound recommendations for academics and practitioners in the retail context. Especially, as the subject of inferences and product evaluation has attracted a lot of research attention, the focus of this thesis is on determinants of inferences, namely the alternative sources of information (Lee & Olshavsky, 1997). It is also the first study to explore the dependency of matching product

display format to consumers' mode of information processing in the retailing context. The findings postulate that available sources of information play a significant role in forming new inferences for the missing product attributes, especially those depicted in alternative brands displayed in high proximity to the partially described product.

1.1 Problem Statement and Research Questions

The main research objective of this thesis is to investigate consumer's cognitive process of inference formation when a particular product attribute sold in a traditional supermarket is not explicitly given. Moreover, the study will provide answers on how consumers respond to such situations, namely, what is their purchasing intention upon evaluating a partially described product.

In the event when a consumer is urged to estimate the missing value of the product attribute, the inference processing model described in Lim and Kim (1992) implies that the presented (external) attributes serve as informational cues which the consumer infers from, to substitute the missing attributes. Having inferred missing attribute from a presented one, consumer integrates the presented and inferred information to form an overall product's evaluation (Lim & Kim, 1992). Academics agree on two most important presented information cues or 'sources': other-brand information and same-brand information sources.

Other-brand information source is used when consumers infer from available information about the attribute of other brands in a product class (Ford & Smith, 1987). For example, if a consumer wants to buy a Colgate toothpaste and notices its price tag is missing, she or he will most likely look at other brands in close proximity, e.g. Aquafresh, Blend-a-Med or Sensodyne which have their price (attribute) displayed, and infer Colgate's price from (average of) those prices.

Same-brand information source occurs when inferences are formed basing on other attribute available in the partially described brand itself, providing both missing and given attributes are highly correlated with each other (Johnson & Levin, 1985). Continuing with the Colgate toothpaste example, a consumer might perceive a strong relation between the product's brand name and price, and hence infer missing price from the perception of how strong the Colgate brand name is.

Being aware of those two information sources, it is interesting to consider the following question - out of the two, which information source do consumers make use of most often and under what circumstances this takes place? Therefore, the first aim of the research is to determine, if a consumer, faced with a situation of a missing price label for product A will be more confident when inferring the price from product A's other given attributes such as A's brand, or from the same attribute (price) presented in other alternatives (products B, C, D, E)

placed on the same supermarket shelf. The scope of this research question thus considers the traditional supermarket environment predominantly, which provides a rich and relevant context for this kind of inquiry.

Secondly, the likely consumer responses to products with missing information have not often been explored in a broader context. Therefore, the second aim of this study focuses on investigating under what circumstances a consumer is more likely to purchase a partially described product; and if those circumstances are mediated through consumer's confidence in the value that was inferred.

Lastly, this thesis takes into consideration and controls for the individual differences of consumers which might have a significant impact on information processing exercises. Particularly, the analysis will focus on demographic characteristic such as gender, age, income levels and marital status.

1.2 Academic and Managerial Relevance

Despite a vast amount of literature collected on inference making and choices under incomplete information (see Table 1) scholars in marketing and psychology still emphasize an insufficient commitment to studying inferential processes (Ford & Smith, 1987; Kivetz & Simonson, 2000; Lee & Olshavsky, 1997; Ross & Creyer, 1992). Ross and Creyer (1992) argue there is little understanding of how consumers use cognitive processes to determine the inferred value of the missing attribute and how the available information cues are used to form those inferences. Particularly with reference to inferring from same- and other-brand information sources, Lee and Olshavsky (1997) highlight their unclear impact on inference making when both are present. Gardial and Schumann (1990) imply that academics are still "(...) grappling with some basic issues regarding inference making such as how often it occurs or what types of consumers are most likely to make inferences".

As far as the existing literature is concerned, no journal articles on inferring missing information from available external cues have been published post 2000 period without considering minor exceptions (Kardes et al., 2004; Burke, 2006; Gunasti and Ross, 2008; Popkowski-Leszczyc, et al., 2008). Nevertheless, even most recent studies call for more research in drawing inferences about price levels (Popkowski-Leszczyc et al., 2008). Taking into account changing market environment and consumer's purchasing behaviour, it is worth validating the results from past research. Furthermore, developing models that describe how consumers evaluate product attribute information is important for both theoretical and practical reasons (Johnson & Levin, 1985).

Secondly, the complexity of studying the nature of inferences as such and the manipulation of independent variables in experiments led to many methodological limitations

in the past research, thus calling for a reconsidered study. For example, when researching the relative dominance of other-brand information source over the same-brand information source, authors have manipulated poorly other-brand information cues either by not including more than two alternatives in the experiment (e.g. binary choice models used in Kivetz & Simonson, 2000; Ford & Smith, 1987) or they have not manipulated it at all (e.g. sequential design; or including missing values for attribute 1 across all brands instead of just one brand in Experiment 1 in Broniarczyk & Alba, 1994). Moreover, majority of experiments have been conducted in the laboratory environment, which is far from the real world situations, thus impacting the value of the results when extending them to the current marketplace.

Thirdly, the nature of the experimental stimuli used in previous studies has been pointed out as a potential limitation, hence this thesis takes it into account to improve the findings. Academics investigating the impact of missing information on consumer's purchase satisfaction and willingness to buy have almost always focus on a high involvement product such as a 35mm camera (Broniarczyk & Alba, 1994; Moon & Tikoo, 1997; Dick et al., 1990), TV (Johnson, 1989; Johnson & Levin, 1985), bicycles (Ford & Smith, 1987; Ross & Creyer, 1992) or refrigerator (Simmons & Lynch, 1991). Majority of results show that missing information on one or more attribute(s) lead to lower satisfaction with the product and hence, lower levels of purchase intentions, as compared with a fully described product. The same was found in studies on services such as pizza restaurant (Meyer, 1981) or health clubs (Kivetz & Simonson, 2000). Nevertheless, buying a high involvement good implies consumer's attachment to the decision-making process and a substantial level of uncertainty, thereby automatically assuming lower satisfaction in a situation when information on that good is missing. An interesting question is therefore, if the same situation takes place when faced with incomplete information on a high turnover and highly promoted good, where it is assumed the uncertainty levels are lower.

Fourthly, one of the purposes of this thesis is explanatory, i.e. to elaborate and enrich theory's explanation by extending it to new issues and topics (Neuman, 2011) such as the traditional supermarket environment. No prior studies applied missing information and inference theory in retailing context, which is certainly a relevant and interesting area to look at. Majority of research methods rather implement an experiment method of presenting available and missing product information in a form of product catalogue with numerical scores for different product attributes. A study whereby a consumer, facing a number of alternative brands displayed on a supermarket shelf, makes decisions on products with incomplete information would certainly add value to the retailing curriculum.

Lastly, the implications of existing findings usually refer strictly to advertising, namely deciding which type of information to put on a promotional campaign (Johnson, 1989; Troutman & Shanteau, 1976; Johnson & Levin, 1985; Hansen & Zinkhan, 1984). This thesis

extends both theoretical implications and recommendations for best practice to retailing, e.g. how to design survey experiments to ensure respondents are making inferences and those are captured, or how to motivate consumers in a traditional supermarket environment to infer missing cues through manipulation of products' price points or the design of individual brands.

Continuing with the above conclusion, this thesis has also several more interesting motives to be considered by practitioners. Campo et al. (2000) found five possible decisions a consumer might make when faced with an out-of-stock situation, however knowing possible consumer behaviours when responding to an "out-of-information" product situation would certainly be of interest to both manufacturers and retailers. Also, marketers and retailers nowadays have greater control over which information is displayed and taking into account the fact that customers often face information overload when making purchase decisions (Kivetz & Simonson, 2000; Jacoby et al., 1974), retailers must be equipped with knowledge about what information to disclose and in what manner, in order to facilitate this process for their customers.

Lastly, studying individual differences in ability to infer missing information is highly relevant for segmentation, targeting and positioning decisions. Retailers and manufacturers might find some consumer segments more confident with processing available cues to infer information which is not explicitly given and hence design strategies which are targeted towards them.

1.3 Structure of the Thesis

This thesis proceeds as follows. I firstly review the existing literature on consumer decision-making for partially described products as well as analyze in greater detail the inference formation process and its determinants (i.e. same-brand and other-brand information sources). Secondly, on the basis of a sample model of inference formation in a traditional supermarket environment, the main hypotheses are developed. Following the conceptual framework, I provide a detailed description of pilot test, pre-tests and the final experimental survey design to investigate the hypotheses. Having analysed the data and discussed the main findings of this study, I focus on the recommendations on the topic of inferences for both the academic research as well as the best practice. Lastly, I outline the main limitations of the survey experiment and basing on those, provide suggestions for improvement in the future research.

2. Literature Review and Hypotheses

This study aims to investigate the inference formation process with the implications for retailing and its theoretical foundations stem from the information-processing perspective. In order to develop testable hypotheses, firstly, an analysis of existing findings from the literature on consumer behaviour under missing product information as well as the entire process of inference formation (with its inputs and outcomes) is described below (see Table 1).

2.1 Evaluating products with missing information

According to Hansen and Zinkhan (1984) a consumer is likely to follow one of the three possible scenarios when she or he cannot find the information on product's attribute. Those scenarios are also highly relevant in a traditional supermarket environment for the purpose of this study:

1) Consumers search for the information externally in the environment (e.g. by asking sales assistant or scanning the product with available technology in that supermarket);
2) Consumers search for the information internally (i.e. by retrieving information from memory basing on brand/product category knowledge or on own past experience with purchasing the product); and
3) Consumers infer the value of the missing attribute from the value of another (salient) attribute.

Additionally, Ross and Creyer (1992) argue a consumer might form an overall evaluation of the product simply by ignoring the missing attribute. Nevertheless, if an attribute is perceived by the consumer to be highly relevant, such as price, the former activity may not take place.

Overall, academics agree on the fact that consumers declare lower intention to purchase a partially described product and experience less satisfaction if purchasing it, as compared to the fully described alternative. Slovic and MacPhillamy (1974) prove that consumers give more weight to products with full information rather than to partially described ones. In such situations consumers tend to overweight attributes with given information (the so-called 'common attributes') and form overly extreme evaluations of the product. Moreover, context might affect the way given and missing attributes are weighted and impact the overall evaluation of the product (Sanbonmatsu et al., 1997).

Ebenbach and Moore (2000) discuss the notion of the 'Penalty Effect', whereby consumers judge a partially described product more negatively than its complete alternative due to a missing cue. This is a logical conclusion as consumers tend to be risk-averse (Burke,

2006) and are more likely to experience higher levels of uncertainty when evaluating a product with missing information, especially when having no prior expertise on a brand or product category. Therefore, this is one of the reasons why consumers might be less incentivised to purchase such a product and attach more favourable weight to those which are fully described.

However, Kivetz and Simonson (2000) agree that under some circumstances a product with missing information might be evaluated with higher utility levels than the one with complete information. Providing both products share a known value of common attribute, a consumer will choose a product with incomplete information if it has a higher (superior) value on common attribute as compared to the one with complete information.

2.2 Inference formation process

Fishbein and Ajzen (1975) define inferences as "(...) beliefs formed by consumers for unknown individual product attributes for which no information, external or in memory, are directly available" (as cited in Moon & Tikoo, 1997, p. 135). Therefore, in a situation when a consumer cannot fully evaluate the product because some information is missing, she or he will use all visible attributes which can act as cues to create those beliefs about the missing product attributes or characteristics. Once those are created or 'inferred', they are combined with the visible attributes to construct an overall preference or choice (Huber & McCann, 1982). The question is however, which visible attributes will have the most impact on how confident consumers are with the final inferred value and depending on what is inferred, if the process facilitates purchasing intention.

Academics explored this field of research by finding the answer to the question of how consumers come up with the inferred values. First of all, in order for the inference to occur, a consumer has to be motivated enough and perceive the missing attribute as relevant and valid (Hansen & Zinkhan, 1984). Secondly, the consumer must perceive the available, visible attributes to be highly correlated with the missing information (i.e. available attributes must be highly *diagnostic*) and they need to be *accessible* in consumer's memory (Dick et al., 1990). Authors call the two former conditions as the major determinants of the inference process:

1) Diagnosticity: the correlation between a known and missing attribute needs to be perceived by a customer as strong or 'diagnostic'. This rule must be reliable and produce useful information for the task (Dick et al., 1990).
2) Accessibility: of relevant information in memory. "If a brand's prior overall evaluation is highly accessible relative to its underlying attribute values, a missing brand attribute value may be inferred to be consistent with this retrieved evaluation" (Dick et al., 1990, p. 83).

Table 1: Summary of key journal articles on the missing information literature and inputs for the inference formation process.

Authors	Research question	Dependant variable	Available information source				Empirical findings
			OB	SB	OB and SB	None	
Meyer (1981)	Investigate how consumers form evaluations of products with missing information and variability or unreliability is present within attributes	S1: Evaluation of pizza restaurant S2: choice probabilities	x				Substantial discounting; Multi-attribute judgement model; consumers assigned below-neutral values to missing dimensions and then integrated these values along with the subjective values of known attributes
Huber & McCann (1982)	Influence of an attribute on overall evaluation when information is missing	Inferred value of the missing attribute	x				The effect of inferences to a missing attribute is statistically significant and in the expected direction.
Johnson & Levin (1985)	Looking at the effect of evaluation when missing attributes are salient; model of inferred information	Ratings of purchase satisfaction		x			Increasing the number of missing attributes produce lower satisfaction ratings.
Ford & Smith (1987)	Investigate the processing strategies consumers use to form inferences about missing product information.	Value of the missing attribute of the partially described brand; overall assessment of partially described brand		x			Other-brand information appears to not affect inferences when same-brand information is present; however compared only two brands
Johnson (1987)	Incomplete information bias model	Quality rating score; measure of subject's product knowledge		x			Support for inferred information hypothesis, existence of individual differences in judgements of incompletely described alternatives
Johnson (1989)	Looking at the effect of inferences in conjoint analysis; model of influence of inference on overall evaluation	S1: effect of attributes on ratings (slope estimate) S2: mean of evaluations		x			Same-brand information (m) leads to more favourable evaluations (R) than other-brand information (k). Correlation effects and bias against missing information are greater when missing information is more important.
Dick et al. (1990)	Consumers' inference strategies in a mixed choice task involving memory, external information, and missing information	Subjects' inferences, choices, and task perceptions		x			Instructed inferences by high accessibility subjects tended to follow a correlational rule linking missing information to other attribute information in memory.
Simmons & Lynch (1991)	The effects of competitive context on slopes and on discounting	S1,2,3: recalled product evaluation				x	Discounting and slope effects on brand evaluations are not influenced by inferences, but

		S4: response time to evaluate a product description			arise because of treating missing information as negative
Lim & Kim (1992)	Investigating the effect of consumers' confidence in judgements about missing information on product evaluations	Respondents' preference and purchasing intention Confidence in inferred attribute	x		The levels of inferred attributes and consumers' confidence in the inferred attribute have a significant impact on the magnitude of the mean shifts.
Ross & Creyer (1992)	The use of information processing perspective (Within-attribute and within-alternative processing) in inferring missing values	Inferred value of the missing information	x	x	OB information dominant (if highly variant, then inferred value is discounted because the strategy is undiagnostic). Occasionally, consumers might switch to same-brand information if that is diagnostic.
Lee & Olshavsky (1997)	A replication of Ford and Smith study	Source of information for inference; inference ratings		x	Findings of F&S rejected; both sources of information are used equally. Interaction between inter-attribute correlations and information source.
Moon & Tikoo (1997)	How consumers use available information to make inferences about missing information, establishing the base for inference making	S1,2: inferred value of missing information	x	x	Same-brand information is used to infer missing values. Consumers appear to use other-brand information when brands show stable ratings for the missing attribute.
Sanbonmatsu et al. (1997)	How and when contextual cues influence sensitivity to limited information	S1,2,3,4: Product evaluation	x		Other-brand information is evaluated by the context of objects in the same product category
Kivetz & Simonson (2000)	Unique and common attributes (superior and inferior); consumer choice under incomplete information; intransitive consumer preferences	Consumers' preference choices		x	Purchase decisions of buyers who consider attribute importance before choosing and those with high need for cognition are less influenced by missing information
Gunasti & Ross (2008)	Researchers conduct five studies to examine the effects of multiple inferences in multi-attribute, multiproduct choice environments.	S1,5: no-choice option S2,4: inferred values S3: choice of available options			Prompting consumers to make inferences, especially spontaneous, about the missing attributes increases the likelihood of making a purchase decision.

Notes: "X" indicates consumers infer missing values from information source; OB – other-brand information source; SB – same-brand information source; S – Study.

Authors argue that diagnostic 'links' are more likely to guide customer's inferences than the prior overall evaluations of brands. This means that in a situation when e.g. a price of a product is missing, a consumer is more likely to infer its missing price from another (known) product's attribute such as package volume, contents or brand name more than simply retrieving product's overall evaluation from the past shopping trips, only if the link between known attribute and the missing price is highly diagnostic and accessible in memory.

As mentioned before, two major sources of information available for the customer to infer missing cues exist, however "(...) little is known about the dominance relations among them" (Broniarczyk & Alba, 1994, p. 394). This research aims to use the information processing perspective in inference formation in order to establish which of the two sources of available attribute information make consumer more confident about the inferred value. Academics usually divide into two representative teams of those who support the 'other-brand information source' perspective and the 'same-brand information source' perspective. Yet, the interesting question is and has not been studied before, if in a traditional supermarket scenario, a customer is more likely to use same- or other-brand information sources to infer the missing information such as price, or are both be used simultaneously; and under what circumstances it is going to happen?

2.2.1 Same-brand information source

Majority of the existing research support the notion that same-brand information source provides a stronger base for inferring missing attributes, especially when two attributes of the same brand (one missing and one available) are highly correlated with each other – the so-called inter-attribute correlation is large (Broniarczyk & Alba, 1994; Johnson, 1989; Johnson & Levin, 1985; Dick et al., 1990; Ford & Smith, 1987). Broniarczyk and Alba (1994) in a series of 4 experiments on customers' intuitive inference making found that strong, intuitive beliefs about the inter-attribute correlations provide a sound basis for inference formation. Other-brand information source was only prominent when inter-attribute correlation was not observed, proving its diminished influence on inference formation. However, the poor manipulation of other-brand information source in experiment 4 explains why the research findings were in favour of same-brand information source.

