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Reference Price Formation for Product Innovations – the Role of Consistent Price-Value-Relationships

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ABSTRACT

When deciding between product alternatives, consumers have to compare the observed prices to their internal reference price to determine whether the offer is a good deal or not. For product innovations, for which no reference price has been established, it is unclear against which standard the observed price is compared. Despite extensive research on the use of reference prices, little attention has been devoted to the formation of an internal reference price for an unfamiliar product category. We suggest two mechanisms of how reference prices are constructed and find support for these in two experiments. Reference prices for an unfamiliar product category can either be formed through repeated exposure to incidental price information or through transfer of price information from a familiar, similar product category to an unfamiliar product category. Crucial is however that the product price-value relationship is consistent; a condition often not accounted for in product innovation testing.

Keywords*: Behavioural pricing, internal reference price, product innovation*

Extended abstract

During a shopping trip, consumers have to conduct a sequence of evaluation and choice tasks. To evaluate whether a product offering is a good deal or not, consumers have to compare the alternative's price to a reference price. In order to understand and predict these evaluative outcomes better, it is essential to understand how the reference price is constructed. In the behavioural pricing literature it is assumed, that consumers develop a category-specific internal reference price, which consists of a range of acceptable prices that becomes more distinct with experience (Cheng & Monroe, 2013). Despite a considerable amount of research on the use of reference prices, little is known about how such a reference price is constructed for an *unfamiliar product category*. We assume two possible mechanisms of how a reference price can be constructed. The first one relies on an implicit learning mechanism of incidental price information (Frensch & Rünger, 2003). This is comparable to a situation of repeated exposure to an unfamiliar product category, for example through advertisements. The other mechanism we assume is through transfer of price information between similar product categories. Assuming categorization as one of the basic principles of how we structure our environment (Rosch, 1978), it is likely that if no prior reference price information is available for an unfamiliar product category, price information for a similar, familiar product category is used as a proxy for constructing a plausible reference price for this unfamiliar product category. We further assume that only if the constructed reference price is assumed to be reliable, will it serve as comparison standard.

Experimental design

We conducted two experiments using the same stimuli and similar procedures. To study both suggested mechanisms of how an internal reference price is constructed for an unfamiliar product category, we need two similar

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product categories which are unfamiliar to the respondents. We therefore use stylised products which varied in shape and colour. To test the first reference price formation mechanism, we assess reference prices prior and post the experimental task for the repeatedly encountered *Category 1*. To test the second suggested reference price formation mechanism, we measure the reference price for a similar, unfamiliar *Category 2* after exposure to price information in *Category 1*.

Upon arrival to the university's laboratory, participants were randomly assigned to a computer work station and instructed to follow the instructions on the screen. In the beginning of the experiment, participants were presented with the products from the two categories and instructed to think of them as products that can be bought in a supermarket. Thereupon followed the *Learning Task 1* in which participants were exposed to 2x16 high (M_H = 30 DKK) or low (M_L = 10 DKK) price-product combinations to implicitly establish a reference price for *Category 1*. Reference prices were assessed subsequently, which we call "prior" reference price assessment. Next, participants were exposed to 4x16 high or low price-product combinations. To ensure incidental price exposure, participants were preoccupied with a task, indicating the hedonic value of the product attributes. For this purpose, the products carried up to 6 coloured symbols which resembled product attributes that could vary in value. In Experiment 1, the combined attribute value and the price were randomly combined. In Experiment 2, the price increased with increasing attribute value.

In the following *Task 2*, participants were presented with a product assortment from *Category 2* at a price range around 20DKK. The products carried different attribute combinations but were equal in value. The main dependent variable, the perceived price level for this category, was assessed at this stage. Subsequently, participants had to indicate their reference price for both product categories, which we call "post" reference price assessment. Reference price ranges were assessed using a procedure adapted from Chandrashekaran and Grewal (2003). Participants had to indicate the typical price, the highest price they would be willing to pay and the lowest price they had seen for each product category using three visual number lines ranging from 0 to 40 DKK. An index of these items was used as reference price. Perceived price level was measured as an index of expensiveness and price level ratings on 7-point scales, comparable to previous studies (Ofir, Raghubir, Brosh, Monroe, & Heiman, 2008).

Results

We recruited 70 and 63 paid volunteers from the university's research laboratory participant pool for Experiment 1 and 2 respectively. For both experiments, the elicited reference prices for *Category 1* differed significantly between the high and the low price condition for *Category 1* (Experiment 1: Cat 1 prior: M_H = 23.44 vs. M_L = 12.73, $F_{(1,68)}$ = 89.58, p<.001, Cat 1 post: M_H = 26.24 vs. M_L = 10.45, $F_{(1,69)}$ = 311.89, p<.001; Experiment 2: Cat 1 prior: M_H = 20.47 vs. M_L = 10.42, $F_{(1,62)}$ = 78.65, p<.001, Cat 1 post: M_H = 23.84 vs. M_L = 10.45, $F_{(1,62)}$ = 44.91, p<.001), thus supporting the first proposed mechanism of repeated exposure. *Category 2* reference prices showed a carryover effect from prices displayed in *Category 1* in both experiments (Experiment 1: Cat 2 prior: M_H = 22.63 vs. M_L = 12.91, $F_{(1,69)}$ = 92.78, p<.001, Cat 2 post: M_H = 22.24 vs. M_L = 12.6, $F_{(1,69)}$ = 80.47, p<.001; Experiment 2: Cat 2 prior: M_H = 21.47 vs. M_L = 12.90, $F_{(1,62)}$ = 83.91, p<.001, Cat 1 post: M_H = 21.73 vs. M_L = 14.94, $F_{(1,62)}$ = 37.32, p<.001), confirming the second mechanism of price information transfer.