A strong inter-attribute correlation is argued to be an important determinant of whether inference is made or not. Hansen and Zinkhan (1984) use the network of associations to explain this phenomenon arguing the stronger the links between the known and missing attributes, the more probable inferences are made. Johnson and Levin (1985) operationalize inter-attribute correlation as 'm' variable and integrate it into the model of inferred information, whereby the inferred value of the missing attribute is linearly related to the value of known attribute.

If m = 0, the correlation is not perceived by customer to exist and hence is not used to infer missing values. On the other hand, the greater the m, the more inferences are formed and what is interesting, the more favourable evaluations are of that product (Johnson, 1989).

2.2.2 Other-brand information source

Despite the extensive research on proving same-brand information source being the dominant one in the inference formation process, some academics disagree with this stance and argue other-brand information source exerts more influence. Meyer (1981) came up with a conclusion that when evaluating a product with incomplete information, a customer infers the missing value from the known values of the attribute across other alternatives in the product class. However, due to the uncertainty which is carried in variation of those values across other alternatives, a consumer is highly likely to infer a *discounted average* of those values (Meyer, 1981).

Huber and McCann (1982) also argue that other-brand information source is the dominant determinant of inference formation, however consumers assign a discounted average of those values depicted in other brands. The greater the uncertainty, the greater the discounted value. This argument is criticized by Simmons and Lynch (1991) who prove that consumers do not make any inferences at all when noticing a missing value of a product's attribute. According to their paper, discounting occurs not because of consumers' lack of confidence with the inferences formed, but because of their negative perception of missing information overall (linking back to 'Penalty Effect' notion).

Therefore, consumers do not assign a lower value to a missing attribute due to their uncertainty in inferred values, but because of the fact that the product does not contain full information, unlike other alternatives. Still, caution needs to be taken when interpreting the study of Simmons and Lynch (1991) as in their experiment inferences are not prompted.

An important contribution to this thesis is provided in the analysis of Ross and Creyer (1992). Authors conducted two experiments, one involving a computer-based information acquisition system called Mouselab, to assess the relative dominance of one information source over the other. Moreover, they also looked at the total amount of information acquired and the total time spent acquiring information under both conditions. Whichever the condition investigated, subjects always used other-brand information source first and if that information was diagnostic, they inferred the value of the missing information from that cue, with minor consideration of additional information such as e.g. other attribute of the same brand (Ross & Creyer, 1992). Authors hence provide interesting implications for marketers and policy makers by stressing the need to provide the 'industry standard' information and by identifying the possibility of being an 'information free-rider'. If a manufacturer positions itself close to

established industry standards, he can free-ride on information he wishes not to disclose, as consumers most likely infer those missing values in any case.

2.2.3 Contingency perspective

What is more, Ross and Creyer (1992) emphasize another important issue in inference formation process, i.e. the source upon which inferences are formed by customers is not always constant, as customers generally adapt their inference making to changes in the choice situation. Just like in the information-processing model, whereby consumer processes different types of information depending on varying circumstances, this finding gives rise to the contingency perspective which accepts the influence of both source types (same-brand and other-brand information) rather than establishing the dominance of one over the other. The important question is therefore, what moderates this 'adaptation' aspect.

Ford and Smith (1987) although proved the use of same-brand information source, argue that consumers adjust their inference formation process depending on their level of uncertainty of available information sources. What does 'uncertainty of available information sources' mean? A consumer might either perceive a too weak correlation between two attributes of the same brand to infer one from the other (e.g. consumer perceives the product price to have nothing in common with its brand), or simply the variance of the attribute across other brands might be too high (e.g. price range of alternative brands is very wide).

The study of Moon and Tikoo (1997) is the second important contribution to this thesis. Authors established that the choice of the information sources depends on the two determinants of inference formation mentioned earlier by Dick et al. (1990) – accessibility and diagnosticity of information input. Authors find that both types of information sources are used in inferring missing values, however depending on how available information is correlated with the missing cue (diagnostic) and/or accessible in consumer's memory, a particular source will be chosen to infer the value. Their study indicated that same-brand information source is commonly used, however if brands show stable and favourable ratings for the missing attribute, a switch to other-brand information source is recorded (Moon & Tikoo, 1997).

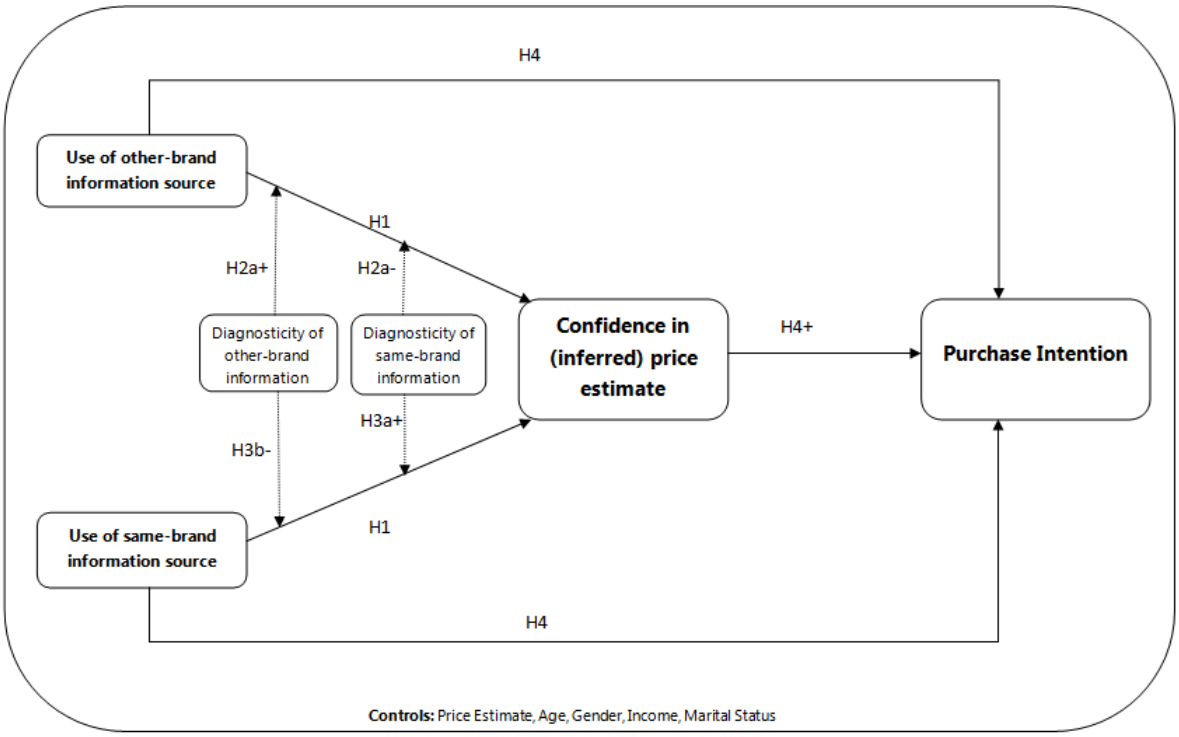
2.3 Hypotheses development and conceptual model

Having in mind the three possible outcomes upon evaluating a product with incomplete information (Hansen & Zinkhan, 1984; Ross & Creyer, 1992), this thesis investigates one of the possible scenarios in a greater detail, i.e. when the incomplete information is inferred. This means the study already assumes inferences are being formed and there is no possibility of questioning whether such processes occur or not as studied in Simmons and Lynch (1991). From the experimental research point of view, this means that the respondents will be

prompted to make an inference when evaluating partially described products, so that their cognitive mode of information processing and inferring can be analyzed in a greater detail.

The conceptual model in Figure 1 presents the general outline of the hypotheses and the relationships between them. The first part of the model aims to establish the prevailing dominance of one source of available information (other- vs. same-brand) over the other in altering consumers' confidence with the value that they inferred for the missing attribute. Whilst this part investigates the antecedents of consumers' confidence in their price estimates or namely, the inputs for the inferences to take place, the second part of the model looks at the outcomes of this process. In other words, the study aims to look at the likely decision outcomes which consumers follow depending on their level of confidence in their inference formation task. Therefore, the final hypothesis answers the question of whether consumers are more likely to purchase a partially described product depending on how confident they feel with the value of the missing attribute that they inferred.

Figure 1: Conceptual model of the determinants and outcomes of inference formation process.



What is confidence in inferred value for the missing information[1] and why is it important to study? In general, "(...) confidence refers to the degree of certainty the buyer perceives toward a brand. It is related to brand comprehension, attitude, intention and satisfaction" (Howard & Sheth, 1969) as cited in (Laroche et al., 1996, p. 115). Confidence in

[1] Due to price being the missing attribute for product A, the 'inferred value for the missing information' is referred to in this conceptual model as the '(inferred) price estimate'.

inferred value for the missing information is thus the level of certainty that one has with performing a particular task of estimating the missing value and that the outcome of this inference is believed to be valid. Although this construct is also related to self-confidence, it does not measure self-esteem per se. The main reason researchers and practitioners are interested in studying confidence is that the measure is related to purchase intention. As consumer acquires more information about the good or service, confidence rises and so does the likelihood of purchase (Howard & Sheth, 1969) in (Laroche et al., 1996). Biwas and Sherell (1993) highlight studying consumers' confidence in price estimates play a significant role in shopping intentions for specific brands. Therefore, examining the likely conditions under which one's confidence with the inferred information improves is extremely important to understand how purchase intention towards partially described products increases.

Inference processing literature highlights confidence in inferred values for missing attributes is related to brand attitude and preference (Bennett & Harrell, 1975), i.e. high confidence translates to the correctness of brand attitude. The topic of missing information and inference formation is thus important to study as the task of inferring itself involves high uncertainty and risk that the inferred value might not be correct (Meyer, 1981; Jaccard & Wood, 1988). However, if consumers are more confident in their inferred attribute, the overall evaluation and attitude toward the brand will not be discounted. Consequently, consumers are more likely to purchase a partially described product. Having had not studied confidence, but the inferred value of the missing attribute (i.e. price estimate) as dependent variable instead, would not have explained the likely consumer intentions and behaviours. The study is thus looking at how to alter consumers' levels of confidence once they face a situation of evaluating partially described products, so that their intentions to purchase are not diminished.

In the debate on the consumer's major use of one information source over the other in inferring missing cues, majority of academics admit that same-brand information source is the prevailing one. Ford and Smith (1987) prove that when both sources of information are present and diagnostic to the consumer, she or he infers from the same-brand information source, even when missing cue is more correlated to that one depicted in other brands than to another attribute within the same brand. Moreover, other-brand information does not even appear to affect inferences when same-brand information is present, thus confirming the dominance of same-brand information source. This effect was strengthened by perceived inter-attribute correlation and by prompting consumers to infer the missing value. Nevertheless, Lee and Olshavsky (1997) address several limitations of Ford and Smith's study such as implementing a within-subjects design which might have introduced a systematic bias into data and impact the reliability of the results. Their replication of Ford and Smith study has actually led to an

interesting result – in situations of incomplete information, a customer used both sources *equally* to come up with an inferred value.

Contrarily, Ross and Creyer (1992) believe other-brand information source is more dominant as consumers generally examine the missing attribute across other brands first and only when those vary greatly (the source is highly undiagnostic) they switch to same-brand information source.

Transferring the research findings to traditional supermarket environment, it can be assumed that when the product misses information on one attribute, the available information on that attribute that is given across many alternative brands is more salient to a customer who is facing a supermarket shelf, rather than given information on other attributes of this partially described product. Thus, when a customer notices a missing price tag on a product, the probability of basing her or his inferences on other-brand information sources is very high (i.e. inferring the missing price from prices of other brands displayed in high proximity).

However, as price is one of the most important cues in order to make a purchase decision, the lack of it certainly draws customer's attention to the product. This assumption bases on a classic behavioural premise that "(...) anything out of the usual in a choice environment will arouse attention and lead to an increase in search" (in Dickson and Sawyer, 1990, p. 45). To find the answer of why would a product have a missing price or what would that price be, a customer might become more aware of the product's own brand, packaging or contents and start grasping basic information on those attributes in mind. In consequence, the correlations between given product's attributes and the missing price become more diagnostic and hence the likelihood of inferring missing price from same-brand information source is also present.

Nevertheless, findings of Burke (2006) provide evidence that inferring missing information from the available cues depicted in other brands is more widely accepted and results in reduced uncertainty with such process. One has to remember that the dominance in the use of one of available information source over the other is measured in terms of how greatly it impacts consumers' confidence with the value they infer. Therefore, academics might argue that use of same-brand information source plays more important role in inferring missing values, however such process might not necessarily lead to higher confidence levels. According to Howard (1989) in (Laroche et al., 1996) customer paying more attention to information depicted in the alternative products becomes more confident in her or his ability to judge product's attributes and in result, infers what is missing from those given cues. Other-brand information source thus guarantees more confidence when consumers infer missing values in traditional supermarket environment:

H1: Consumers' confidence in price estimate is higher when inferring from the available other-brand information source than when inferring from the available same-brand information source.

Despite establishing the relative dominance of one information source over the other in confident inference formation, which Hypothesis 1 aims to examine, the answer might not be so clear cut. Academics insist to look at how consumers react when amount of available information varies across different situations (Johnson & Levin, 1985). For example, Dickson and Sawyer (1990) suggest that signals of the special price may lead to greater checking of the item's price against the prices of alternatives. "The use of the processes may vary due to many choice context factors such as information format, number of alternatives, time pressure, (...) extraneous data (...) as well as individual differences" (cited in Burke, 1995, p. 226).

As the supermarket scenario involves simultaneous interaction of diagnosticities of both information sources, there might be situations when a customer changes her or his inference strategy to adapt to the external circumstances, as highlighted by contingency perspective. Furthermore, Burke (2006) argues that perceived attribute correlations impact our ability to infer confidently and resolve uncertainty. It is therefore necessary to investigate how the consumer makes use of the two information sources and which type of diagnosticity (whether that of a same- or other-brand information) has the greatest moderating effect on which information source will impact consumer's confidence. The hypotheses below investigate the interactions between two available information sources and their own diagnosticities.

Role of diagnosticity of the available information source

Literature review confirms that the decision on which information source is retrieved to infer a missing cue is dependent on its own diagnosticity and accessibility (Dick et al., 1990; Moon & Tikoo, 1997; Kardes et al., 2004). An example of accessible information source is provided in Lynch et al. (1988) who argue consumers infer missing information based upon prior knowledge about brand names, in a mixed choice task conditions[2]. As mixed choice tasks are beyond the scope of this thesis, retrieval of evaluations toward a brand from memory as well as the level of its accessibility in customer's mind are not the focus of this investigation (Moon & Tikoo, 1997). Moreover, as one of the assumptions of the main study is to examine how a customer deals in situations when information is not provided on a newly introduced brand, there would be no prior information accessible in her or his memory about this brand. As a result, spontaneous inferences are more of a focus here.

[2] A mixed choice task is a situation when a customer evaluates different alternatives in one store and then evaluates same alternatives in a different store with a consideration of a new attribute. Therefore, to come up with an evaluation, a customer needs to retrieve information about prior store from his memory (Lynch et al., 1988).

Dick et al. (1990) imply that the greater the relevance of the missing information to task needs, the greater the effort of natural inferring. Therefore, diagnosticity of the available information is chosen as the main moderating variable because upon inference decision (whether inference is natural or prompted), consumers assess the likelihood of inferential rule being reliable. In other words, consumers assess the perceived diagnosticity of alternative inference processes and the more diagnostic they are, the more consumers will use those processes as foundation to infer. Ford and Smith (1987) also emphasize the importance of controlling for both diagnosticities of available information sources, as "(...) consumers appear to adjust their inferences depending on their perception of the level of uncertainty of the available information" (Ford & Smith, 1987, p. 363).

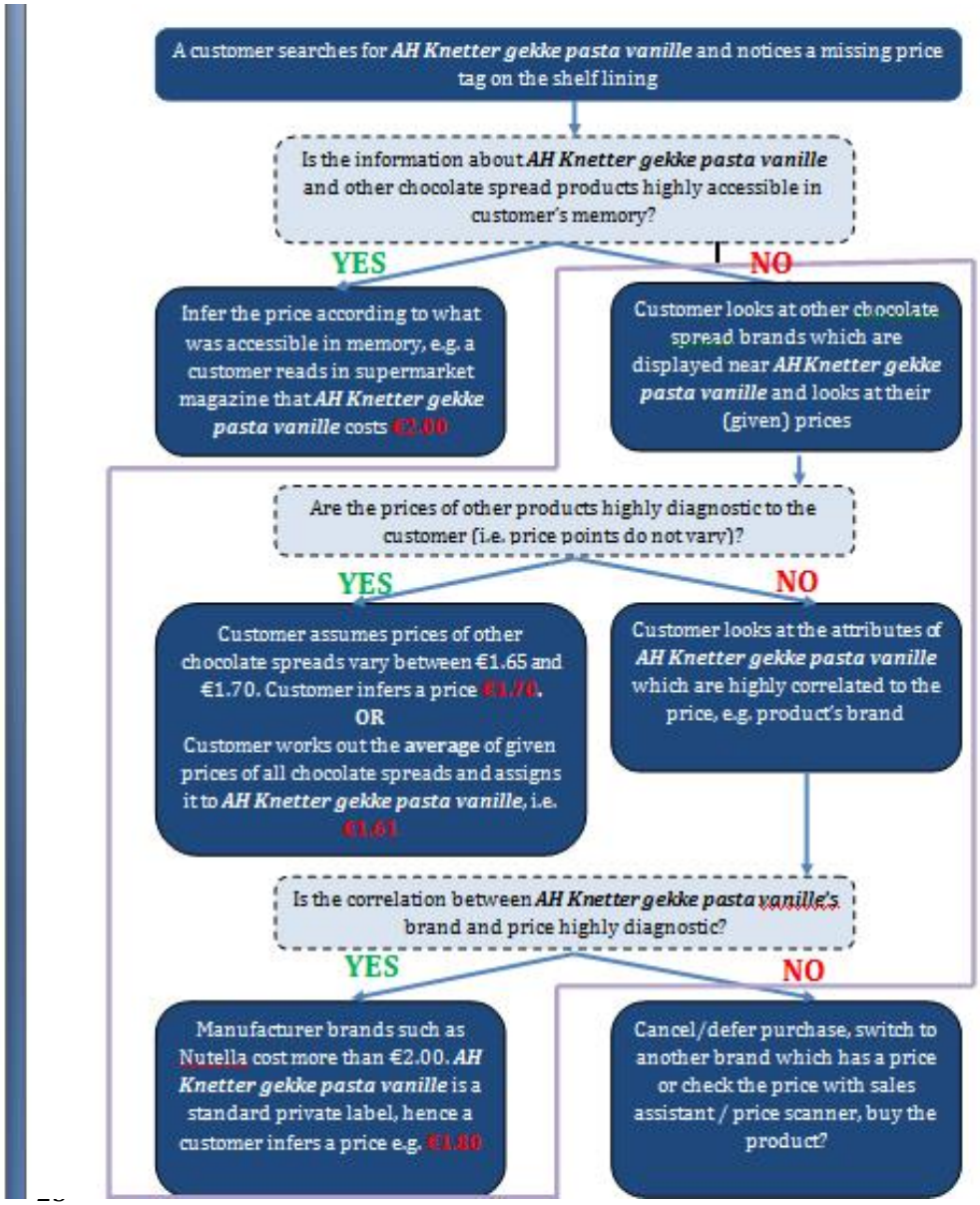
Ross and Creyer (1992) outlined a brief model of inference formation and formed their hypotheses basing on this graphical representation. This study also supports its hypotheses with a model more relevant to a traditional supermarket environment (see Figure 2). Diagnositicity of other-brand information yields a significant influence on what type of information source the customer is confidently inferring from when noticing a missing product's price tag. Following the approach proposed by Moon and Tikoo (1997), this work proposes that diagnosticity of same-brand information source is determined by inter-attribute correlation within the same brand, whereas diagnosticity of other-brand information is caused by the variance of given attribute across alternative brands.

Ross and Creyer (1992) and Moon and Tikoo (1997) prove in their studies that a customer is more likely to infer missing information from cues depicted in other brands than from a product itself, however only when the cue depicted in other brands does not vary (i.e. other-brand information is highly diagnostic) and the correlation between missing and available attribute within the brand is perceived to be weak (i.e. same-brand information is not diagnostic). Therefore, once the consumer perceives the other-brand information source to be highly diagnostic through the small variation in given prices of other alternative brands, confidence in the price estimate inferred from that source of information further increases, as compared to situation when there is be large variation in given prices of alternative brands (i.e. source being highly undiagnostic):

> **H2a: Customers' confidence in price estimate is higher when inferring from the other-brand information source, especially when the diagnosticity of other-brand information increases.**

Despite evidence in past literature on the insignificant effect of other-brand information source once diagnosticity of same-brand information is large, no studies prior to this thesis investigated this phenomenon in a traditional supermarket environment.

Figure 2: Scope of the study - Model of inference formation when the product in a traditional supermarket has incomplete information (e.g. price).



Previous findings might not hold true when applied in new contexts, especially when in the supermarket other brand information is more salient to a customer observing supermarket shelf with real, tangible products, rather than e.g. reading a product catalogue. Thus, in a condition when same-brand information source becomes less diagnostic to a customer, she or he is even more confident in inferring missing price from other-brand information than from the same-brand. On the other hand, if both sources of available information become diagnostic, customers might become confused over which source to focus on to process necessary information to infer missing values and hence affect their confidence levels:

H2b: Customers' confidence in price estimate is higher when inferring from the other-brand information source, especially when the diagnosticity of same-brand information decreases.

Overall, if Hypotheses 2 (a and b) are confirmed, then consumer infers missing information from other-brand information source primarily and with greater confidence, otherwise same-brand information source prevails.

Ford & Smith (1987) conclude that no matter which information is more salient to a customer, she or he will predominantly choose same-brand information source to infer the missing attribute. Therefore, in a supermarket a customer is mostly likely to focus attention on the product first, considering other products second. If same-brand information source is predominantly used in inferring missing values then its effect should be significant in each interaction with same- and other-brand information diagnosticties. Therefore, no matter how the diagnosticity of other-brand information is manipulated, same-brand information should always have higher impact on consumer's confidence in inferred price estimate:

H3a: Customers' confidence in price estimate is higher when inferring from the same-brand information source, especially as the diagnosticity of same-brand information increases.

H3b: Customers' confidence in price estimate is higher when inferring from the same-brand information source, especially as the diagnosticity of other-brand information decreases.

If Hypotheses 3 (a and b) are supported, then same-brand information source is a prevailing means in confident inference process, despite varying environmental circumstances. However if either of hypothesis is to be rejected, both manipulations should significantly impact customer's confidence with inferring, especially in second condition (H3b) where other-brand information becomes highly diagnostic. Supported H1 and H3 would indeed provide an interesting support for the contingency theory, whereby a customer predominantly makes use

of other-brand information source in inferring missing information confidently, however in situations where diagnosticities of both sources vary simultaneously, a customer is likely to adapt her or his inference strategy to existing circumstances.

Mediation Analysis

According to Gunasti and Ross (2008), the effects of inferences on the actual choice outcomes have received less attention, as compared to inferred values and consumers' judgements. Not many studies up-to-date have looked at the contingencies upon which customers might be more or less willing to purchase a product with missing information having had inferred that absent cue and being confident with this belief. Academics agree that inference formation and purchase intention are negatively correlated due to high uncertainty and risks that missing information carries (Meyer, 1981). Johnson and Levin (1985) found in their study on TV choice evaluations that when information on price or warranty or both were withheld, the purchase satisfaction rating substantially decreased, especially with missing price. Studying relatively low involvement goods such as the choice of beer (Huber & McCann, 1982) yielded similar results. Therefore, it is highly relevant to look at how confidence in inferred price estimate mediates the effect of inferring from available information sources on purchasing intention of the product with the missing price.

According to MacKinnon et al. (2007) mediation analysis is one of the approaches to explain the process by which one variable affects another. In general, researchers such as Baron and Kenny (1986) describe the mediator as the variable which accounts for the relationship between the independent variable and the outcome variable. Whilst "moderators specify *when* certain effects hold, mediators speak to *how* or *why* such effects occur" (Baron & Kenny, 1986, p. 1176). This is the reason why confidence in inferred price estimate is treated as a mediator in the final hypothesis, rather than the moderator.

It is important to understand *how* inferring missing information through the use of available sources leads to greater purchasing intention of the partially described product and *for what reasons* would this effect take place. The answer to this question is how confident the consumer is once she or he infers the missing price. Perhaps there is no direct relationship between the input of the inference formation (i.e. what the consumer infers from when noticing a product with a missing price tag on the supermarket shelf) and the action outcome of this process (i.e. her or his likelihood to buy this product having had inferred the price), and the only way this effect can arise is through the mediator (i.e. once the consumer is confident with the inference itself). This is why a test for mediation is necessary to find out if when using available inputs to give price estimates, consumers' likelihood to buy will increase as a result of being more confident in their estimates.

Hypothesis 1 suggests that inferring from other-brand information source makes the consumer more confident with the inferred price estimate. Greater confidence levels should result in greater purchasing intention – meaning the mediation analysis has a higher probability of being significant with if other-brand information source is present. Same-brand information source might have a significant effect on purchasing intention, as outlined in the literature review, however when controlling for confidence, this relationship can change, thus making the mediation insignificant. Confirmed Hypotheses 1 and 4 prove the relative dominance of other-brand information source in determining inference formation and its impact on the outcome of this process – greater purchasing intention:

H4: Likelihood to buy a product with missing information is greater when consumers infer it from other-brand information source, even when controlling for confidence in inferred price estimate.

Table 2: Summary of hypotheses.

	Hypothesis	Expected effect	Rationale
1	UOB -> Confidence in inferred price estimate	+ **UOB>USB**	Inferring from other-brand information source makes consumers more confident with what they inferred, as compared with inferring from same-brand information, as information depicted in alternative brands displayed in the supermarket send stronger signals to the consumer.
2a	(UOBxDOB) -> Confidence in inferred price estimate	+	Availability of other brands' information is greater in a traditional supermarket environment, however the effect on confidence is even stronger when price points do not vary between each other.
2b	(UOBxDSB) -> Confidence in inferred price estimate	-	
3a	(USBxDSB) -> Confidence in inferred price estimate	+	The greater perceived correlation between the brand name and missing price, the more consumer infers missing price from the brand name, no matter how the prices of other brands vary.
3b	(USBxDOB) -> Confidence in inferred price estimate	-	
4	UOB -> Confidence in inferred price estimate -> Purchase Intention	+	Inferring from given other-brand information source only leads to purchasing intention once mediated through confidence in inferred price estimate, as there is a proven relationship between inferences, uncertainty and intentions.

Notes: UOB – use of other-brand information, USB – use of same-brand information, DOB – diagnosticity of other-brand information, DSB – diagnosticity of same-brand information.

3. Research Methodology

In order to test the above hypotheses, I collected data using experimental survey design. This research involved a between-subjects design methodology, which means an online survey was sent to a random sample consisting of 4 groups of respondents.

Between-subjects, as opposed to within-subjects experimental design was preferred to make use of the benefit of time, effort and sample size (Field & Hole, 2003). Between-subjects designs assign separate groups of respondents to a different condition in the experiment, and each respondent is tested only one time. On the other hand, within-subject designs involve each respondent tested several times, as she or he is exposed to all of the conditions in the experiment (Field & Hole, 2003). Another main reason for choosing this type of design was to overcome the addressed limitation of practice effects in previous studies (Ford & Smith, 1987). Between-subjects design ensures there is no possibility of performance in one condition affecting performance in another. Lastly, it was necessary to eliminate any probabilities of carryover and backfire effects, which occur when respondents are influenced by their previous responses (Bickart, 1993). Having had incorporated all four manipulations into one lengthy survey to be distributed to a single sample only, would have made them more salient to the respondents and they might have guessed the true aim of the research, which was highly avoided.

3.1 Pilot study

I conducted a pilot study to test for the most effective stimuli design and manipulations that would be included in the main experimental survey. Firstly, I wanted to find product categories which consumers were most familiar with when doing their groceries as well as to discover their main brand associations with existing chocolate bar brands in the market. Secondly, this pilot helped to derive a new brand name for the stimuli for the main study. Final reason to run a pilot study was to test and choose the most effective manipulations of same- and other-brand information for the main experimental study.

An online questionnaire (see Appendix I) designed through online survey platform Qualtrics was administered to a sample of marketing master's students from one Dutch university posted via closed course group on social network site Facebook. Out of initial 77 replies, 59 *complete* responses were received.

Firstly, the survey asked respondents to indicate the most frequently purchased grocery product by choosing between butter and chocolate bar, and depending on which answer they chose in the first question, they were navigated to parts of the survey on the selected product category. For this study, a product category which was relatively high turnover, frequently

bought and price-promoted was desirable, as the likelihood of missing price tags across such products is very high (Dickson & Sawyer, 1990). Several prior studies in consumers' price estimate and valuations used chocolate as stimuli (e.g. Wang et al., 2007), as it was discussed to be a relatively low priced and interesting product for majority of respondents. Chocolate (product area: confectionery, sweet biscuits & snacks) was ranked as the 6th in terms of food and beverage categories with largest absolute growth globally ($1.9bn), as determined by AC Nielsen (2006). Other products ranked in the top five, i.e. beer, carbonated drinks, coffee and fresh meat products have not been considered in this study, as they are not relevant to majority of consumers, whilst bottled water industry in the Netherlands is heavily associated with one brand only, SPA, thus limiting opportunity to manipulate other brand information source effectively.

Respondents who bought neither of the two categories mentioned above were asked to write down other product categories. Pilot study verified that out of 77 respondents that initially started filling in the survey, 43 bought chocolate bar regularly (56%), 12 bought butter (16%) and 22 bought neither of the two (29%), proving chocolate bar was more frequently bought by respondents than butter. Suggested other product categories were bread, vegetables and meat.

Secondly, continuing with chocolate bar survey questions, only 33 participants completed entirely this part of the survey. They were first asked to group given brand associations as indicated in the paper of Low and Lamb Jr. (2000) to the existing chocolate bar brands. This was to done to discover how participants perceived the brand concepts of *existing* brands in the chocolate bar market, and to ensure respondents in the main study are in agreement with the brand positioning of those chocolate bars. Hence, Lindt Excellence was perceived to be a high quality (39%) and prestigious (30%) brand, private label brand Albert Heijn – functional (30%) and cheap (39%), Cote d'Or – expensive (27%) and high quality (21%), Milka – good taste (42%) and attractive (27%) and finally a generic brand – unattractive (36%) and cheap (27%).

Thirdly, subjects were asked to determine the high and low levels of same- and other-brand information diagnosticity in order to ensure the proposed experimental manipulations in the final study were effective (Moon & Tikoo, 1997). The most effective manipulations that had arisen as a result of this pilot study will be described in the main study (see Appendix II). Same-brand information diagnosticity (DSB) was measured by asking subjects to indicate the relationship between prices and brands of chocolate bars on a 5-point scale (1 = not related at all, 5 = strongly related). Subjects in the high same-brand information diagnosticity question ($High_{DSB}$) identified a strong relationship, whereas in low same-brand information diagnosticity question (Low_{DSB}) identified a low relationship. Independent samples t-test indicated that the

mean of differences between $High_{DSB}$ and Low_{DSB} differed statistically from zero ($High_{DSB}$ = 4.27, Low_{DSB} = 1.61; F= 1.734, p<0.05). Other-brand information diagnosticity (DOB) was measured by asking subjects to indicate their perceptions of variability in prices across all chocolate bars on a 5-point scale (1 = not variable at all, 5 = highly variable). Subjects in high other-brand information diagnosticity ($High_{DOB}$) reported significantly lower perception of variation than in low other-brand information diagnosticity (Low_{DOB}): Low_{DOB} = 4.33, $High_{DOB}$ = 1.52; F = 0.074, p<0.05 (Moon & Tikoo, 1997).

Lastly, respondents were asked to describe the brand concept of four new brand names of chocolate bars by choosing from given brand associations (Low & Lamb Jr., 2000). A brand name that had greatest amount of associations of 'prestigious', 'high quality', 'expensive' was chosen to be displayed as a brand name for the stimuli in the main study, so that respondents infer a high price from the brand positioned as 'prestigious', 'expensive' and of 'high quality'. The name could not have any connotations with existing brands in the chocolate bar industry in order to avoid the influence of past knowledge or brand familiarity on inference making. Pilot study indicated that 'Baures'[3] had most associations with high quality (31%) and prestige (31%), whilst other brand names such as 'Magique' were perceived to be prestigious only (31%); 'Golden' (19%).

All in all, the findings from the pilot study above provided sufficient grounds for building precise questions in the final survey. More importantly, a chocolate bar was chosen as the main stimuli, alongside its new brand name, *Baures*. Respondents agreed that competitor brands Lindt Excellence, Milka and Cote d'Or were high quality, interesting brands, whilst generic brands and private label Albert Heijn chocolate were perceived as cheap and unattractive. Price points for highly diagnostic and undiagnostic other-brand information source manipulations were chosen – an undiagnostic, highly variable manipulation involved a difference of €2.80 between the highest and lowest prices, whereas a diagnostic, highly invariable manipulation incorporated a difference of only €0.05 between two price extremes. The main feedback coming from this pilot survey consisted of remarks such as including an image of the supermarket shelf in every question or displaying more than 5 brands on the supermarket shelf to better manipulate both types of diagnosticities.

3.2 Pre-test

Integrating feedback and main findings from the pilot study, I designed and pre-tested the final survey to ensure greater reliability when distributing it to a large sample. 6 volunteers

[3] Baures is the name of the town in Bolivia where cocoa beans are produced for largest cocoa trader company in the country, El Ceibo (El Ceibo, 2013).

who lived and studied in the Netherlands and did not participate in the pilot test or in the final experimental study agreed to fill in the online survey, which was sent to them via email.

Respondents were asked to imagine their regular weekly grocery shopping and to search for a new chocolate bar brand recently recommended by their friend (an image of the bar was presented with a short description of the brand). Moreover, the survey included a spectrum of existing chocolate bar brands in the Dutch chocolate bar market together with the information on their prices (stated in €). Next, subjects were presented with two supermarket shelves displaying 10 different chocolate bars and their price tags, including 'Baures' brand with no price tag attached to the lining. Respondents' task was hence to provide the price estimate for the missing value and state their level of confidence with this estimate. They then were asked to indicate the relationship between chocolate bars' brands and their prices as well as the degree of variability in chocolate bars' prices displayed on the shelves.

Contrarily to procedure applied in Lee and Olshavsky (1997) where authors asked respondents directly to write down sources of information for inference, this survey included three questions to establish which source of information respondents solely inferred missing price from (i.e. brand, other visible prices or both). Next, questions on purchase intention and brand evaluation were asked following the demographic questions asking for respondents' gender, age, household income and marital status, in order to control for differences within experimental groups.

The results from the pre-test indicated strong, although lower levels of same- and other-brand information diagnosticities, as compared to the ones recorded in the pilot study ($DSB_{Pre\text{-}test} = 3.70 < DSB_{Pilot} = 4.27$; $DOB_{Pre\text{-}test} = 4.00 < DOB_{Pilot} = 4.33$). This could have occurred as a result of researching smaller sample, yet still provided satisfying results (means are above 3.5 cut-off level). Use of information source was measured on a 5-point scale, where participants indicated their agreement with the level of using the available information sources to infer missing values (1 = strongly disagree, 5 = strongly agree). Analysis of three questions on the use of particular available information source, i.e. the use of same-brand information (USB), use of other-brand information (UOB) or both, presented a surprising result - one-way ANOVA confirmed that the mean responses did not differ statistically from each other: USB = 2.20, UOB = 2.20, both USB and UOB = 2.40, $F = 0.058$, $p > 0.05$, thus indicating participants did not differentiate between the two sources of information correctly. It was therefore suggested to withdraw the 'both' answer option as it could confuse respondents in providing a truthful answer, as well as split the question into two parts and randomize the order of the two, so that more reliable responses could be elicited. Brand evaluation of 'Baures' chocolate, as compared to alternatives, was rated as 3.22 out of 5.00, which triggered an action to provide a more sophisticated and exclusive design of the main stimulus. Respondents later on suggested designing the packaging in the

white colour and providing more appealing graphics. Moreover, a proposal to include the definition of brand elements which constituted the overall 'brand' concept in the question on USB was added to the final experimental survey.

3.3 Main study

Experimental design

I conducted the survey experiment using a 2 (same-brand information diagnosticity: low/high) × 2 (other-brand information diagnosticity: low/high) between-subjects design. The outline of the four experimental conditions used is included in Appendix II.

As mentioned before, price of a chocolate bar was chosen to be the missing attribute, because consumers, in order to infer what is not explicitly given, must perceive the missing cue as valid and relevant (Hansen & Zinkhan, 1984). In a supermarket environment, a grocery shopper needs to have access to information such as price in order to make decisions quickly therefore lack of it certainly motivates him in a larger extent to form an inference.