We used partial least squares structural equation modeling (PLS-SEM) to determine whether the elicited reference price served as a mediator, i.e. a reliable comparison standard, between the observed price level of *Category 1* and the perceived price level of *Category 2* (Baron & Kenny, 1986; Hair, Hult, Ringle, & Sarstedt, 2013). As can be seen from Figure 1, in a first step, we regressed the perceived price level in *Category 2* on the observed price level in *Category 1* and found a significant negative influence in both experiments. In a second step, we include the reference price from *Category 2* in the model and found a significant positive effect of the observed price level in *Category 1* on the reference price in *Category 2* for both experiments. The crucial difference between experiments is that we only found a significant effect of the elicited reference price on the perceived price level in *Category 2* in Experiment 2. The bootstrapping procedure resulted in a significant t-value of - 2.55 for the indirect effect. The direct effect of the price level in *Category 1* on the perceived price level in *Category 2*, became insignificant and positive after including the mediator. This sign change resulted in a VAF >1, which suggests full mediation of the effect of price level in *Category 1* on the perceived price level in *Category 2* by the reference price for *Category 2.* We therefore conclude that the reference price was learned reliably in Experiment 2 but not in Experiment 1.

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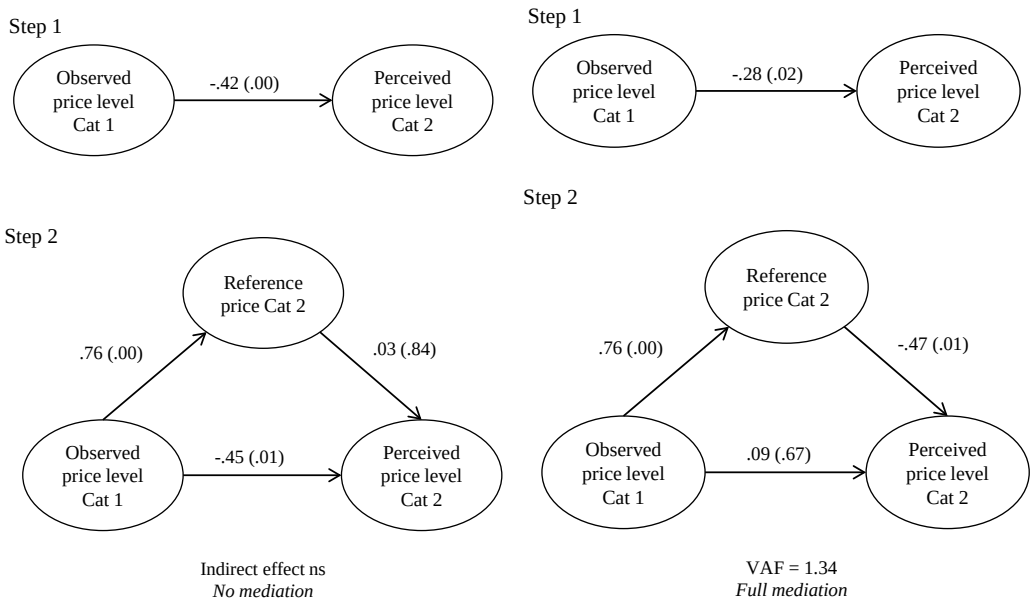
Figure 1. Mediation analysis, Experiment 1 (left panel) and 2 (right panel)



Note: Numbers on arrows depict path coefficients with p-values in brackets.

Conclusion

We could find support for two mechanisms to construct an internal reference for an unfamiliar product category. The internal reference price can either be learned through repeated exposure to incidental price information or based on the transfer of price information from a familiar, similar product category to an unfamiliar product category. Both mechanisms work however only if the relationship between the price and the combined hedonic attribute value are consistent. From a practitioners point of view, when testing the acceptance of and willingness to pay for product innovations, it important to keep in mind that depending on the degree of innovation, participants cannot estimate a reliable willingness to pay statement, because they have no standard to compare the product to. When using choice experiments or experimental auctions with suggested prices, it is essential to correlate the prices with the combined attribute values accordingly, to facilitate learning of a reliable internal reference price.

References

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173-1182. doi: 10.1037/0022-3514.51.6.1173

Chandrashekaran, R., & Grewal, D. (2003). Assimilation of advertised reference prices: the moderating role of involvement. *Journal of Retailing, 79*(1), 53-62. doi: http://dx.doi.org/10.1016/S0022-4359(03)00002-2

Cheng, L. L., & Monroe, K. B. (2013). An appraisal of behavioral price research (part 1): price as a physical stimulus. *AMS Review, 3*(3), 103-129. doi: 10.1007/s13162-013-0041-1

Frensch, P. A., & Rünger, D. (2003). Implicit learning. *Current Directions in Psychological Science, 12*(1), 13-18. doi: 10.1111/1467-8721.01213

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2013). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Thousand Oaks: Sage.

Ofir, C., Raghubir, P., Brosh, G., Monroe, K. B., & Heiman, A. (2008). Memory-Based Store Price Judgments: The Role of Knowledge and Shopping Experience. *Journal of Retailing, 84*(4), 414-423. doi: http://dx.doi.org/10.1016/j.jretai.2008.08.001

Rosch, E. (1978). Principles of Categorization. In E. Rosch & B. Lloyd (Eds.), *Cognition and Categorization* (pp. 27-48): John Wiley & Sons Inc.

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