In order to investigate use of same-brand information source, the second, given attribute of chocolate bar product was its own brand, i.e. "a name, term, sign, symbol, or design, or combination of them which is intended to identify the goods and services of one seller or group of sellers and to differentiate them from those of competitors" (Kotler, 2000, p. 442). The aforementioned definition illustrates the complex nature of the product's brand itself, as it is composed of several elements which together build brand equity. Explicitly, those elements are: brand names, logos, symbols, characters, slogans, jingles and design and packaging (Keller et al., 2012). Studies of Berning and Jacoby (1974) have shown that brand took precedence over other attributes as a source of information in consumers' decision making process. Moreover, this attribute must be perceived to be correlated with the missing one (price), as Johnson and Levin (1985) argued in their model (m>1), in order for inference to happen. Brand was therefore the best choice, as it represents the 'chunks' of information on quality and price.

DSB was manipulated by varying the degree of correlation between given price of chocolate bar (stated in €) and its brand. It was mentioned explicitly what elements a brand is composed of as indicated by Keller et al. (2012). High diagnosticity was represented by displaying a chocolate brand priced according to what the look of its brand conveyed (namely quality, associations and image). Therefore, high-end brands such as Lindt, with a sophisticated package design were priced as more expensive than generic brands with simple package design. Contrary, low diagnosticity represented a situation whereby chocolate brand image conflicted with how much it has been charged for, e.g. Lindt chocolate being priced lower than a private label.

DOB was manipulated by varying the price points across nine chocolate bar brands. According to Moon and Tikoo (1997) in order for manipulation of other-brand information to be effective, more than two brands must be studied (authors studied six brands). Therefore, high diagnosticity was represented by limited variation in price points, as they only varied by €0.05, as determined in the pilot study. Low diagnosticity indicated large variation in price points, namely the difference between the highest and lowest price was €2.80, as determined by pilot study.

Dependant variables

Confidence in inferred price estimate was chosen as the dependent variable in the first part of the study. It was measured using a single five-point bipolar-adjective item (1= "not at all confident"/ 5= "very confident") after asking subjects to infer missing price of the chocolate bar. This measure has been used in literature on inferring missing information by Lim and Kim (1992) and Burke (2006). The use of confidence in inferring missing information scale serves to link studies of inference processes in judgements with general studies on confidence in judgement (Levin et al., 1988, as cited in Burke, 1996). This means, the dependant variable will answer whether different manipulations have not only caused the process of inferring to be more difficult or easier to the consumer but also if judging the partially described product overall has been made easier or not.

Purchasing intention was another dependant variable chosen to be researched in the second part of the study. It was measured using a single five-point bipolar-adjective item, where respondents had to indicate how likely it would have been for them to buy that particular chocolate bar during that shopping trip (1 = "extremely unlikely", 5 = "extremely likely"). This measure has been also used in Huber and McCann (1982) and Park et al. (2007).

Subjects

A total of 180 volunteers none of whom participated in the pilot or pre-test studies, were randomly assigned to one of the four experimental conditions. The final sample size used for analysis was 152 (86 females and 66 males, aged 20 years and older, living in the Netherlands). The remaining total of 28 subjects from all four experimental conditions failed to fully complete the online survey. Thanks to tracking feature which enables to monitor completion rates per single question in Qualtrics survey tool, one could see that in every experimental condition, subjects who did not complete the survey withdrew from doing so immediately upon accessing it. 152 participants were randomized to each of the four conditions, which consisted of 36-40 respondents.

As the study involved a between-subjects experimental design, importance of randomization in order to avoid causal of systematic differences between conditions was highly

significant (Field & Hole, 2003). One of the requirements was to distribute questionnaires to various samples at exact same time of the day (evening) to ensure participants are randomly assigned to all conditions equally. Secondly, to ensure participants were randomized across groups, the links to the surveys were sent out at a random draw, e.g. when emailing a distribution list of one known Dutch company, recipients were told to click on any one link they preferred out of the four links provided.

Moreover, for this hypothetical survey to mimic consumer behaviour in field, subjects had to be reflective of shoppers in the grocery store (Chang et al., 2009). Thus, as suggested by Chang et al. (2009) reliance on student samples *solely* was avoided. Data was collected through online distribution channels such as e-mail delivery, social networking sites and intranet sites. In order to ensure access to varied sample of consumers in terms of age, education, income, gender and household size, the online questionnaire has been uploaded on social networking sites of major Dutch grocery retailers. To ensure respondents who filled in the survey were aware of the Dutch grocery retailer market, closed online discussion groups like e.g. Internationals in Rotterdam or Expats in Groningen were chosen to distribute the survey, as administrator of the site needs to grant access, to prevent from unknown users joining the group.

Procedure

As mentioned before, the experimental survey design made use of an online questionnaire as a major tool for data collection, provided by Qualtrics. Subjects were informed that the study involved consumer decision making in a traditional supermarket environment. They were instructed to imagine their regular weekly groceries shopping trip to one of existing, known European supermarket and asked to search for a new brand of chocolate bar recommended by their friend.

The experimental stimulus consisted of a new Bolivian chocolate brand 'Baures' and subjects were told that it was a 100g bar of fine milk chocolate and sold for a limited time period by European retailers. Subjects were also presented with information about chocolate bar product category, namely the current, existing brands sold in Dutch groceries market, and how they are positioned in terms of prices and brand image. Although previous research used brand names A-Z, it has been avoided here, in order to make the study more engaging and interesting to participants. Next, subjects were presented with two supermarket shelves displaying 10 different chocolate bars and their price tags. To prime more realistic situation, chocolate bars were displayed according to how they were laid out on the shelves in known Dutch supermarket. Baures brand had no price tag attached to the lining, thus respondents were

prompted to draw attention to this circumstance and to infer the missing price in order to make a purchase decision as used in the existing experimental design (Lim & Kim, 1992).

Incentive-compatible approach

Firstly, respondents were asked to write their price estimate for the partially described Baures chocolate bar basing on the image of the supermarket shelves *only* and were consequently informed about a chance of winning a prize having had guessed the real price of this product currently sold by one known retailer in the Netherlands.

The rationale behind making the above question incentive-compatible was because of the hypothetical, instead of field, real-life based nature of the responses in this survey. Hypothetical bias occurs when people become less price-sensitive and discount their budget constraints in hypothetical conditions (Ding, 2007; Wang et al., 2007; Chang et al., 2009). Thus, without providing appropriate incentives, it would have been difficult to elicit accurate and truthful answers, which are of significant importance to this research in obtaining consumers' true, inferred information. Although the inferred price estimate has nothing to do with one's willingness to pay or reference price, where incentive-aligned measurement approach is highly valid, it had to be ensured that participants respond as true in their real shopping scenario as possible. For example, a respondent who fills in a survey based on hypothetical situation is not motivated to behave as in real shopping scenario where she or he faces time and/or budget constraints. The person is thus not triggered to provide a truthful price estimate and might have indicated a random price for a chocolate bar, e.g. €0.05.

Despite majority of incentive compatible mechanisms basing on auction design (Ding, 2007; Lusk et al., 2008), lottery incentive structure was chosen. Academics have agreed that such complex design methods like auction designs proved ineffective for lower-priced goods, as "(...) people often do not appear to behave rationally when dealing with low-valued goods" (in Lusk et al., 2008, p. 494). In order to control for strategic responses, subjects were informed that the real price has been already set by one European retailer, and would not be disclosed (Wang et al., 2007). To increase experimental realism, respondents were prompted about facing products as they are currently displayed in one of the known supermarkets and asked to answer the questions basing on that image only.

To check for the effectiveness of the manipulations presented in the survey, I asked two questions on how same- and other-brand information was diagnostic to the consumer. Their goal was also to conceal the real purpose of this study. Follow-up questions which were designed to collect data on individual differences of respondents to control for variances in dependent variables, included questions on gender, age (the year of birth), household income after tax (stated in €), and marital status. The entire survey took on average 7-10 minutes to complete.

4. Data Analysis and Results

4.1 Manipulation checks

Manipulation checks were conducted to assess whether the diagnosticities of same- and other-brand information sources were perceived by subjects as intended.

For DSB subjects were asked to indicate the relationship between the brands of chocolate bars (i.e. their brand names, logos, symbols, design and packaging) and their own prices (1=not at all related, 5=strongly related) in line with the analysis of Moon and Tikoo (1997). Subjects in the high diagnostic condition ($High_{DSB}$) indicated a stronger relationship than those in the low diagnostic condition (Low_{DSB}): $High_{DSB}$ = 3.74, Low_{DSB} = 2.10, F = 5.410, $p<0.05$. Independent samples t-test indicated that the means for both $High_{DSB}$ and Low_{DSB} groups were significantly different from each other.

DOB was checked by asking subjects to estimate the variability of prices of chocolate bars (1=not variable at all, 5=highly variable) as in analysis of Moon and Tikoo (1997). Subjects in the low diagnostic condition (Low_{DOB}) perceived a higher variability among prices than those in high diagnostic condition ($High_{DOB}$): $High_{DOB}$ = 2.55, Low_{DOB} = 4.18, F = 10.552, $p<0.05$. As indicated by independent samples t-test, two above conditions yielded statistically significant differences in results. Thus, both manipulations for DSB and DOB were successful.

4.2 Ensuring random assignment to given experimental groups

Statistical analysis was carried out to check for potential differences across four experimental groups in terms of their gender, age, marital status and household income. One-way ANOVA test in Table 3 show significance values higher than the 0.05 level for age, household income and marital status variables, meaning the four experimental groups do not differ significantly between each other in terms of the given demographics. Nevertheless, the test indicated statistically significant group differences in terms of respondents' gender (F = 2.997, $p<0.05$). Independent samples t-test further confirmed that groups 1 and 3 were more over-represented by female respondents than groups 2 and 4 (61% and 60% in groups 1 and 3 vs. 45% in groups 2 and 4). Nevertheless, when controlling for extraneous variables where gender was a dummy variable, the linear regression analysis output in Table 5, shown no statistically significant influence of gender on any of the independent variables' coefficients, thus randomization of subjects to experimental group has been achieved successfully.

Table 3: ANOVA test for extraneous variables.

		Sum of Squares	df	Mean Square	F	Sig.
Age	Between Groups	143.344	3	47.781	.470	.704
	Within Groups	15039.755	148	101.620		
	Total	15183.099	151			
Household Income	Between Groups	17.762	3	5.921	.771	.512
	Within Groups	1136.949	148	7.682		
	Total	1154.711	151			
Gender	Between Groups	2.139	3	.713	2.997	.033
	Within Groups	35.203	148	.238		
	Total	37.342	151			
Marital Status	Between Groups	.220	3	.073	.288	.834
	Within Groups	37.721	148	.255		
	Total	37.941	151			

4.3 Hypothesis tests

According to Hypothesis 1, consumers feel more confident about their (inferred) price estimate for the missing value when inferring from available UOB rather than from USB. In other words, UOB independent variable has a greater impact on the variation in the dependent variable than USB independent variable. To test for this effect, multiple linear regression analysis was carried out with UOB and USB as the main independent variables and Confidence in inferred price estimate as dependent variable to determine which of the two main sources of available information contributed to higher confidence in what was to be inferred. Furthermore, the linear model was extended by controlling for extraneous demographic variables "gender", "age", "marital status" and "household income":

$$C = \beta_0 + \beta_1 USB + \beta_2 UOB + \beta_3 UOB \times DOB + \beta_4 UOB \times DSB + \beta_5 USB \times DSB + \beta_6 USB \times DOB + \beta_7 UOB \times PE + \beta_8 USB \times PE + \beta_9 Age + \beta_{10} Gender + \beta_{11} Income_1 + \beta_{12} Income_2 + \beta_{13} Income_3 + \beta_{14} Income_4 + \beta_{15} Income_5 + \beta_{16} Income_6 + \beta_{17} Marital\ Status + \varepsilon$$

ANOVA output in Table 4 presents the probability of the F statistic (9.214) for the overall regression relationship for all independent variables as significant, as its significance value is below the 0.05 level, hence the null hypothesis for the final model can be rejected (i.e. there is a significant relationship between the set of all independent variables and dependent variable).

The following summary of unstandardized Beta coefficients (B) in the regression model and their significance levels (see Table 5) confirms that when controlling for extraneous

variables, none of them significantly contribute to the variation in the dependent variable ($p>0.05$).

Significance values for Beta coefficients in Table 5 indicate that only the main effect of UOB and the interaction effects between UOB and its own source diagnosticity (DOB) as well as the interaction effect between USB and inferred Price Estimate (PE) significantly affect the level of the dependent variable (B_{UOB} = 0.480, $p<0.05$; $B_{UOB\times DOB}$ = 0.175, $p<0.05$; $B_{USB\times PE}$ = 0.163, $p<0.05$), ceteris paribus. The main effect of USB is insignificant (B_{USB} = -0.216, $p>0.05$), ceteris paribus.

The multiple linear regression analysis provides the following model including the coefficients for the dependent and independent variables, extraneous variables and control variables:

$$C = 1.518 - 0.216USB + 0.48UOB + 0.175UOB \times DOB + 0.099UOB \times DSB + 0.059USB \times DSB - 0.012USB \times DOB - 0.047UOB \times PE + 0.163USB \times PE - 0.011Age + 0.262Gender + 0.142Income_1 - 0.284Income_2 - 0.031Income_3 + 0.142Income_4 - 0.715Income_5 - 0.271Income_6 - 0.119Marital\ Status + \varepsilon$$

Looking at the *standardized*[4] partial coefficients in Table 5, it can be seen that UOB has a larger effect than USB (β_{UOB} = 0.542>β_{USB} = -0.216). Given the size of β, it can be thus stated that UOB has a greater impact on Confidence in inferred price estimate than USB. This means, that when inferring the values for a missing product attribute from available other-brand information source increases one's confidence in that inferred value by 0.48 points, whereas inferring from available same-brand information source, decreases the dependent measure by 0.216 points, ceteris paribus.

To test if the difference between two partial coefficients in this regression equation is statistically meaningful, the output from the SPSS analysis is not sufficient. The significance values outlined next to each of the independent variable's Beta coefficients emphasize if the coefficient varies significantly from zero, so that it has an impact on the dependent variable. It does not explain if the difference *between* the coefficients themselves is statistically significant.

[4] Unstandardized partial coefficients or Beta (B) explain how much the dependant variable changes once the independent variable is increased by one unit, holding all other variables constant. Standardized Beta coefficients (ß) are subject to their own standard deviations, so that their variances are equal to 1. Hence, those coefficients are used to predict which independent variable has a greater effect on the dependent variable, when the variables are expressed in different units of measurements.

Table 4: ANOVA and model summary for multiple linear regression with Confidence in inferred price estimate as dependent variable.

Model	Sum of Squares	df	Mean Square	F	Sig.	R	R Square	Adjusted R Square	S.E. of the Estimate	R Square Change	Sig. F Change
1	110.128	8	13.766	17.663	0.000[a]	0.705[a]	0.497	0.469	0.883	.497	.000
2	119.421	17	7.025	9.214	0.000[b]	0.734[b]	0.539	0.480	0.873	.042	.215

Notes: a. Predictors: (Constant), USB, UOB, USB×DSB, USB×DOB, UOB×DOB, UOB×DSB, UOB×PE, USB×PE
b. Predictors: (Constant), USB, UOB, USB×DSB, USB×DOB, UOB×DOB, UOB×DSB, UOB×PE, USB×PE, Age, Gender, Income, Marital Status

Table 5: Model summary for partial coefficients with Confidence in inferred price estimate as dependent variable.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	**S.E.**	**Beta (β)**					**B**	**S.E.**	**Beta (β)**		
1	(Constant)	1.269	.372		3.407	.001	**2**	**(Constant)**	**1.518**	**.482**		**3.150**	**.002**
	USB	-.250	.175	-.250	-1.427	.156		USB	-.216	.177	-.216	-1.225	.223
	UOB	.518	.149	.585	3.471	.001		**UOB**	**.480**	**.151**	**.542**	**3.176**	**.002**
	UOB×DOB	.153	.068	.278	2.243	.026		**UOB×DOB**	**.175**	**.069**	**.318**	**2.512**	**.013**
	UOB×DSB	.079	.093	.134	.850	.397		UOB×DSB	.099	.095	.168	1.051	.295
	USB×DSB	.072	.097	.082	.742	.459		USB×DSB	.059	.099	.067	.594	.554
	USB×DOB	.022	.095	.024	.236	.813		USB×DOB	-.012	.096	-.012	-.122	.903
	UOB×PE	-.059	.066	-.209	-.901	.369		UOB×PE	-.047	.066	-.167	-.712	.478
	USB×PE	.164	.071	.433	2.302	.023		**USB×PE**	**.163**	**.071**	**.431**	**2.288**	**.024**
								Age	-.011	.009	-.095	-1.232	.220
								Female	.262	.158	.108	1.659	.099
								Single	-.119	.182	-.049	-.650	.517
								Income 1	.142	.253	.035	.562	.575
								Income 2	-.284	.251	-.072	-1.130	.261
								Income 3	-.031	.282	-.007	-.111	.912
								Income 4	.142	.325	.029	.437	.663
								Income 5	-.715	.651	-.067	-1.098	.274
								Income 6	-.271	.258	-.076	-1.053	.294

Note: Dummy variables - Income 1: Respondent earns between €20,000 and €29,999; Income 2: €30,000 - €39,999; Income 3: €40,000 - €49,999; Income 4: €50,000 - €59,999; Income 5: €60,000 - €69.999; Income 6: Respondent earns above €70,000.

Cohen et al. (2003) elaborates on the methodology of testing the difference between two partial coefficients βs and Betass for different independent variables by calculating the standard error of the difference either between βs and Betas and then analyzing their associated t-values:

$$SE_{\beta 1-\beta 2} = \sqrt{\frac{1-R_Y^2}{n-k-1}(r^{ii} + r^{jj} + 2r^{ij})} \qquad t = \frac{\beta_i - \beta_j}{SE_{\beta i-\beta j}}$$

$$SE_{Bi-Bj} = \sqrt{SE_{Bi}^2 + SE_{Bj}^2} - 2SE_{Bi}SE_{Bj}(\frac{r^{ij}}{r^{ii}r^{ij}}) \qquad t = \frac{B_i - B_j}{SE_{Bi-Bj}}$$

As the 'r' variables are derived from the inverse of the correlation matrix for the independent variables, which in this case (with many control dummy variables) would involve complex calculations, a simpler approach was implemented. As applied in the analysis of Lee and Olshavsky (1997) the paired samples t-test confirmed that the usage frequencies between other-brand information source and same-brand information source were significantly different from each other ($Mean_{UOB}$=3.43, $Mean_{USB}$=2.45, t = 5.307, p<0.05). The graphical analysis of the confidence intervals of both independent variables, as outlined in Janssens et al. (2008) and Cummings and Finch (2005) shows that use of other-brand information source scores higher than the use of same-brand information source, and both confidence intervals do not overlap, meaning there is a significant difference between the two β or Beta coefficients. The above results suggest that consumers feel more confident with their inferred price estimate when inferring from the prices of other brands displayed in high proximity to a partially described product rather than from that product, hence Hypothesis 1 is fully supported.

Hypotheses 2 and 3 look at the interactions of available information sources with their diagnosticities on the change in respondents' Confidence in inferred price estimate. In other words, having known consumers feel more confident when inferring missing price from given price tags of other brands displayed nearby (Hypothesis 1), there might be conditions under which their level of confidence changes due to some information sources being more or less diagnostic to them.

Hypothesis 2a proposes that the more consumers make use of the available other-brand information source, the more they are confident with the inferred price estimate, and this effect is further strengthened when consumers perceive the nearby products' prices to be highly invariable. Statistically this would mean that both the main effect of UOB on Confidence as well as the interaction effect between UOB and DOB are significant and positive. Table 5 with given Beta coefficients (B) and their significance levels shows that both coefficients significantly differ from zero, B_{UOB} = 0.480, p<0.05; $B_{UOB \times DOB}$ = 0.175, p<0.05. All other things being equal, a one unit increase in the use of other-brand information source will lead to 0.48 increase consumer's confidence levels, however when the other-brand information source becomes more diagnostic (e.g. price points vary by small interval as compared to large interval), then confidence

increases further by 0.175 units. Both coefficients have positive signs which further confirm the direction of the linear relationship. Hypothesis 2a is hence fully supported.

Hypothesis 2b investigates the influence of diagnosticity of available same-brand information source on the use of available other-brand information source and the confidence levels associated with inferred price estimates for the missing values. Operationally this would mean the interaction effect between UOB and DSB to be significant and negative – the less the source becomes diagnostic to the consumer, the more she or he makes use of available other-brand information source to come up with an inferred price estimate. Table 5 provides a positive coefficient value (B =0.099), yet the p-value is above the 0.05 confidence level, meaning the interaction effect is insignificant, and all other things being equal, it has no further effect on the dependent variable. Hence, no matter if the available same-brand information source is more or less diagnostic to a consumer, her or his confidence level associated with inferred value will not change. The main effect of UOB is positive and significant, hence Hypothesis 2b can be only partially supported, as the more of available other-brand information cues are used, the more confidence in inferred value rises – yet the effect remains the same no matter how missing value is correlated to the given attribute *within the same brand.*

Hypothesis 3a looked at the similar effects as in Hypotheses 2a, yet investigated the role of available same-brand information source on how consumers are confident with their inferred values. Given the insignificant main effect of USB on Confidence in inferred price estimate in Table 5, to partially support Hypothesis 3a, a significant and positive interaction effect between USB and DSB would be highly desirable. The output from the multiple linear regression table shows that this interaction effect does not significantly differ from zero (p-value 0.554>0.05). Given the fact that both the main and interaction effects are insignificant, even when controlling for extraneous variables, Hypothesis 3a must be fully rejected.

In order for Hypothesis 3b to be fully supported, the main effect of USB, when interacting with DOB must be significant and negative, as the less diagnostic available other-brand information source is (i.e. price points become more variable), the more should consumers rely on available same-brand information source to become more confident with their inferred price estimate. Table 5 indeed shows a negative sign for the USB×DOB coefficient, yet the significance value does not differ from zero (0.903>0.05). In other words, no matter if consumers use same-brand information source or not, their confidence levels will not be altered and furthermore, this will not improve as a result of other-brand information being more or less diagnostic to them. Thus, Hypothesis 3b must be also fully rejected.

The final output of means of Confidence in inferred price estimates across four experimental groups is presented in Table 6. One-way ANOVA test has confirmed that the levels of the dependent variable varied significantly between the four experimental conditions at 0.05

level. When consumers perceive the prices of other brands to vary slightly, it is easier for them to infer the missing price from that diagnostic information source and hence they are more confident with what they infer (the level of Confidence in inferred price estimate increases from 2.13 to 3.93 in Low_{DSB} condition, and from 3.53 to 4.18 in $High_{DSB}$), hence Hypothesis 2a is supported. On the other hand, when same-brand information source becomes diagnostic to them and they notice a strong correlation between the brands and their prices, their confidence levels increase further, contrarily to assumptions of Hypothesis 2b (2.13 to 3.53 in Low_{DOB} condition and 3.93 to 4.18 in $High_{DOB}$ condition).

When consumers perceive strong inter-attribute correlations in the brand, their Confidence in inferred price estimate also increases (2.13 to 3.53 in Low_{DOB} condition and 3.93 to 4.18 in $High_{DOB}$ condition) however the regression analysis in Table 5 confirmed an insignificant effect on the dependent variable, rejecting Hypothesis 3a. The same applies to Hypothesis 3b, as with an increase in other-brand information diagnosticity, Confidence in inferred price estimate also increases, contrarily to what was assumed before (2.13 to 3.93 in Low_{DSB} condition, and from 3.53 to 4.18 in $High_{DSB}$). Results in Table 6 clearly present that the greatest Confidence levels are reported in group 2, where both diagnosticities were high, whilst the lowest are reported in group 4, with low levels of diagnosticity for both information sources:

Table 6: Means of confidence levels for four experimental groups**.**

		Diagnosticity of other-brand information	
Diagnosticity of same-brand information		Low	High
	Low	Group 4: 2.13 (38)*	Group 3: 3.93 (40)*
	High	Group 1: 3.53 (36)*	Group 2: 4.18 (38)*

Note: (n) indicates the number of respondents per experimental condition
*p<0.05

4.4. Mediation Analysis

In order to test the significance of Hypothesis 4, mediation analysis was carried out to investigate the mediating role of Confidence in inferred price estimate for the effect of use of given information sources on the Purchasing Intention of the partially described product. As introduced in Baron and Kenny (1986), for the purpose of this study, the single-mediator model was extended to include two independent variables (UOB and USB) as well as the control for moderators (DSB, DOB, PE) and extraneous variables (gender, age, marital status, household income). Although Hypotheses 1 through 3b suggest the only significant and dominant linear relationship between UOB and Confidence, it is highly important to include all variables in the mediation model and also control for USB. Since Purchasing Intention is now the main

dependent variable, USB might yield significant results when being mediated through Confidence in inferred price estimate.

In short, Baron and Kenny (1986) introduced the causal steps approach to assess mediation effect and it involves the analysis of the following three equations:

$$Y = i_1 + cX + e_1, \quad 1.$$
$$Y = i_2 + c'X + bM + e_2, \quad 2.$$
$$M = i_3 + aX + e_3, \quad 3.$$

where i_1, i_2 and i_3 are constants, Y is the dependent variable, M is the mediator, X is the independent variable, c being the coefficient relating X to Y, c' is the coefficient relating X to Y through the presence of M, b is the coefficient relating M to Y adjusted for the X, a is the coefficient relating the X to the M, and e_1, e_2 and e_3 being residuals (MacKinnon et al., 2007). Firstly, when regressing X on Y, the c coefficient must be significant (equation 1). Secondly, the a coefficient must likewise be significant when regressing X on M (equation 3). Thirdly, when regressing both X and M on Y, the b coefficient must significantly differ from zero in equation 2. Lastly, for full mediation to take place, the c coefficient in equation 1 must be significantly larger than c' coefficient in equation 2.

As mentioned before, for the purpose of this thesis the model was extended to include multiple independent variables, as in the analysis of Thompson and Hamilton (2006) and Berrone et al. (2007) applied elsewhere. To confirm the Hypothesis 4, several conditions of the mediation analysis must be met. First of all, either both or one of the two main coefficients (UOB and USB) must be significant and positive with and without the presence of the mediator Confidence in inferred price estimate. Next, when including all variables in the model and regressing them on Purchasing Intention, the coefficient of the mediator must be significant and positive, whilst coefficient of independent variable(s) must be significantly smaller or even insignificant as compared to when being regressed on the mediator (equation 1). Thus, Hypothesis 4 will be accepted once those conditions are satisfied and moreover, one of the main independent variables will remain significant throughout the mediation, and the other one not (i.e. it will be only positive when mediator is absent).

The mediation analysis revealed that main effect of use of information sources (UOB and USB) on Purchasing Intention was not mediated by the consumers' Confidence in their inferred price estimate (Sobel z=-3.689, $p<0.0002$; Baron & Kenny, 1986; Thompson & Hamilton, 2006). According to the regression output in Table 7, when Purchasing Intention was regressed on UOB and USB together with moderators and extraneous variables, only the main effect of UOB was significant ($B_{UOB} = 0.391$, S.E. = 0.189, $p<0.05$). In other words, when consumers make use of available other-brand information source, their Purchase Intention is likely to change by

0.391 units, ceteris paribus. Secondly, multiple linear regression carried out before to test Hypotheses 1-3b shown that only the main effect of UOB and interaction effects with DOB and between USB and Price Estimate were significant when regressing independent variables on Confidence in inferred price estimate (now being the mediator). This means that Confidence in inferred price estimate will only change if consumers infer missing values from other-brand information source, and especially when that source is perceived to be more diagnostic to them. Additionally, this effect will change depending on the inferred price, when inferring from the brand of the partially described product. Finally, when Confidence in inferred price estimate was entered as the predictor to the first analysis, it did not significantly impact the dependent variable ($B_{Confidence}$ =-0.113, S.E. = 0.108, p>0.05), however main effect UOB and the interaction effect between USB and Price Estimate still remained significant (B_{UOB} = 0.445, S.E. = 0.195, p<0.05; $B_{USB \times PE}$ = -0.139, p<0.05).

Table 7: Mediation analysis of Confidence in inferred price estimate on the effect of UOB and USB on Purchase Intention for a partially described product.

Equation number	Dependent variable	Independent variable	Standard regression coefficients	t
1	Purchase Intention	**UOB**	**.391**	**2.072***
		USB	.276	1.252
		UOB×DOB	-.088	-1.012
		UOB×DSB	-.004	-.031
		USB×DOB	.108	.871
		USB×DSB	.105	.880
		UOB×PE	-.027	-.328
		USB×PE	-.157	-1.769
2	Confidence	**UOB**	**.480**	**3.176***
		USB	-.216	-1.225
		UOB×DOB	**.175**	**2.512***
		UOB×DSB	.099	1.051
		USB×DOB	.059	.594
		USB×DSB	-.012	-.122
		UOB×PE	-.047	-.712
		USB×PE	**.163**	**2.288***
3	Purchase intention	**UOB**	**.445**	**2.276***
		USB	.252	1.135
		UOB×DOB	-.068	-.767
		UOB×DSB	.008	.063
		USB×DOB	.115	.924
		USB×DSB	.104	.870
		UOB×PE	-.033	-.392
		USB×PE	**-.139**	**-1.933***
		Confidence	-.113	-1.047

Notes: * p<0.05

Following the recommendations of Berrone et al. (2007) none of the mediating conditions for USB independent variable were satisfied, however it was important to control for the presence of this element in the full model.

All in all, according to Baron and Kenny (1986) and MacKinnon et al. (2007) for the mediation to follow successfully, the coefficient connecting independent variable to the

dependent variable in the final equation should be significantly reduced by the presence of the mediator or become insignificant. Here, adverse situation happened: B_{UOB3}=0.445>B_{UOB1}=0.391. However, as it can be seen in Table 7, the coefficient for interaction effect between UOB and DOB has become insignificant in equation 3, which could potentially suggest a partial mediation, if the coefficient of Confidence mediator significantly differed from zero. For the mediation effect to occur between UOB, Purchasing Intention and Confidence in inferred price estimate, the latter would need to be significant and positive in the final equation, however that was not the case here. Thus, it cannot be stated that the use of other-brand information source impacts purchasing intention of the partially described product by mediating one's confidence in the inferred price estimate. Hypothesis 4 is therefore rejected.

Nevertheless, first equation provides interesting insights– as there is a direct linear and significant relationship between the main effect UOB and the purchase intention, one can see that when consumers are prompted to infer the missing value, making use of other-brand information source significantly increases their intention to purchase the partially described product, no matter if they are confident with the inferred value or not.

Table 8: Summary of hypotheses with findings.

	Hypothesis	Expected effect	Rationale	Findings
1	UOB -> Confidence in inferred price estimate	+ **UOB>USB**	Inferring from other-brand information source makes consumers more confident with what they inferred, as compared with inferring from same-brand information, as information depicted in alternative brands displayed in the supermarket send stronger signals to the consumer.	Fully supported. UOB has a greater effect on Confidence levels than USB. The difference between two Beta coefficients is significant.
2a	(UOBxDOB) -> Confidence in inferred price estimate	+	Availability of other brands' information is greater in a traditional supermarket environment, however the effect on confidence is even stronger when price points do not vary between each other.	Fully supported. UOB has an effect on Confidence levels, and that increases with DOB.
2b	(UOBxDSB) -> Confidence in inferred price estimate	-		Partially supported. Main effect UOB significant, however positive, insignificant interaction effect between UOB and DSB.
3a	(USBxDSB) -> Confidence in inferred price estimate	+	The greater perceived correlation between the brand name and missing price, the more consumer infers missing price from the brand name, no matter how the prices of other brands vary.	Rejected. Both main effect USB and interaction effect USB and DSB are insignificant.
3b	(USBxDOB) -> Confidence in inferred price estimate	-		Rejected. Both main effect USB and interaction effect USB and DOB are insignificant.
4	UOB -> Confidence in inferred price estimate -> Purchase Intention	+	Inferring from given other-brand information source only leads to purchasing intention once mediated through confidence in inferred price estimate, as there is a proven relationship between inferences, uncertainty and intentions.	Rejected. UOB has an effect on Purchasing intention, USB not. Confidence measure insignificant and Beta coefficient linking UOB to PI through Confidence is larger than in equation between independent and dependent variables, thus mediation analysis is not supported.

4.5 Control variables

As mentioned before, the linear regression models used for testing Hypotheses 1-3b and for testing the mediation analysis in Hypothesis 4 control for additional demographic variables, i.e. gender, age, household income and marital status. Additionally, price estimate, which was the inferred value for the missing attribute of Baures chocolate, is included in the regression. This is done to ensure that variations in those variables do not affect the value of the dependent variable and hence they are controlled for. Academics treat it as a method to reduce the confounding effect (Montgomery, 2005) and advise to treat them as covariates in analyses such as multiple regression analysis. Variables gender and age were chosen to describe the demographics of respondents assigned to various experimental groups, whereas marital status and household income were included to look for potential differences in variations in Confidence in inferred price estimate depending on whether someone is single, or has a family, and those who have high or low household income.

The R Square Change value in Table 4 associated with the addition of extraneous variables increases by 0.042 which means that as a result of controlling for additional demographic variables, the error in predicting the dependent variable falls by 4.2%. Nevertheless the Sig. F change value (0.215) is higher than 0.05 significance level, which means that the addition of the control variables to the restricted model does not result in its *significant* improvement (Janssens et al., 2008). Looking at the significance levels of Beta coefficients for both Model 1 and 2 in Table 5, none of the control variables has a significant impact on the dependent variable. Gender, with "Is the respondent female?" as a dummy variable, could have a significant influence on Confidence in inferred price estimate as its p-value was closest to 0.05 (p-value 0.099>0.05), however even testing for 90% confidence interval yields an insignificant value.

5. Conclusion

5.1 General Discussion

The following results are clearly in alignment with the statement made in the research of Burke (1996) that consumers' information processing strategies impact inference use. Additionally, this thesis has shown that depending on which information processing strategy is used, consumers' levels of confidence in inferred value of the missing attribute also changes.

The main finding arising from this experimental research is that once consumers are faced with a situation of purchasing a product with missing information (in a traditional supermarket environment) and prompted to infer the missing value, they are most likely to support their estimates with the use of all readily available information depicted in alternative brands rather than with the information available within the product. Moreover, once inferred the value, consumers feel more confident with such estimate when inferring from given information provided by alternative brands on the missing value than when inferring solely from other given attributes that are correlated with the missing value, but included *within* the brand.

Table 9: Summary of price estimates within four experimental groups.

Experimental group	DOB	DSB	Price range*	Mean price estimate	Mode price estimate
1		x	€2.38 - €3.24	€2.61	€2.50
2	x	x	€2.94 - €2.99	€2.88	€2.99
3	x		€1.70 - €1.73	€1.83	€1.70
4			€0.44 - €2.38	€2.09	€2.50

Notes: * Price points displayed on the same supermarket shelf.

Recurring significant main effect of the use of other-brand information source on confidence in inferred price estimate across Hypotheses 1 through 3b confirms that the source plays a dominant role in inferring missing values, considering a situation when consumer needs to make a purchase decision in the traditional supermarket environment. Data collected during survey experiment shows that means of confidence in inferred price estimate were higher for those respondents who inferred missing price of Baures chocolate from the given prices of alternative chocolates, than for those respondents who claimed to infer the missing price from the Baures brand only.

What is more, the analysis of the inferred price estimates themselves (provided in Table 9) further explains respondents' reliance on other-brand information source to be more assured of one's task in inferring. The mode values given in groups 2 and 3 clearly show that majority of respondents assigned a price to Baures chocolate bar within the price range of given alternative chocolates, e.g. in group 2 the most frequent inferred price was €2.99, whereby the price range

of available alternative chocolates varied between €2.94 and €2.99. The same situation is seen in group 3, with inferred price of €1.70, whilst the price range varies between €1.70 and €1.73. This proves that once other-brand information source was highly diagnostic (group 2 and 3) and the given prices of alternative brands did not vary to a large extent, respondents inferred the missing price of Baures chocolate from that piece of available information, no matter what the brand perceptions of Baures chocolate bar brand were (group 2 priced the chocolate on average €2.88, whilst group 3 priced it €1.83, despite being aware of the positioning of Baures as a high-end and exclusive brand). If Hypothesis 1 was rejected in favour of the use of same-brand information source, the inferred price of Baures chocolate would remain high and not vary across four groups (especially if diagnostic in groups 1 and 2), as respondents would base their estimates on the brand image and brand positioning of Baures chocolate bar brand as an expensive product. Yet, one can see that even when other-brand information source is not diagnostic (in group 1) and Baures is positioned around higher-priced chocolate brands, the average price estimate was €2.61, compared to €2.09 in group 4, where Baures is displayed around lower-priced chocolate brands.

Therefore, what is the most likely situation if a consumer who wants to purchase a product in a supermarket, notices a missing price tag? She or he will make use of and primarily refer to price tags of alternative brands that are readily available with greater confidence, rather than guess or estimate the price from the brand or packaging of the product itself. This major finding contrasts with results of Ford and Smith (1987) and Moon and Tikoo (1997) who argued that other-brand information source, regardless of its level of diagnosticity, does not affect inferences when same-brand information source is present. However, one must remember that the nature of the experimental research, manipulations of main independent variables, the stimuli as well as the research context applied in this thesis varies significantly from mentioned studies.

On the other hand, findings support the results of Ross and Creyer (1992) in that consumers use other-brand processing and if that information is diagnostic, infer the value of the missing information with little consideration of additional information. The same occurs when considering the results of Lee and Olshavsky (1997), who argued that both sources of information impact one's inference formation. Looking at the change of confidence levels across four experimental groups in Table 6, the group with the highest confidence in inferred price estimate was subject to both diagnostic other- and same-band information sources. A significant and positive interaction effect between UOB and USB and their diagnosticities ($B=0.094$, $p<0.05$) gives support for contingency theory, in that both sources of available information are highly influential to draw an inference about a missing attribute.

Insignificant main effect of USB confirms that consumers do not feel confident with inferred price estimate enough when referring to this available source of information. One could assume that product's brand (e.g. name, logo, design or packaging) provides information on product's quality and is also highly correlated with product's price, hence should offer sufficient grounds for inferring missing values from those given attributes. Nevertheless, consumers still prefer to base their assumptions on other types of available information and feel more confident with value that they infer when looking at the given values of the missing attribute depicted in other brands. Even when the chocolate brands were highly correlated with their prices and consumers perceived this source of information to be diagnostic, that still did not have a significant effect on Confidence levels or (smaller) use of same-brand information source .

However, consumers still perceived their price estimate to be valid, depending on how much they inferred from the same-brand information source and how that interacted with the final value of the price inferred. Positive and significant coefficient B = 0.163 shows in Table 5, that the more was inferred from the same-brand information source and the higher was the estimated price, the more consumers felt confident in their price estimates (however, that neither translated to Purchasing Intention of the product). This finding is reasonable, as respondents in the survey were prompted of the high quality of Baures chocolate and its exclusive brand positioning. Therefore, the higher the price was inferred due to relying more on available information depicted in Baures chocolate (e.g. its elegant packaging, logo, Spanish brand name), the more respondents felt confident that this was the right estimate. This adds to discussion on how to approach the investigation of inferring missing information, as insignificant *main* effect of USB on Confidence and its only significance when interacting with Price Estimate, suggests including the inferred values in the conceptual frameworks and analysis as applied in e.g. Moon and Tikoo (1997) or Lee and Olshavsky (1997).

Analysis of Hypothesis 4 indicates that the of use of other-brand information source influences Purchasing Intention of the partially described product, however the magnitude or direction of that influence is not mediated through Confidence in the value that consumers infer. The direct, significant effect of UOB on Purchasing Intention (despite the presence or absence of the mediator) shows that the more consumers make use of the available other-brand information source, the more they are likely to purchase the product which missing information they infer on. If the Confidence coefficient in the final equation of the mediation analysis significantly varied from zero, other-brand information source would increase Confidence in the inferred price estimate and thereby lead to an increase in Purchasing Intention, as hypothesised. Surprisingly, confidence in that inferred value plays a diminished role here, which stands in opposition to majority of research that associated missing information and inference formation with high levels of uncertainty (Meyer, 1981; Huber & McCann, 1982).

Perhaps one of the explanations for the lack of significant linear relationship between Confidence in inferred price estimate and Purchasing Intention is that missing information impacts the product evaluation negatively. Consumers who notice the product to be partially described, attach a negative value to the overall evaluation and depending on the context effects, might not choose the given product (Simmons & Lynch, 1991; Sanbonmatsu et al., 1997). Applying the finding to this research means that consumers, when prompted to infer missing information, might feel confident with the value they had estimated, however due to the fact that the information is still missing, they might perceive the overall product to perform worse than fully described alternatives, and hence do not to purchase it. A study looking at the effect of Confidence in inferred value on product overall evaluation would certainly be an interesting addition to the research.

Moreover, significant, interaction effect between the use of same-brand information source and given price estimate on Confidence in the second and final mediation equations confirms, that the mediation analysis might not have been supported due to the (high) inferred price of the partially described product. When Confidence in inferred price estimate was the dependent variable, the interaction effect was positive, as consumers felt their high price estimate was aligned with the positioning of the brand. However, once asked for purchasing the brand, the interaction effect turned negative – depending on the inferred price, consumers were more or less likely to buy the partially described product. Although price estimate variable measured respondents' estimate of the missing attribute, combining it with Purchasing Intention provides a different picture – consumers might simply not buy the partially described product due to it being perceived to be priced too high, especially when subjects inferred the price from same-brand information mostly.

This is in line with the implications of Moon and Tikoo (1997) who claimed that marketers must be aware of what information can or should not be disclosed in the advertising campaigns. For example, if the manufacturer knows that consumers form their inferences even when information on products is missing, then it would be beneficial not to disclose less desirable information, as consumers might infer a more appropriate value. Here, depending on the objectives of the marketer, manipulating the position of the Baures chocolate or price points of all chocolate brands might result in different price perceptions and hence, purchase intentions. Thus, this study has shown that inferences are just another way of influencing consumer's perceptions and purchase behaviours.

5.2 Academic Contribution

The subject of inference formation is highly relevant in academic literature since early 1980s and this study addresses many challenges in studying inferences as well as eliciting those

from respondents. The major contribution of this work comes from its experimental design which meets the complex nature of studying inferences, e.g. respondents were told explicitly about the missing information within the product and instructed to provide an inferred value for this missing attribute. In this scenario, there are assumptions made that consumers are inferring information, when this is not provided, so that the inference process can be studied more deeply. Otherwise, if not prompted to give a price estimate, respondents might not even infer the value, but respond to missing information in a different way, e.g. by cancelling or deferring purchase.

Moreover, the design addressed the limitations of previous studies, particularly those highlighted by Moon and Tikoo (1997) and Lee and Olshavsky (1997). In order to ensure sufficient manipulation of other-brand information source, nine alternative brands were displayed on the supermarket shelves, so that the available information on their prices was more evident to consumers. To meet the limitation of the study of Broniarczyk and Alba (1994), there was only one missing price tag shown, instead of ten. For the sufficient manipulation of same-brand information source, real life brands were used in the online survey, so that respondents could infer information from perceived correlations between brands and prices already held in their memory. In order to ensure for the right brand perceptions and correlations, the appropriate brands were chosen basing on the pilot study carried out beforehand. Displaying real life brands as well as locating them in the order consistent with the one used in one European retailer ensured the experimental design imitated as most real conditions as possible, thus overcoming the limitation of studying inferences in the lab environment.

This work contributes to the literature on missing information and inference formation by extending it to new contexts, which in this case is retailing. Carrying out research with surveys which presented products on the supermarket shelves instead of product catalogues was not mentioned in any research elsewhere. Certainly, the results from this study are interesting to retailers and FMCG brand manufacturers, as the traditional supermarket is a rich and relevant environment where consumers constantly infer information. Being able to understand how this process occurs and what are the inputs and outcomes of it helps retailers to control and influence it, in order to achieve desirable goals.

Lastly, this study made use of the survey experiments, which involved distributing online questionnaires to participants that were randomly assigned to four different experimental groups. The use of online surveys and online panels such as Amazon Mechanical Turk, is becoming widely accepted in consumer behaviour research (Johnson & Borden, 2012) and this research confirmed many benefits of using online survey tools; most of all ease of survey distribution, greater coverage and simplicity in coding and analysing collected data.

From the analytical point of view, using the Internet as the main data collection tool did not hinder the representativeness of the sample, as respondents generally reflected the characteristics of the Dutch population in terms of their age structure or household income levels. The only exception relates to gender, whereby the experimental groups were at times over-represented by female respondents, which is not consistent with the Dutch sex ratio of 1.01 male(s) to female between ages 15 and 64, as recorded by countries' information database (CIA, 2013). All in all, the online survey tool proved to entirely suit the needs and objectives of this research.

5.3 Managerial Implications

The study mainly looked at how consumers respond to situations when information is not explicitly given and at their readiness to process available information in various merchandise display environments. The results can thus provide the basis for recommendations for retailers to maintain customer satisfaction in situations when product labelling is incorrect or missing, which might hinder product evaluation and purchase decisions. For marketers, this study provides invaluable insights for developing strategies to increase consumers' purchase decisions under uncertain choice situations (Gunasti & Ross, 2008).

Firstly, despite no support for mediation analysis between the use of other-brand information source, Confidence in inferred price estimate and Purchasing Intention of the partially described product, there is a significant and positive effect between UOB and PI. In other words, inferring missing information from available cues depicted across alternative brands helps the consumer to make a decision and hence be more willing to purchase the product with that missing information. It can be concluded thus that inferences do increase consumers' willingness to buy, supporting the findings of Gunasti and Ross (2008), and hence encouraging consumers to make inferences in the real marketplace is the way to go forward. This can be done through various retailing strategies:

- *Category management*: establishing the appropriate amount of Stock Keeping Units (SKUs) in assortment planning to avoid the problem of the overload of information processing. Retailers must decide how many brands to store to ensure consumers have access to the optimal amount of information to process in order to make a purchase decision. Also in case the information on one brand's attribute is missing, a sufficient amount of alternative brands with the information on that attribute should encourage the consumer to infer the missing value and depending on the outcome, purchase the product.
- *Pricing strategy – price lining*: this study has clearly shown that once the information depicted across brands does not vary, consumers will infer missing value from that

source. Hence, if price labelling is often a problem for a retailer, having few established price points should be one of the solutions to maintain constant sales. Moreover, it is important to make a clear distinction between shelves, in case of multiple brands in the category, so that brand manufacturers can display their products on shelves with desirable price points. On the other hand, having a spread range of price points confuses the consumer and makes it more difficult to come up with a price estimate, not even a sound average.

- *Visual merchandising strategy*: retailers and category captains must ensure the appropriate location and display of brands in order to send strong signals to consumers who actively process other-brand information. This study has shown that depending on where the product with missing price is located, the perceptions of price differ significantly, hence retailers can use that knowledge to manipulate our awareness by simply paying more attention to displaying products appropriately.

The positive and significant coefficient for the interaction effect between USB and PE in regression analysis with Confidence as dependent variable also provides interesting insights especially for brand manufacturers. According to Huber and McCann (1982) the knowledge of inferences is important not only in getting information from, but also getting information to the customer, and hence marketers must know in which ways to provide the right cues to their target audience. As discussed before, if brands are positioned well and the message is communicated appropriately to the customers, then they are more likely to infer the missing values also from the product itself. The two following implications refer particularly to private labels and new brands which enter the market, as in those situations it is more likely for the consumers to be unaware of product quality, which is another type of missing product information:

- *Branding strategy*: importance of the appropriate design of brand elements which are used as indicators of the brand image and its strength. Strong brands send strong signals about price and associations of quality, and therefore ensuring all elements of the brand send a consistent message can help consumers infer the right type of information.
- *Market research*: marketers must be aware of inter-attribute correlations (IAC) and decide which information to disclose on product packaging. Hence, there is a high importance of conducting market research to find appropriate IAC levels in different product categories as well as across different attributes. Moreover, marketers must research what kind of cues consumers are most often looking for in situations when information is simply not there, both in offline and online markets. For example, a manufacturer who sells a chocolate brand which is not that strong and does not look sufficiently appealing but is priced above the industry average, is better off in situations

when price labels are not providing full information. This is because a consumer is very likely to infer lower price from the available cues stored in the brand or packaging and depending on how the inferred price is, she or he will buy this brand, otherwise too high price might have discouraged the consumer from even placing the brand in the consideration set in the first place.

5.4 Limitations and Directions for Future Research

The findings presented in this research should be interpreted in the light of few limitations, which arise as a result of the complex nature of studying the inference formation process.

First of all, Shogren et al. (1999) point out significantly different consumer behaviour under experimental mail survey and a grocery store experiment[5]. In the light of this study, a controlled survey design, as opposed to field experiments which measure the dependent variables in their natural settings, implies the absence of the elements of the traditional supermarket surroundings, such as lack of social interactions or those with the store servicescape (technology, staff, and ambience). This ultimately assumes that generalizing the findings of this study to realistic situations is difficult, no matter how well the survey design controlled for extraneous variables. As the survey experiment was conducted in isolation from the 'supermarket context', this might have led respondents to focus their attention on a decision task, resulting in a different set of decisions compared to those made during real shopping scenarios (Hudson et al., 2012).

Combris et al. (2009) in their research on using sensory and experimental economics techniques to study consumers' preferences, address the limitation of exposing respondents to specific, rather than unlimited characteristics of the products, which is unlikely to happen in a traditional supermarket environment, where the customer is free to process any kind of information available. As traditional supermarket environment provides a rich and relevant context for studying inferences and missing information problem, a field experiment involving eye tracking studies, observation or sales data, would certainly add more valuable insights to the subject matter and perhaps comparing the findings from both types of experimental designs would be the best solution to address this limitation.

Secondly, despite urging respondents (through incentive-compatible approach) to consider their time and budget constraints when asking for a price estimate in the survey, they still might be less sensitive in terms of their purchasing intentions towards the product due to the (hypothetical) nature of the survey. As outlined in the research on economics and

[5] Shogren et al. (1999) found that hypothetical mail surveys yielded a higher willingness to pay and market share estimate than in the grocery store.

marketing, people discount their budget limits when considering hypothetical conditions (Ding, 2007). As the survey asked a hypothetical question on the purchasing intention of a partially described product rather than for instance observing consumers' real purchase decision in store, respondents might have disregarded this question and not provide a truthful answer.

Lastly, lack of significant relationship between confidence in inferred price estimate and purchasing intention in the mediation analysis, which contradicts with previous findings on inference formation is an additional limitation to this study. The reason for an insignificant relationship between Confidence in inferred price estimate and Purchasing Intention might lie in using single-item scale to measure the dependent variables. Researchers nowadays suggest adopting multiple-item marketing scales as it guarantees reliable responses and controls for external validity (Ross & Creyer, 1992). Future investigation on the topic of inference formation process should take this limitation into account and incorporate multiple-item scales when measuring dependent variables.

It is the first time that the research on consumers' responses to missing product information is applied in the retailing context, and certainly there are many recommendations and improvements for the future enquiries.

At the outset, academics might look into the moderating effect of brand or product class knowledge on the use of available information to infer missing values. As suggested by Kardes et al. (2004), consumers' sensitivity to information omissions and their product evaluations vary depending on how knowledgeable they are about the product category and if they have already well-established standards of comparison. Perhaps consumers who maintain better knowledge on chocolate bar category, infer missing cues with greater confidence and are more willing to purchase partially described product. Moreover, brand familiarity can be another variable which moderates the relationship, yet it has not been studied here as the stimuli brand was a new entry to the market. Vaidyanathan (2000) found that brand familiarity had a significant influence on subject's confidence in their internal reference price, however purchase-decision involvement proved to be a stronger predictor.

Following on with this finding, future research should look into the moderating effect of the various levels of purchase-decision involvement. Depending on how involved with decision making a consumer is, her or his confidence in inferring missing cues can fluctuate. Inference formation research looks into the elaboration likelihood model (Petty and Cacioppo, 1983) which suggests involvement with the purchase decision has a moderating effect on customer's information-processing. Academics proved that (high) involvement is associated with higher levels of confidence in inferences and in evaluation (Vaidyanathan, 2000; Burke, 2006). The customer is thus more likely to be confident with inferring missing information, the more she or

he is involved with processing the given information. Forthcoming studies should test if the above assumptions are valid.

In addition, Ross and Creyer (1992) argue an increase in the number of alternatives with the same attribute value might also increase diagnosticity of the strategy and more informed inference making, however this was beyond the scope of their study. Looking at the effect of amount of alternative brands on consumers' confidence with inferring is an additional suggestion for future research. Leading representative of this argument is Schwartz who explains that consumers face a diminishing marginal utility from alternatives – the more options added, the lower is the feeling of well-being. Translating this conclusion to information processing perspective and inferences, too many options create too many information sources to grasp simultaneously and in result hinder the attribute processing (Capon and Burke, 1980). This is because our cognitive limits prevent us from processing the available information thoroughly. An overload of information to process can also cause lower levels of confidence in inferring what is missed.

In sum, the subject of how people form inferences, especially in situations when information necessary to make a decision is not there provides multiple opportunities for extending it into new contexts. Tannen (1981) investigated the role of cultural differences on people's ability to draw inferences. Moreover, as this study looked into the traditional, offline supermarket environment, a logical follow up study should consider an online retailing channel. It would have certainly been interesting to look at what type of content to provide online, to better facilitate the formation of inferences or what type of content to omit, so that consumers could infer a more desirable value to drive more sales.

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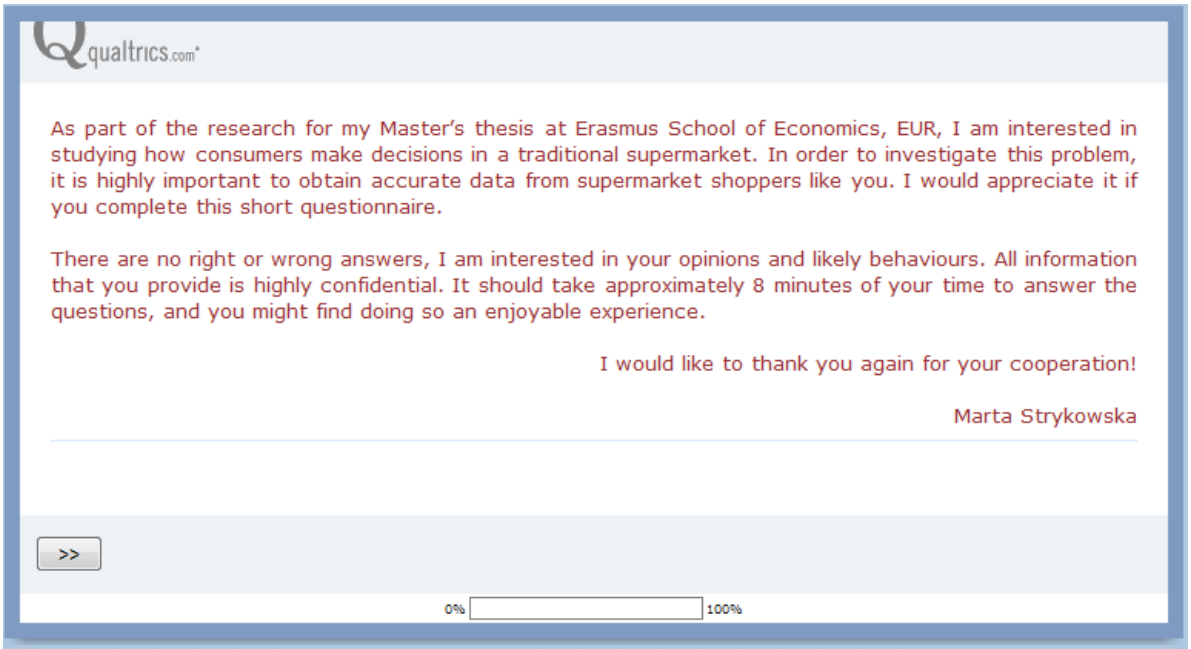
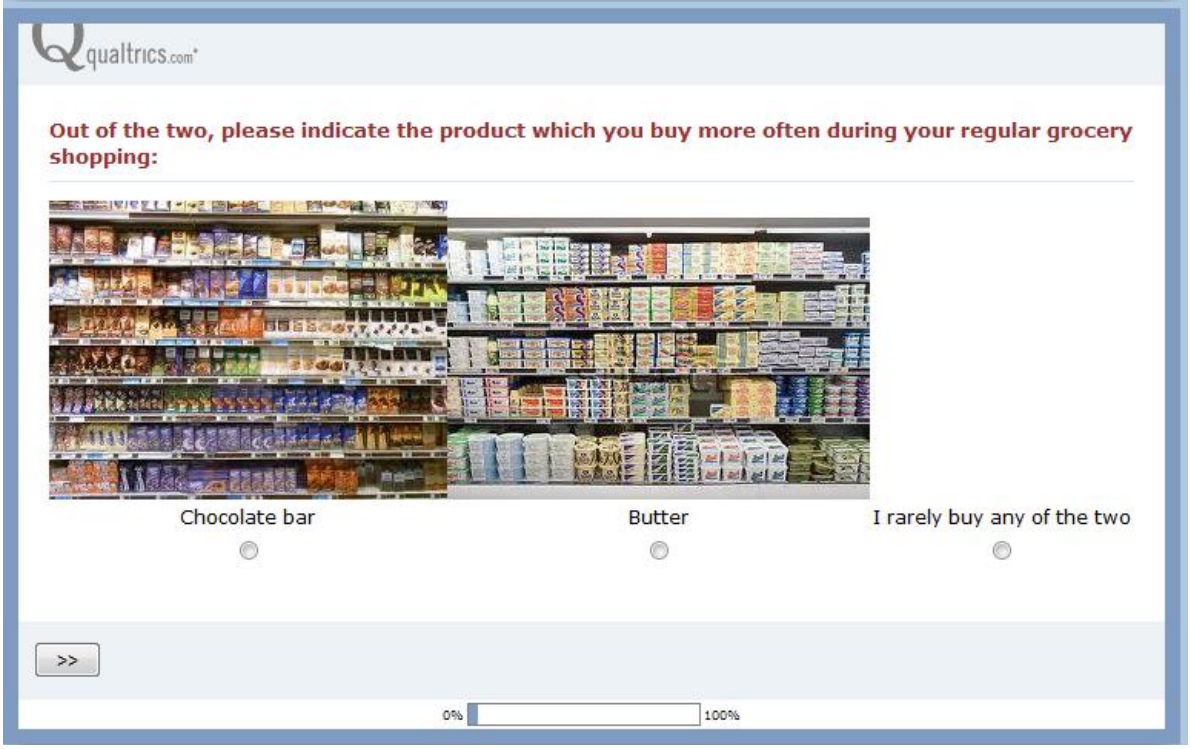
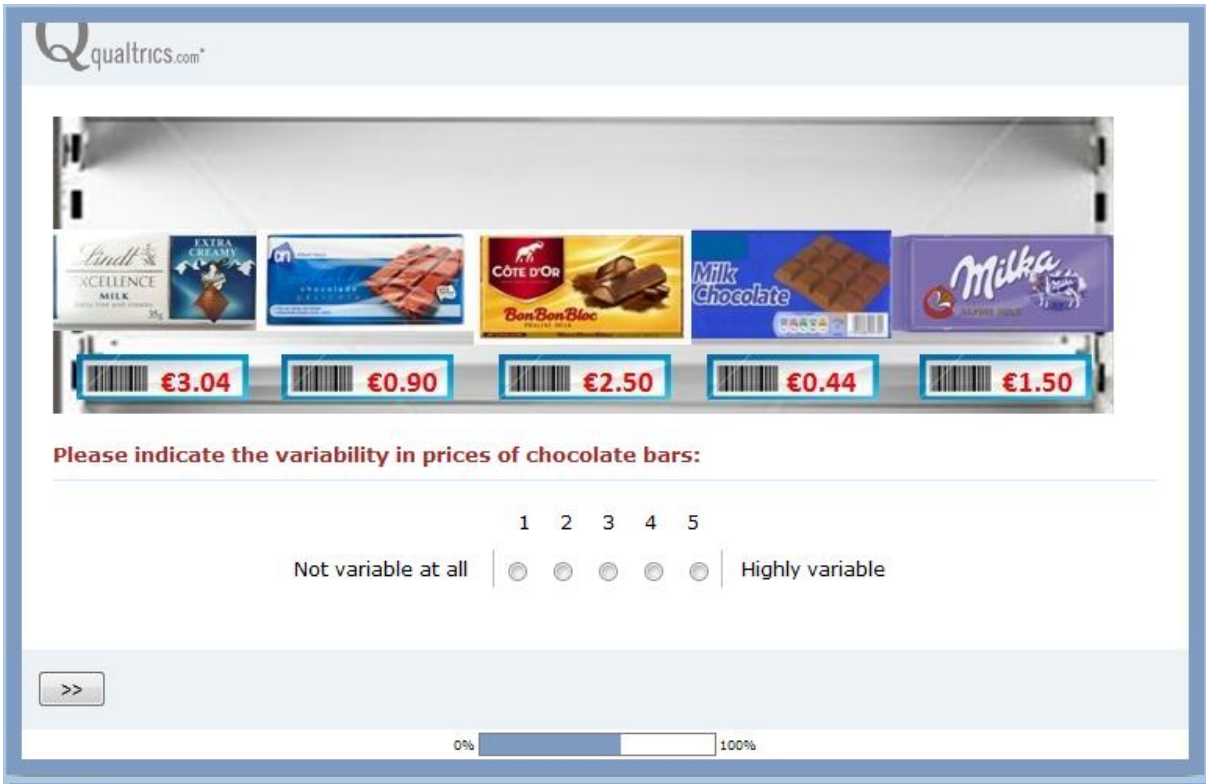
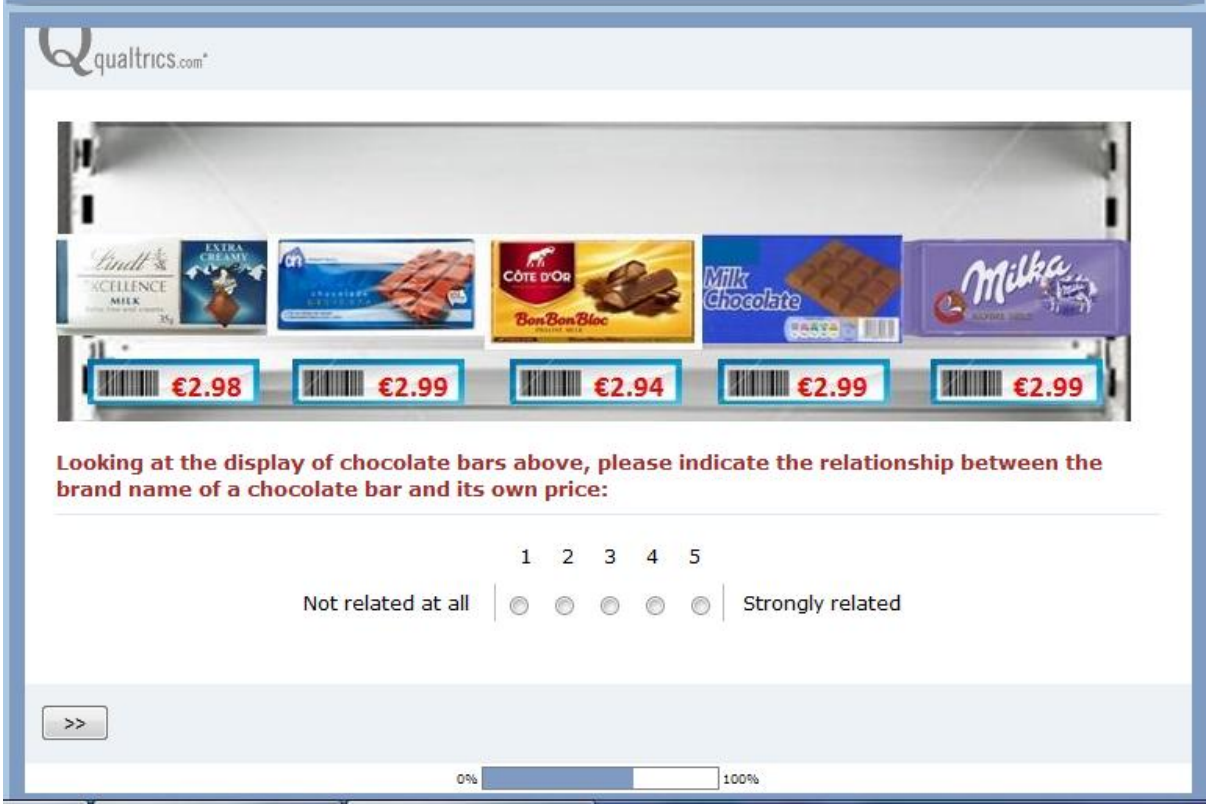
Appendix I: Pilot study sample survey

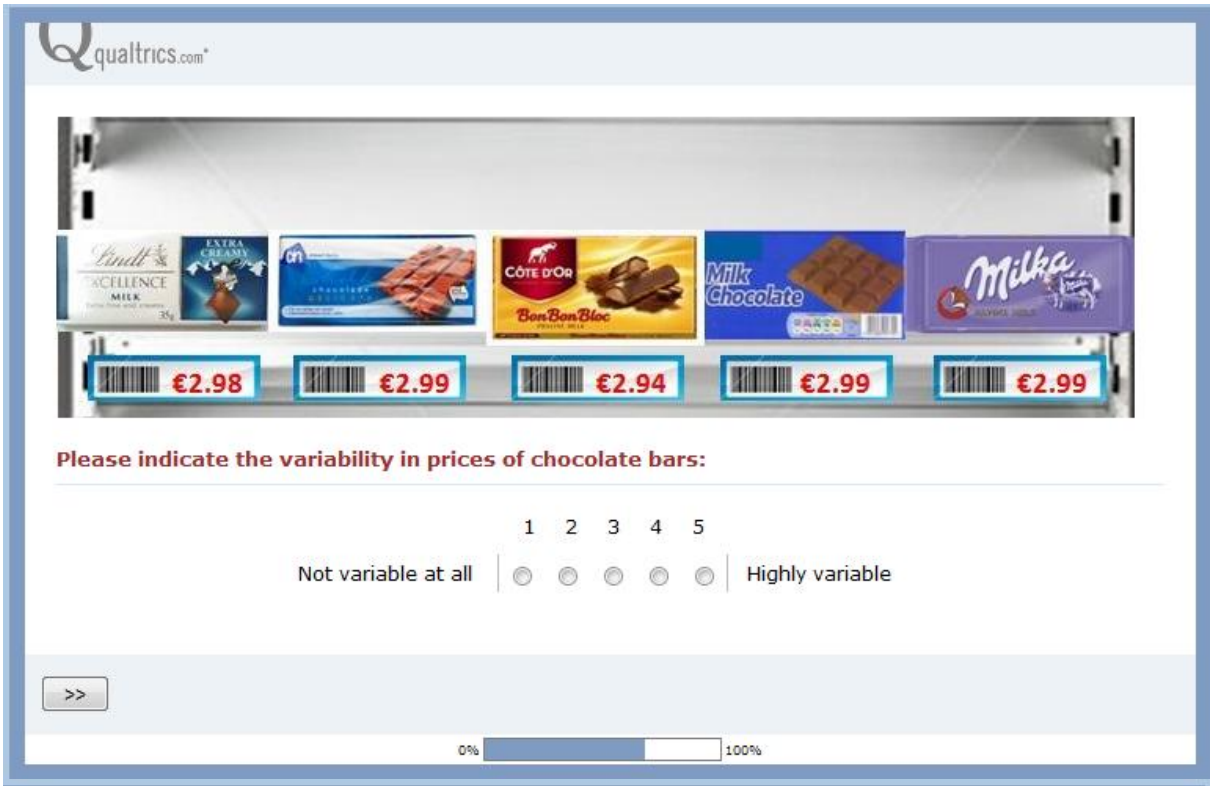


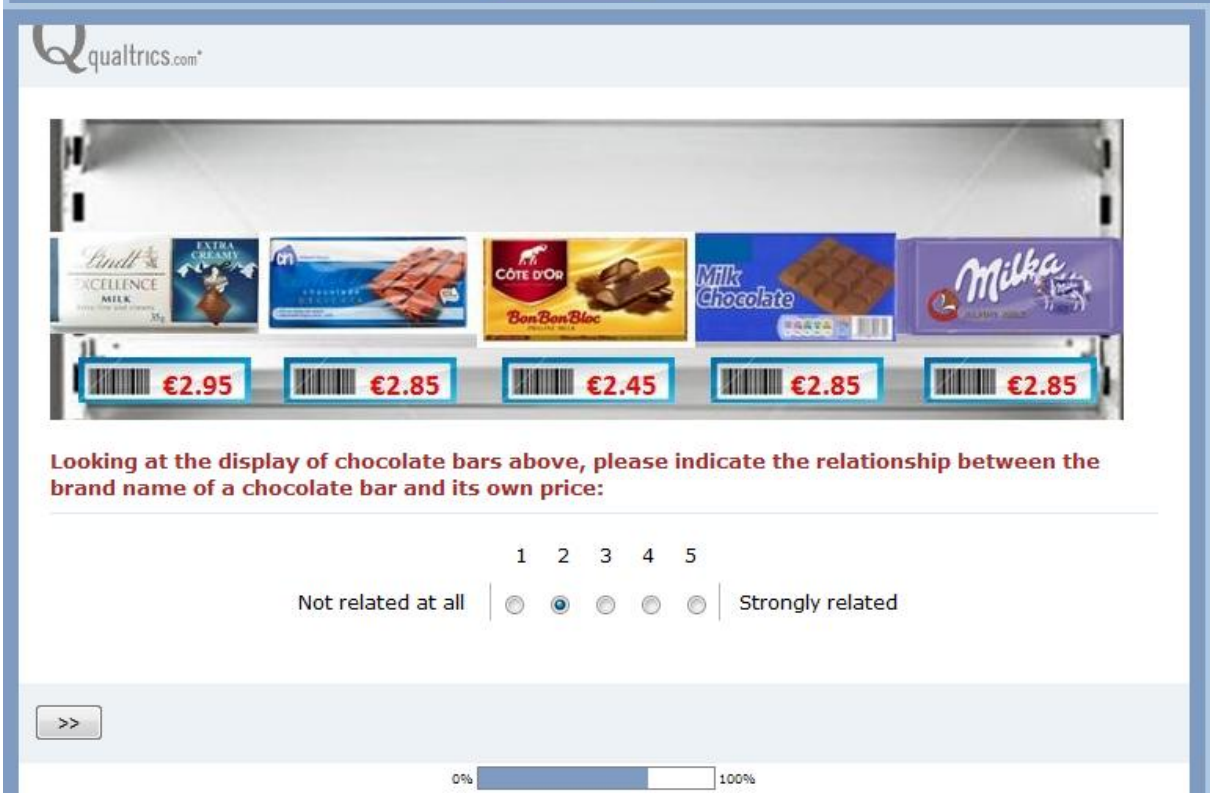


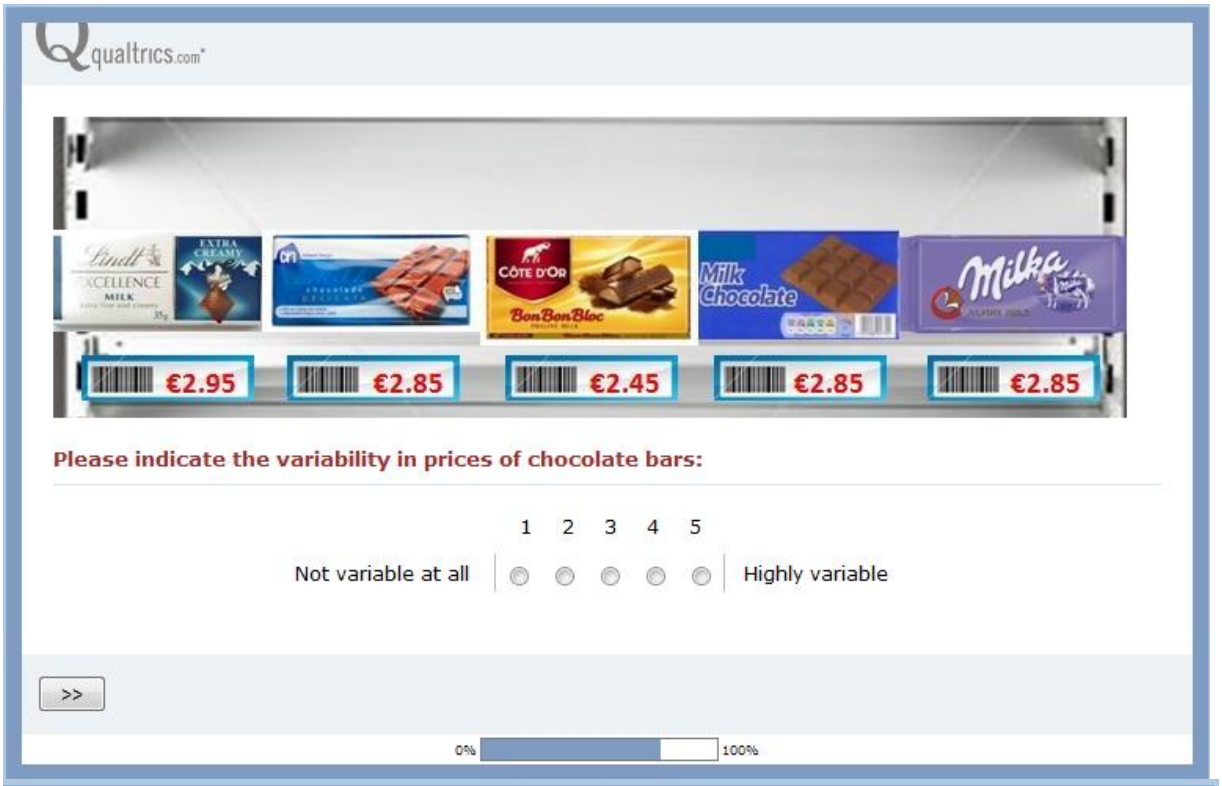

Please describe each of the following brand *names* of chocolate bars by choosing one adjective from the list below. NB: you cannot use the same adjective more than once.
Lindt Excellence
Albert Heijn
Cote d'Or
Generic brand
Milka
Items
High quality
Low quality
Prestigious
Functional
Expensive
Cheap
Attractive
Unattractive
Good taste
Bad taste
Lindt Excellence
Albert Heijn
Cote d'Or
Generic brand
Qualtrics.com
€3.04
€0.90
€2.50
€0.44
€1.50
Looking at the display of chocolate bars above, please indicate the relationship between the brand name of a chocolate bar and its own price:
1 2 3 4 5
Not related at all
Strongly related
>>
0%
100%

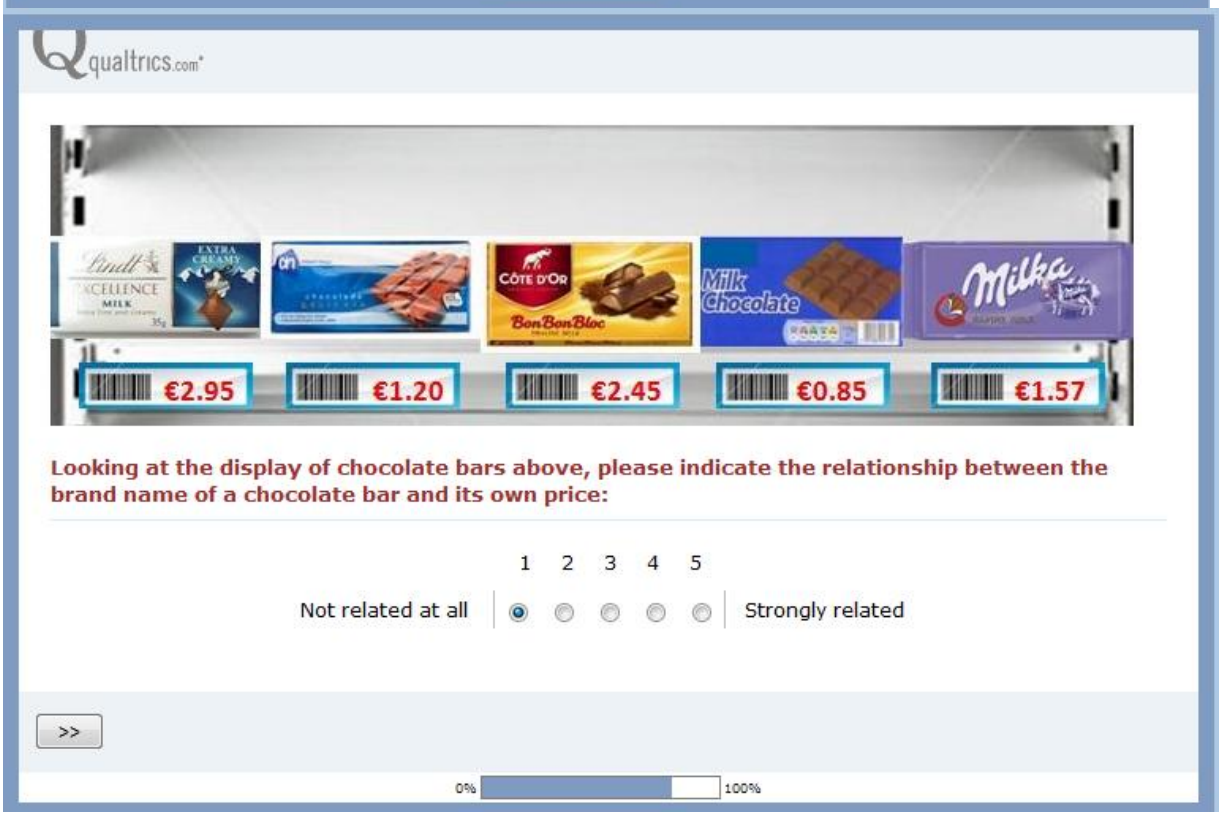

qualtrics.com
€3.04
€0.90
€2.50
€0.44
€1.50
Please indicate the variability in prices of chocolate bars:
1 2 3 4 5
Not variable at all
Highly variable
>>
0%
100%

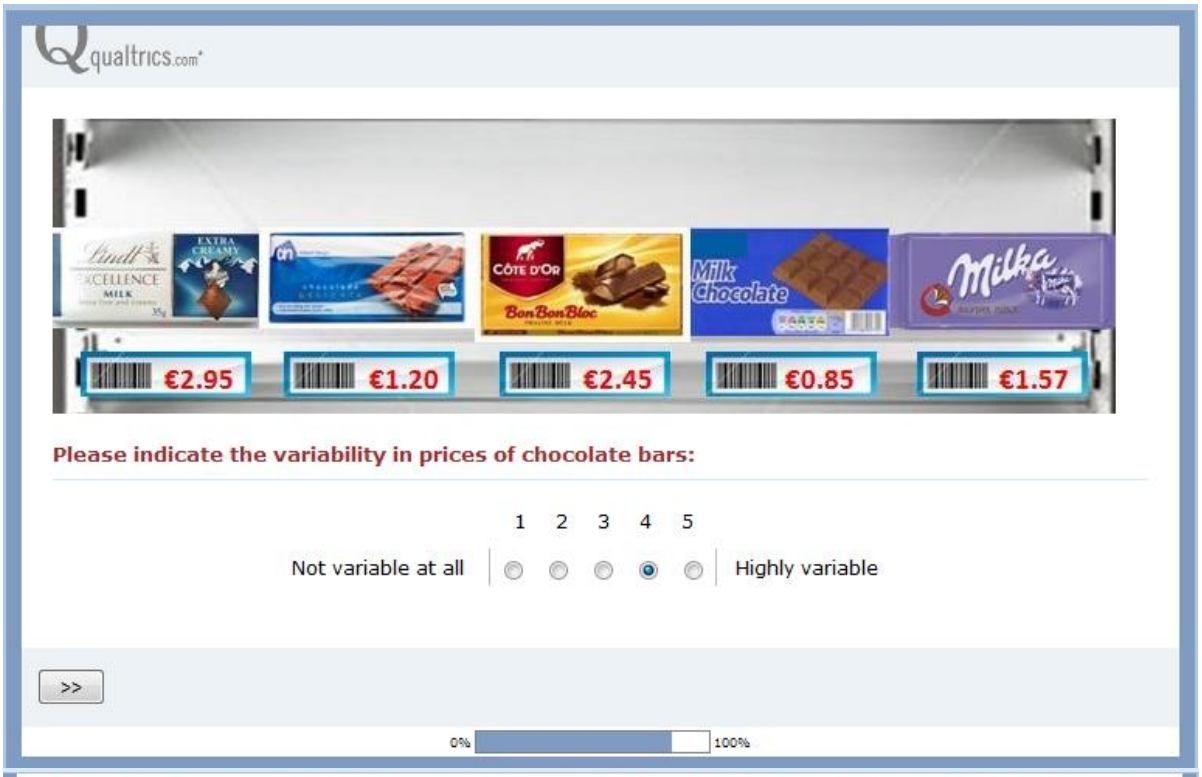

qualtrics.com
€2.98
€2.99
€2.94
€2.99
€2.99
Looking at the display of chocolate bars above, please indicate the relationship between the brand name of a chocolate bar and its own price:
1 2 3 4 5
Not related at all
Strongly related
>>
0%
100%

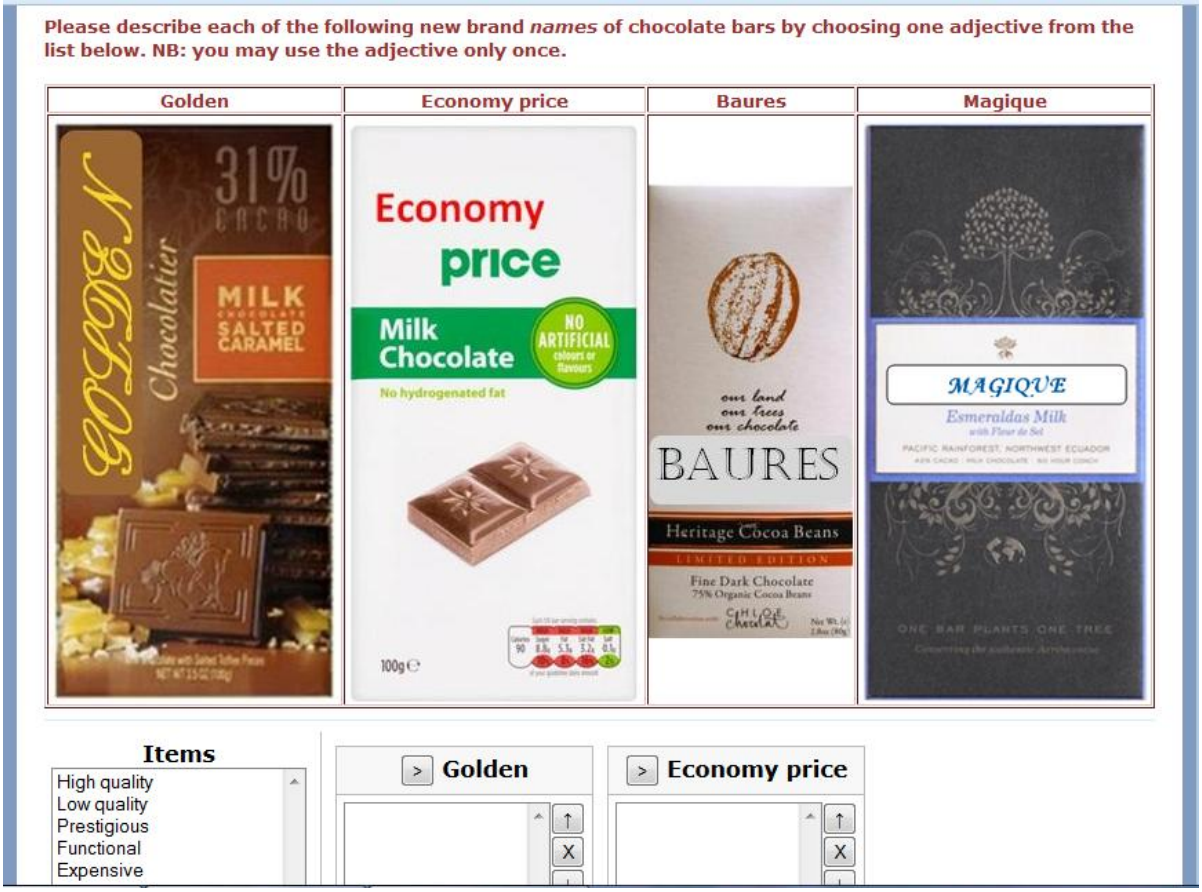

qualtrics.com
€2.98
€2.99
€2.94
€2.99
€2.99
Please indicate the variability in prices of chocolate bars:
1 2 3 4 5
Not variable at all
Highly variable
>>
0%
100%

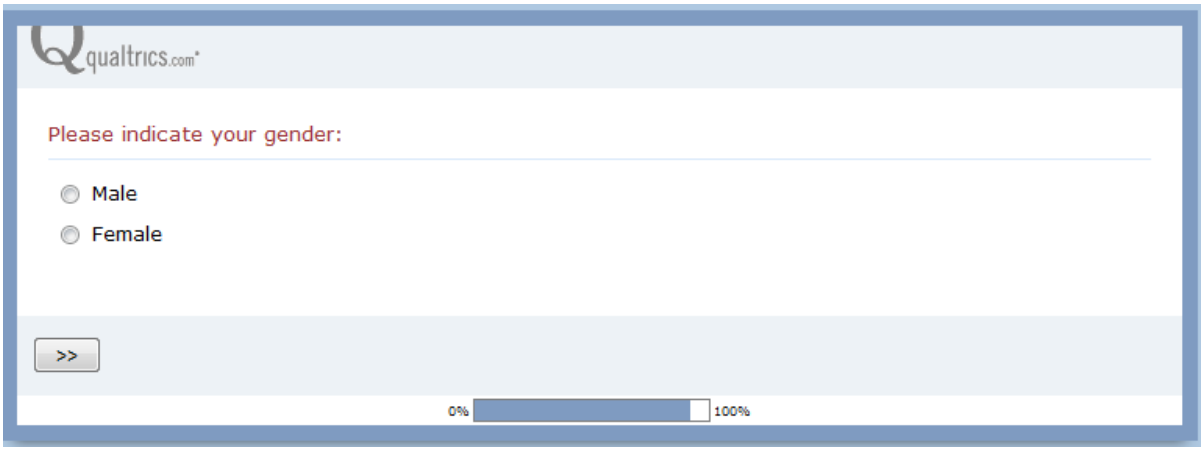

qualtrics.com
€2.95
€2.85
€2.45
€2.85
€2.85
Looking at the display of chocolate bars above, please indicate the relationship between the brand name of a chocolate bar and its own price:
1 2 3 4 5
Not related at all
Strongly related
>>
0%
100%


qualtrics.com
€2.95
€2.85
€2.45
€2.85
€2.85
Please indicate the variability in prices of chocolate bars:
1 2 3 4 5
Not variable at all
Highly variable
>>
0%
100%


qualtrics.com
€2.95
€1.20
€2.45
€0.85
€1.57
Looking at the display of chocolate bars above, please indicate the relationship between the brand name of a chocolate bar and its own price:
1 2 3 4 5
Not related at all
Strongly related
>>
0%
100%


qualtrics.com
€2.95
€1.20
€2.45
€0.85
€1.57
Please indicate the variability in prices of chocolate bars:
1 2 3 4 5
Not variable at all
Highly variable
>>
0%
100%


Please describe each of the following new brand names of chocolate bars by choosing one adjective from the list below. NB: you may use the adjective only once.
Golden
Economy price
Baures
Magique
Economy price
Milk Chocolate
NO ARTIFICIAL
No hydrogenated fat
BAURES
Heritage Cocoa Beans
Fine Dark Chocolate
MAGIQUE
Esmeraldas Milk
Items
High quality
Low quality
Prestigious
Functional
Expensive
Golden
Economy price


qualtrics.com
Please indicate your gender:
Male
Female
>>
0%
100%

Appendix II: Manipulations used in four experimental groups

Figure 3: Group 1 – High DSB and Low DOB.

Figure 4: Group 2 – High DSB and High DOB.

Figure 5: Group 3 – Low DSB and High DOB.

Figure 6: Group 4 – Low DSB and Low DOB.

Appendix III: Final study sample survey

As part of the research for my Master's thesis at Erasmus School of Economics, EUR, I am interested in studying how consumers make decisions in a traditional supermarket. In order to investigate this problem, it is highly important to obtain accurate data from supermarket shoppers like you. I would appreciate it if you complete this short questionnaire.

There are no right or wrong answers, I am interested in your opinions and likely behaviours. All information that you provide is highly confidential. It should take at most 10 minutes of your time to answer the questions, and you might find doing so an enjoyable experience.

I would like to thank you again for your cooperation!

Marta Strykowska

Imagine you are doing your regular weekly groceries at one known European supermarket and you want to buy a new brand of chocolate bar that your friend has recently recommended to you.

You know that there are several different chocolate bars in the market, and their **brands** vary from generic and unattractive to distinctive and attractive. The approximate range of prices is between €0.35 and €3.50, where:

The new chocolate bar that you are looking for was described by your friend as a Bolivian high-end brand, fine milk chocolate, and sold for a limited time period by European retailers, looking like this:

You walk to the aisle with confectionery and you observe two shelves with this layout of chocolate bars. You notice that Baures chocolate bar doesn't have a price tag and hence the price is unknown to you immediately. You are in a hurry and decide to estimate the price of Baures, to make a decision:

Basing on the information given in this picture **only**, please write your price estimate (€) for Baures chocolate bar in the text box below.

Note: Please act as true to your real shopping decision-making as possible, e.g. consider your income and time constraints. Respondent whose price estimate matches the current, real price of this chocolate bar determined by one known retailer in the Netherlands will win a special gift from chocolatier Godiva.

Please indicate your level of confidence with your price estimate:

	1	2	3	4	5	
Not at all confident	○	○	○	○	○	Very confident

Please indicate your agreement or disagreement with the following statement:

I inferred the missing price of Baures chocolate bar **only** from its brand (brand name Baures, logo, symbol, design and packaging).

1 2 3 4 5

Strongly disagree ○ ○ ○ ○ ○ Strongly agree

Please indicate how are the **brands (brand names, logo, symbols, design and packaging)** of chocolate bars displayed above related to their own prices:

1 2 3 4 5

Not at all related ○ ○ ○ ○ ○ Strongly related

Please indicate your agreement or disagreement with the following statement:

I inferred the missing price of Baures chocolate bar **only** from the prices of chocolate bars displayed nearby.

1 2 3 4 5

Strongly disagree ○ ○ ○ ○ ○ Strongly agree

Please indicate how variable are the prices of chocolate bars displayed above:

	1	2	3	4	5	
Not variable at all	○	○	○	○	○	Highly variable

Please indicate your agreement or disagreement with the following statement:

As compared to other chocolate bars on the supermarket shelf, Baures chocolate bar represents premium quality.

Strongly disagree	○	○	○	○	○	Strongly agree

Please indicate how likely it is that you buy Baures chocolate bar during this shopping trip:

	1	2	3	4	5	
Extremely unlikely	○	○	○	○	○	Extremely likely

Please indicate your gender:

- ○ Male
- ○ Female

In which year you were born?

Please indicate your total annual household income from all sources (after tax and other deductions):

- ○ Below €20,000
- ○ More than €20,000 but less than €29,999
- ○ More than €30,000 but less than €39,999
- ○ More than €40,000 but less than €49,999
- ○ More than €50,000 but less than €59,999
- ○ More than €60,000 but less than €69,999
- ○ More than €70,000
- ○ Would rather not say

Please indicate your marital status:

- ○ Single
- ○ Married/living with partner
- ○ Divorced
- ◉ Widowed
- ○ Would rather not say